The First Farmers:
The Neolithic of east-central Scotland in its wider context

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Critical review of the published work submitted for the degree of PhD (by research publications)

University of Edinburgh

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No. of words in the main text of Thesis: c. 23,000

The research reported upon had one aim: to create a modern account of the inception and development of farming in lowland east-central Scotland (defined as the old local authority Regions of Tayside and Fife, and the adjacent parts of the Regions of Central and Grampian), taking particular account of potential inter-regional differences, and in a coherent national interpretative context.

There are seven specific objectives:
1. to reveal and explore the extent and diversity of the remains of Neolithic occupation in the area, in part through creating corpora of site types
2. to document and explain the long histories of use and change on Neolithic/early Bronze Age ceremonial/burial sites
3. to set the rich ceremonial/burial evidence into a more rounded settlement and environmental context
4. to assess the evidence for, and establish the extent and nature of inter-regional variation throughout the Neolithic
5. to place the development of locally appropriate explanatory models in the history of archaeological thought
6. to set the study of the archaeology of lowland Scotland in a wider historical/cultural context
7. to identify and quantify the threats to the survival of the Neolithic archaeological resource

The research was undertaken through the gathering of new information in the field, reinterpreting the results of older fieldwork in the light of more recent understanding, and through survey of relevant archaeological, historical and political literature.
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Statements

This is the statement required under paragraph 3.11.16 of the regulations governing the award of the degree of PhD by research publications. I confirm that the work now submitted has not been submitted previously in whole or part for the award of another degree.

This is the statement required under paragraph 3.9.11 of the regulations governing format and binding. I confirm that co-authors of published works have agreed to their inclusion in the thesis and that the publishers have given their consent for the original material or copies thereof to be bound into the thesis.

I confirm (to comply with paragraph 3.11.13 of the regulations) that I am the sole author of items 4, 6, 9 and 11 of the portfolio of published work, and that I made a major contribution to the works produced by more than one author. My role, as agreed with my co-authors, is set out at the end of the summary for each paper.
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8.1 The relationship between papers submitted and the objectives of the research
The material submitted

The material formally submitted for examination comprises, in date order:


North Mains


Nature of Project/Publication

A research excavation, funded by learned societies, on a terrace-edge enclosure on the Strathallan estate in Strathearn, close to the North Mains burial mound, henge and ring-ditches (excavated by GJB in 1978-79, published in 1983). Small scale excavations at Collessie in Fife (Barber 1982) had suggested the possibility of a tradition of Neolithic enclosed settlement.

Role of GJB

GJB initiated the project, directed the work on site and prepared the text. Ms Tolan shared the responsibility of the actual fieldwork.

Abstract/Summary

A small part of the terrace-edge enclosure at North Mains was excavated to test the hypothesis that it was contemporary with one or other of the Neolithic/early Bronze Age ceremonial monuments immediately to the north [a henge, ring-ditches and a vast burial mound]. Two cropmark ditches and an entrance through them were confirmed by excavation. The inner ditch was very steep-sided; postholes were found on the inner edge of both ditches. Possible postholes were also noted on the outer edge of the outer ditch. Traces of a number of structures were located in the interior, including what may be the slight wall-trench of a circular house. The results of radiocarbon dating may suggest that the ditch was dug in the second millennium BC, while at least one of the structures in the interior was in use in the late first millennium BC uncal.

The description of GJB’s role has been agreed with Ms Tolan (now Dr Tolan-Smith).
Inchtuthil


Nature of Project/Publication

A research excavation, funded by learned societies, designed to re-evaluate the very limited 1960s excavations on the Inchtuthil prehistoric enclosure, undertaken as part of the excavation of the Roman fortress (Pitts and St Joseph 1985).

Role of GJB

GJB organised the project and, although the on-site direction was shared with GSM, provided the continuous on-site presence. The text was written by both authors, GSM taking the lead with the Roman material, and GJB taking the lead on the interpretation of the Neolithic enclosure and its comparanda, the collation of the text and the design and commissioning of the illustrations.

Abstract/Summary

The excavation of the eastern half of a rectilinear ditched enclosure was undertaken to provide information on its date, structural details and function. Two fence-like structures had been erected consecutively along the line of the enclosing ditch; the second fence had been burned in situ. Elements of this fence were dated to the late fourth/early third millennium BC uncal. There were indications of an elaboration of the eastern end of the enclosure. No associated artefacts were found.

Portions of two Roman barrack blocks were revealed, and a legionary axe was recovered from a disturbed pit cut through the eastern end of the ditch of the prehistoric enclosure.

The description of GJB’s role has been agreed with Mr Maxwell.
Balfarg


Nature of Project/Publication

A major government-funded rescue excavation project in five seasons (1983-85), exploring a large complex of ceremonial and burial monuments.

Role of GJB

GJB was organiser of all five seasons, sole field director in seasons 1 to 4 and joint field director (with P N Tavener) in season 5. GJB directed the post-excavation project, designed the structure of the report, collated and edited most of the descriptive and specialist texts, commissioned the illustrations, and was sole author of section 1.1 to 1.6 (Introduction) and section 4 (Site Discussion) and part author of section 2 (Description and Interpretation).

Abstract/Summary

The portions of the Balfarg/Balbirnie ceremonial complex excavated between 1983 and 1985 are described and related to the portions dug previously (Balbirnie stone circle - Ritchie 1974; Balfarg henge - Mercer 1981; Mercer et al 1988).

The prehistoric ceremonial use of the area seems to have lasted from early in the third millennium until late in the second millennium BC uncal. The sequence began with pit digging and pottery deposition in two parts of the site, near Balfarg Riding School (BRS) and to the west of the Balfarg henge. Then two timber structures, possibly with a mortuary function, were erected at BRS, probably in the early/mid third millennium BC uncal. The later of the two was mounded over and surrounded by a circular ditched enclosure (a henge?); this activity was associated with the deposition of Grooved Ware. At about the same time, at the west end of the site, a similar deposition of burnt and broken Grooved Ware predates the construction of the Balfarg henge, and there is evidence of the first use of the Balbirnie stone circle. Later in the 3rd millennium BC uncal and in the second millennium, during the prolonged use of the Balfarg henge and the Balbirnie stone circle, a complex sequence of events unfolds at BRS, including the digging of a ring-ditch and the erection of two concentric ring-cairns and a further cairn.

The description of GJB’s role has been agreed with Mr Russell-White.
Neolithic Buildings


Nature of Project/Publication

GJB was invited to contribute the chapter on the Scottish evidence for Neolithic buildings to a volume surveying such material in Britain and Ireland, in its wider context. This necessitated preparing a descriptive summary of all the excavated ‘houses’ in Scotland. The paper also dealt with ceremonial/burial structures of similar appearance.

Role of GJB

Sole author of chapter.

Abstract/Summary

The survey was the first, and is still the only, survey of all the excavated evidence for possibly domestic Neolithic structures in Scotland.
State funded ‘Rescue Archaeology’


Nature of Project/Publication

A survey of the history of rescue archaeology, prepared while GJB was in charge of Historic Scotland’s Archaeology Programme, developed from a report to the Ancient Monuments Board for Scotland.

Role of GJB

GJB wrote Chapters 1, 2, 3 (to page 21), 4 and 5, and the Neolithic/Early Bronze Age section of the Appendix. There was significant internal and external refereeing and consequent restructuring, by GJB.

Abstract

The paper was intended to set the Archaeology Programme of Historic Scotland and its predecessors in the wider context of Scottish and British archaeology, and to make explicit the curatorial and research considerations that affect HS’s choice of projects to support or undertake. The document set out specifically to avoid the ‘haven’t we done well’ type of survey of a government spending programme, and instead tried to examine the many remaining gaps in our knowledge. It had the following sections:

- considered the way in which understanding of Scotland’s past had developed in recent decades;
- a historical survey of the development of rescue archaeology in Scotland;
- discussion of changes in rescue archaeology in the last decade;
- an analysis of the general and specific curatorial criteria used by HS;
- an appendix comprising period-specific studies setting out a range of views on the gaps in our present knowledge.
**The Neolithic**


**Nature of Project/Publication**

GJB was invited to prepare the chapter on the Neolithic in a volume edited by a palaeoenvironmentalist and an archaeologist. The volume was intended to provide a full description, not only of the archaeology of the period 8000BC-AD1000, but also the geology and geomorphology, the flora and the fauna, and the inter-relationship between people and environment.

**Role of GJB**

Sole author of chapter.

**Abstract/Summary**

The chapter set out to review the evidence for the whole of the Neolithic of what is now Scotland, rather than basing the account to a great degree on the surviving archaeology of small parts of the country (e.g. Orkney), or largely on stone monuments (e.g. the chambered tombs). It also challenged the interpretation of the Neolithic presented by Thomas in his influential publications of the late 1980s and early 1990s, based substantially on a restricted data-set from southern England.
The Cleaven Dyke


Nature of Project/Publication

A research project funded by learned societies, British Academy and Historic Scotland, to survey and excavate a Neolithic linear earthwork in Perthshire in its wider context. The multi-disciplinary report was published as a Society of Antiquaries of Scotland monograph.

Role of GJB

GJB was the joint instigator of the project with GSM and undertook all the administration, as well as the day-to-day direction in the field and the record-keeping. He shared the interpretation of the survey, wrote the greater part of the descriptive text and all the interpretative discussion on broader Neolithic subjects. He edited the various texts, wrote the section on conservation and designed and commissioned the illustrations.

Abstract

The work proved conclusively that the Dyke was not a Roman monument, but a very well-preserved linear monument of the early to mid Neolithic, related to the cursus monument and bank barrow traditions of the late 5th to mid/late 4th millennia cal BC. The results of the detailed contour survey of the Cleaven Dyke revealed a complex history of segmented construction and suggested that some other major monuments might benefit from our approach, for example, the Maiden Castle bank barrow and the Stonehenge cursus (both of which appear from field inspection to have a segmented character).

Excavation of the Littleour structure gave us a further Neolithic rectilinear structure of probably ceremonial function, and apparent confirmation of the ceremonial context of Grooved Ware in eastern Scotland. It extended the date range of this pottery type. Equally useful, the results of the dating programme confirmed the dangers of assuming that superficially simple structures had a simple building history.

The projects involved ground-breaking research into soil-loss from lowland archaeological sites, the development of contour survey methodologies to deal with the largest survey of this kind yet undertaken in Scotland, and a detailed consideration of the problems faced by geophysical survey on the fluvio-glacial gravels covering much of lowland Scotland.

The description of GJB's role has been agreed with Mr Maxwell.


Recumbent Stone Circles


Nature of Project/Publication

A research project on a restricted group of sites, involving field survey and archaeological and archæoastronomical interpretation.

Role of GJB

GJB initiated the project, having noted the relationship between one of the RSCs (The Cloch) and the Bridgton Hill cairn. CNR and GJB together undertook the field surveys. CNR wrote the astronomical sections, GJB the archaeological. GJB designed and commissioned the illustrations.

Abstract/Summary

The paper considers the nature of a group of possible variant recumbent stone circles at the southern edge of the distribution, in Kincardineshire and Angus. The conclusion is that there is indeed a variant group. One of the sites had an unusual spatial/visual relationship with a nearby cairn. The identification of some sites as RSCs is challenged. Mention is made of possible regional differences between north-east Scotland on the one hand and Angus and the Mearns on the other in the earlier and the later Neolithic.

Professor Ruggles has agreed the description of GJB’s role.
Cairnpapple


Nature of Project/Publication

A reconsideration of the results of Piggott’s excavation of the ceremonial/burial complex at Cairnpapple in West Lothian, arising from the need to prepare a new guidebook and display boards for the site.

Role of GJB

Sole author.

Abstract

It is 50 years since Stuart Piggott excavated the prehistoric complex at Cairnpapple. At that time there were few excavated parallels in Scotland, and interpretation inevitably relied heavily on sites excavated in southern Britain. Much more locally relevant data is now available and the sequence at Cairnpapple can now be re-assessed its regional context.

Piggott’s five periods, from the (pre-radiocarbon) ‘late Neolithic...c. 2500BC’ to ‘Iron Age...within the first couple of centuries AD’, were replaced by four phases from the early Neolithic to the early Christian period.
Cosmology, calendars and society

Nature of Project/Publication
A critical review of MacKie’s long-held ideas about astronomy and Neolithic society, prompted by CNR and GJB’s consideration of a paper in Antiquity in 1997.

Role of GJB
GJB wrote the section entitled ‘Social Hierarchy and Theocracy’, with comments from CNR; CNR wrote the ‘Social alignments...’ section, with comments from GJB. We co-wrote the introduction and conclusions.

Abstract
The authors examined critically MacKie’s long-standing contentions concerning Neolithic Britain - theocratic control of society, the use of a standard unit of measurement and complex geometry in the construction of stone settings, the relationships between monuments and sunrise or sunset on significant days of the year, the use of an ‘elaborate and accurate’ solar calendar, and its survival into the Iron Age and into modern times. The basic archaeological foundations of MacKie’s arguments, set out in 1977 and changed little since, were critically assessed and found wanting.

Professor Ruggles has agreed the description of GJB’s role.
Regional Neolithics


Nature of Project/Publication

The revised version of a paper given at an international conference on the Neolithic of Orkney in Kirkwall in autumn 1998.

Role of GJB

Sole author.

Abstract

The paper explores the way in which the Neolithic of Wessex, and to a lesser extent, the Neolithic of Orkney, continue to dominate interpretation of the period throughout Britain and, to a certain extent, Ireland. It explores the ideas of regional variation already investigated in earlier papers, but also places the interpretation of Scottish archaeology in its wider cultural context. For example, I explore the application of the idea of ‘Highlandism’ (the representation of the whole of Scotland by the paraphernalia of the Highlands) to the perceptions of ‘Scottish’ monument types, in the context of Stuart Piggott’s career in Scotland. I also consider the ways that the use of the concept of ‘inferiorism’, applied to the interpretation of Scottish history, might be used in consideration of the way we interpret the prehistory of Scotland.
Aim & Objectives

Background
The research described here arose out of a personal involvement in the prehistory of Perthshire which began in 1978, when I undertook the rescue excavation of the burial mound, henge and ring-ditch at North Mains, Strathallan, which were threatened with destruction by the expansion of the Strathallan Aircraft Museum (Barclay 1983). Setting the results of that excavation in context for the final report brought home to me the lack of modern exploration of the Neolithic and early Bronze Age in the old Regions of Tayside and Fife, particularly in the arable lowlands, and kindled my interest in the broader subject.

Illus. 0.1 The eastern lowlands of Scotland. The dashed line is the boundary of Perth & Kinross

At almost the same time locally-based oblique aerial photography for archaeological
prospection was revealing the archaeological wealth of the lowlands of eastern Scotland (Maxwell 1979; 1983a; b). The late 1970s and 1980s also saw a radical expansion of archaeological 'rescue' excavation; this led to the first large scale explorations of many types of monument, the discovery of new classes, and the recognition of greater inter-site and inter-regional variability than had hitherto been appreciated. It seemed necessary, in dealing with the hitherto unrecognised wealth of material in Perthshire, to reassess critically the ways in which the past of what is now Scotland was interpreted; the use of models developed on the basis of perhaps not wholly comparable evidence in better studied but distant areas has become less acceptable (Barclay 1997b).

Aim

The aim of the programme of research has been to create a modern account of the inception and development of farming in lowland eastern Scotland, taking particular account of potential inter-regional differences, and in a coherent national interpretative context.

Objectives

I have developed seven objectives for my research in the study area over the last 20 years:

1. to reveal and explore the extent and diversity of the remains of Neolithic occupation in the area, in part through creating corpora of site types
2. to explain the long histories of use and change on Neolithic/early Bronze Age ceremonial/burial sites
3. to set the rich ceremonial/burial evidence into a more rounded settlement and environmental context
4. to assess the evidence for, and establish the extent and nature of inter-regional variation throughout the Neolithic
5. to place the development of locally appropriate explanatory models in the history of archaeological thought
6. to set the study of the archaeology of lowland Scotland in a wider historical/cultural context
7. to identify and quantify the threats to the survival of the Neolithic archaeological resource
Methodologies

The study area was chosen to provide a variety of lowland areas, with a range of upland landscapes nearby, and with hybrid areas where ‘lowland’ valley bottoms are immediately adjacent to uplands.

The research is founded on pre-existing data-sets, expanded or broken down into subsets as necessary. The available data are of variable quality and usefulness. The broad data-set of sites is extensive but without detailed investigation can only be interpreted superficially, usually on the basis of perceived morphological characteristics (e.g. RCAHMS 1994). More detailed information is available from a few excavated sites, and part of the intention of the research has been to increase the amount of detailed data available through new excavation and survey.

The primary data-set is the National Monuments Record for Scotland in various forms. A download of selected fields for every record in the study area was provided by RCAHMS (over 10,000 records). This included thousands of records that were of no interest to the study - for example, modern buildings or sites clearly later than the Neolithic or Early Bronze Age - which could be selected quickly for deletion. There remained a significant body of records of sites that might be of the period of interest, particularly those appearing only as cropmarks. This last body of material had to be considered in detail, site by site, to assess whether each seemed likely, on the basis of morphology or association, to be of the period of interest or to belong to an unrecognised class. This time-consuming task was necessary because the NMRS database is deficient in a number of ways. First, the classification of sites is based on subjective allocation of a cropmark to a ‘class’, rather than any description of the cropmark, and this classification has been undertaken over 25 years and relies on the variable experience and knowledge of individual staff members. Second, many cropmark sites have no written monument description (beyond their ‘class’), in contrast to the majority of upstanding sites. Finally, the NMRS database is substantially incomplete as far as scatters and individual finds of flint and other stone tools are concerned. Fortunately, to remedy this the Lithic Scatters Project had been set up by the University of Glasgow and Historic Scotland to collate all available records of finds in Scotland, to provide a firm basis of further research, as well as management and preservation. I have merged the results of the survey for the study area with the NMRS data.

The edited and amended database was set against topographic and other digital map information in a Geographical Information System.
Archaeological excavation within the overall project was undertaken according to normal professional practice, in particular in conformity with Historic Scotland policy and practice papers, and Institute of Field Archæologists guidelines.

**How the material submitted forms a coherent body of research**

The material forms a coherent body of research because it stems from an intention to undertake a PhD on the Neolithic of Perthshire; in the mid-1980s I hoped to register for a part-time PhD at the University of Edinburgh to pursue research into the Neolithic of Perthshire, but the Civil Service would not fund a full-time first year of study and would provide only five days of study leave a year. My then line manager, Mr Iain Maclvor and my intended supervisor, Mr Roger Mercer (then Reader in Archaeology) persuaded me that the plan was not feasible. However, I determined, with Mr Maclvor’s support and his successor’s encouragement, to pursue as much of the research as was possible in my own time over a longer timescale. This I have done, and the material submitted for examination is part of the output of that research programme. These publications are only part of the total output of the research, which continues. Appendix A is a list of all my publications, including those falling before the 10 year limit: those submitted for examination are marked in bold.

**Note on period coverage**

The divisions into traditional archaeological periods have been undermined since 1945 (e.g. Piggott 1954; Burgess 1980) but they are still used as a form of shorthand. Many, if not most, ceremonial and burial sites with their origins in the Neolithic continue in more or less active use into the second millennium BC - into the full Bronze Age, in traditional terms. Where this is the case, the research takes account of the whole sequence. However, the range and quantity of EBA burial and artefactual material (such as individual burial sites) is so great that it must be beyond the scope of this study. The work set out here therefore takes account of later activity on sites that already functioning, but cannot place it in as full a context as the earlier activity.
Sites Mentioned in the Text – key to illus 1.1 (next page)

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<td>63</td>
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<tr>
<td>Easterton of Roseisle</td>
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<tr>
<td>Fordhouse</td>
<td>65</td>
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<tr>
<td>Fowlis Wester</td>
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<td>Auchategan</td>
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<td>Grandtully</td>
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<td>Hill of Tuack</td>
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<td>Hillend</td>
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<td>Kindrochet</td>
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<td>Kinloch</td>
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<td>Knap of Howar</td>
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<td>Littleour</td>
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<td>Longman Hill</td>
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<td>Lundin Farm</td>
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<td>Monzie</td>
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<td>North Mains</td>
<td>81</td>
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<td>Orwell</td>
<td>82</td>
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<tr>
<td>Pitfour</td>
<td>83</td>
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<tr>
<td>Pitglassie</td>
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<tr>
<td>Pitnacree</td>
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<tr>
<td>Raigmore</td>
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<tr>
<td>Sandy Road</td>
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<td>Skara Brae</td>
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<td>Sketewan</td>
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<td>Spurryhillock</td>
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<td>The Clash</td>
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<td>Wardend of Durris</td>
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<td>Wellbrae</td>
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<td>Wormy Hillock</td>
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<td>Corrimony</td>
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<tr>
<td>Croft Moraig</td>
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<td>Cultoquhey</td>
<td>97</td>
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<tr>
<td>Dalladies</td>
<td>98</td>
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<td>Douglasmuir</td>
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<tr>
<td>Dunloshin</td>
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<td>Easterton of Roseisle</td>
<td>101</td>
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<td>Fordhouse</td>
<td>102</td>
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<tr>
<td>Fowlis Wester</td>
<td>103</td>
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</tbody>
</table>
Objective 1

To reveal and explore the extent and diversity of the remains of Neolithic occupation in the area

The greatest engines of change in understanding in the Neolithic, and indeed much of prehistory in the study area, are:

- Aerial photography
- Rescue and, to a lesser extent Research excavation

Aerial Photography

While aerial photography began to have an important impact on the prehistory of the southern part of this island before the 1939-45 war, and the changes this has wrought have been reasonably well assimilated, it is only since the early 1970s with work by John Dewar for the Inspectorate of Ancient Monuments and only since 1976 by the Scottish Royal Commission that there has been any serious Scottish-based aerial photography programme (Maxwell 1979; 1983b). The structure for making photographs available for Scottish research, the National Monuments Record for Scotland, only began to operate as an efficient archaeological database in the mid 1970s; although Professor St Joseph had made many flights into Scotland from his Cambridge base since the end of the war, Roman material was his main aim, and there was no easy system to make it available for research in Scotland.

This late start had a distinct effect. In Britain as a whole after the second war there was an upsurge in archaeology and the study of prehistory. In southern England in particular, we can see that cropmark archaeology was perhaps better assimilated into the improving picture of that region's past; it was already a picture in which earthen monuments were familiar, if not the norm and where the richness and vulnerability of the cropmark resource had been highlighted by a series of publications - *A Matter of Time* (RCHME 1960), *Aerial reconnaissance over the Warwickshire Avon* (Webster and Hobley 1965) and *The Upper Thames Valley: an archaeological survey of the River Gravels* (Benson and Miles 1974). In Scotland the upsurge in archaeology and the improved understanding of prehistory took place with no major cropmark contribution and thus, the perception of Scotland's surviving archaeology as predominantly stone and/or upland, a picture built up through the extensive antiquarian activity in the 19th and earlier 20th centuries, was reinforced. The effect of this tradition can still be seen in the presentation of Scotland's past (e.g. Historic Scotland 1988). The vast wealth of material which has appeared in the lowlands of Scotland, particularly on
the east coast, has, in the last 25 years, undermined all the pre-existing frameworks of understanding, which were based to a great extent on limited knowledge of few, mostly upland, sites. It may be argued that at many periods in the uplands settlement was either peripheral, economically and socially, or atypical of settlement in the softer lowland landscape, particularly at the time of the crisis in upland farming which seem to have taken place in the first millennium BC. It may also be argued that in some periods (for example the Neolithic) there is little visible evidence of the full range of settlement activities in upland areas. Our opportunities for investigating these periods may only be present, or only exploitable, by being visible through aerial photography, in lowland areas.

The research has been intended to document the diversity of the material, including that revealed by aerial photography. The research has included the creation or extension of three Scotland-wide lists of monument - henge monuments, Neolithic domestic structures and cursus monuments. The last has since been wholly superseded by the PhD thesis submitted by Kenneth Brophy, to whom the then current list of monuments was passed; he has subsequently more than doubled the number known and has described them in greater detail and provided a thorough consideration of the Scottish material in its wider context (Brophy 1999).

The list of henge monuments is described in more detail under Objective 4; that of domestic structures under Objective 2. Regrettably, because of constraints of time, neither list could be developed into a detailed corpus.

**Rescue & Research Excavation**

I edited a review of the crucial contribution of state-funded rescue archaeology to our understanding of Scotland's past, mainly between 1975 and the present, stressing the variation that that work had revealed (Barclay 1997b). Prior to the development of rescue archaeology, knowledge of the Neolithic in eastern Scotland, through excavation, was very limited.

Our knowledge of the types of remains surviving from the prehistoric occupation of Britain has expanded greatly as a result of rescue archaeology, as we have been forced by circumstances of particular developments to investigate monument forms of unknown type or of superficially limited value, or indeed to look at apparently blank areas where no sites were known. It provides the necessary "serendipity"; if rescue driven excavation did not lead us to excavate sites which we would not excavate as part of any sort of research programme then we might plough only familiar furrows, not finding that our perception of those furrows
was itself flawed and very limited.

<table>
<thead>
<tr>
<th>NAME &amp; TYPE</th>
<th>YEAR OF EXCAVATION</th>
<th>PUBLICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pitfour, pair of standing stones</td>
<td>1967</td>
<td>DES 1967, 44-5</td>
</tr>
<tr>
<td>Pitnacree, burial mound</td>
<td>1964</td>
<td>Coles, J M and Simpson 1965</td>
</tr>
<tr>
<td>Lundin Farm, stone setting</td>
<td>1963?</td>
<td>Stewart 1966</td>
</tr>
<tr>
<td>Monzie, stone circle/kerb cairn, cup-marks</td>
<td>1938</td>
<td>Young and Mitchell 1939</td>
</tr>
<tr>
<td>Fowlis Wester, stone circle/kerb cairn, cup-marks</td>
<td>1939</td>
<td>Young 1943</td>
</tr>
<tr>
<td>Croft Moraig, timber setting &amp; stone circle</td>
<td>1965</td>
<td>Piggott and Simpson 1971</td>
</tr>
<tr>
<td>Grandtully, pit complex</td>
<td>1965</td>
<td>Simpson and Coles 1990</td>
</tr>
<tr>
<td>Moncreiffe, henge, timber &amp; stone circles</td>
<td>1974</td>
<td>Stewart 1985</td>
</tr>
<tr>
<td>Clach na Tiompan, chambered tomb</td>
<td>1954</td>
<td>Henshall and Stewart 1956</td>
</tr>
<tr>
<td>Kindrochat, chambered tomb</td>
<td>1929-1930</td>
<td>Childe 1930, 1931</td>
</tr>
<tr>
<td>Cultoquhey, chambered tomb</td>
<td>1957</td>
<td>J H Maxwell (no report, see Henshall 1972</td>
</tr>
<tr>
<td>Sandy Road, stone circle</td>
<td>1961</td>
<td>Stewart 1961</td>
</tr>
<tr>
<td>Orwell, standing stones</td>
<td>1972</td>
<td>Ritchie, J N G 1974</td>
</tr>
<tr>
<td>Barns Farm, EN sherds in EBA cemetery</td>
<td>1973</td>
<td>Watkins 1982</td>
</tr>
<tr>
<td>Clatchard Craig, EN pottery on IA fort</td>
<td>1953-60</td>
<td>Close-Brooks 1986</td>
</tr>
<tr>
<td>Dalladies, long barrow</td>
<td>1970-71</td>
<td>Piggott 1971</td>
</tr>
</tbody>
</table>

Table 1.1 Pre-1975 Excavations on mainly Neolithic sites between the Forth and the Mounth

Childe (1940) was the first to note the skew in perceptions and interpretations towards geographical areas where there are good data sets. The operation of the engine of change - rescue archaeology - runs at vastly different speeds in different parts of the UK. As most population is in the south, and most development is in the south, and as rescue archaeology got seriously under way there some 10-15 years before Scotland, then what were already the largest data sets were further enhanced at a rate faster than elsewhere; this has had a striking effect on the nature of archaeological explanation in areas away from the major
concentrations of research in prehistory, for example Wessex, Yorkshire and Orkney, in the Neolithic and Earlier Bronze Age. That is, the far better studied data sets available for certain parts of the country at different periods have served to restrict the ability of archaeologists elsewhere to erect locally or regionally valid explanations, where the data set for a period is restricted. This issue is dealt with in more detail under Objective 5.

<table>
<thead>
<tr>
<th>Location</th>
<th>Date</th>
<th>Authors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Douglasmuir</td>
<td>1979-80</td>
<td>Kendrick 1995; Barclay 1995</td>
</tr>
<tr>
<td>North Mains henge</td>
<td>1979</td>
<td>Barclay 1983</td>
</tr>
<tr>
<td>North mains barrow</td>
<td>1978-79</td>
<td>Barclay 1983</td>
</tr>
<tr>
<td>North mains ring ditches</td>
<td>1979</td>
<td>Barclay 1983</td>
</tr>
<tr>
<td>Balfarg, henge</td>
<td>1977-78</td>
<td>Mercer 1981a</td>
</tr>
<tr>
<td>Balbirnie, stone circle &amp; cairn</td>
<td>1969-70</td>
<td>Ritchie, J N G 1974</td>
</tr>
<tr>
<td>Balfarg Riding School, henge, mortuary structures, cairns</td>
<td>1983-85</td>
<td>Barclay and Russell-White 1993</td>
</tr>
<tr>
<td>Spurryhillock, pit complex</td>
<td>1993</td>
<td>Alexander 1997</td>
</tr>
<tr>
<td>Balbridie, building</td>
<td>1977-81</td>
<td>Fairweather and Ralston 1993; <em>interim report</em></td>
</tr>
<tr>
<td>Fordhouse, complex barrow</td>
<td>1994-97</td>
<td>Peterson and Proudfoot 1997 <em>interim report</em> [GJB instigator and project manager for Historic Scotland]</td>
</tr>
<tr>
<td>Sketewan, platform cairn</td>
<td>1988</td>
<td>Mercer and Midgley 1997 [GJB instigator of project for Historic Scotland]</td>
</tr>
<tr>
<td>Beech Hill House, cairn</td>
<td>1989</td>
<td>Stevenson, S 1995 [GJB instigator and project manager for Historic Scotland]</td>
</tr>
<tr>
<td>Wardend of Durris (Aberdeenshire), settlement</td>
<td>1988-89</td>
<td>Russell-White 1995 [GJB instigator and project manager for Historic Scotland]</td>
</tr>
<tr>
<td>Kinloch, enclosed settlement?</td>
<td>1980</td>
<td>Barber 1982</td>
</tr>
</tbody>
</table>

*Table 1.2 Rescue excavations 1975-1995*

The contribution of my research has been to undertake excavations at eight sites and to promote excavation at others, deliberately to explore the variety of monument types in the study area and to place them in their local context. My publication record shows that almost
all of the publication in this period in Tayside in the last 20 years has been at my own hand or with my involvement in some way.

<table>
<thead>
<tr>
<th>Publication</th>
<th>Year(s)</th>
<th>Authors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inchtuthil</td>
<td>1989</td>
<td>Barclay and Maxwell 1991</td>
</tr>
<tr>
<td>North Mains enclosure</td>
<td>1987</td>
<td>Barclay and Tolan 1990</td>
</tr>
<tr>
<td>Creag na Cailliech</td>
<td>1989</td>
<td>Edmonds et al. 1992</td>
</tr>
<tr>
<td>Cleaven Dyke</td>
<td>1993-97</td>
<td>Barclay and Maxwell 1998a</td>
</tr>
<tr>
<td>Littleour</td>
<td>1996-97</td>
<td>Barclay and Maxwell 1998a</td>
</tr>
</tbody>
</table>

Table 1.3 Research excavations 1975-1995

Other related sites have been investigated in other parts of lowland Scotland in the last two decades.

<table>
<thead>
<tr>
<th>Site</th>
<th>Year(s)</th>
<th>Authors</th>
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</thead>
<tbody>
<tr>
<td>Beckton (Dumfriesshire), settlement etc</td>
<td>1992</td>
<td>Pollard 1997</td>
</tr>
<tr>
<td>Bannockburn (Stirlingshire) pit/post-alignments</td>
<td>1984-85</td>
<td>Rideout 1997 [GJB instigator and project manager for Historic Scotland]</td>
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<tr>
<td>Biggar Common (Clydesdale), settlement etc</td>
<td>1987-93</td>
<td>Johnston 1997</td>
</tr>
<tr>
<td>Cowie (Stirlingshire), settlement</td>
<td></td>
<td>Atkinson, J A 1996a interim report [GJB instigator and project manager for Historic Scotland]</td>
</tr>
<tr>
<td>Newton of Pitglassie (Aberdeenshire), burial mound</td>
<td>1978</td>
<td>Shepherd, A 1996</td>
</tr>
<tr>
<td>Raigmore (Inverness-shire), building and cairn</td>
<td>1972-73</td>
<td>Simpson 1996. [GJB project manager for completion of report].</td>
</tr>
<tr>
<td>Rattray, cultivation remains</td>
<td>1988</td>
<td>Murray et al. 1992</td>
</tr>
<tr>
<td>Boghead (Moray) burial mound</td>
<td>1972-74</td>
<td>Burl, H A W 1984</td>
</tr>
</tbody>
</table>

Table 1.4 Other relevant excavations

Artefact Studies

Stone Axes

The Creag na Cailliech stone quarrying site, one of only at most nine identified Scottish axe-stone sources, and the only identified ‘factory’ on mainland Scotland, lies at the western end of Loch Tay. It has been investigated three times (Clough 1988; Edmonds et al. 1992; MacKie 1972; Ritchie, P R 1968).
Pottery

In 1983 Henshall published a survey of the sparse collection of earlier Neolithic pottery in north-east Scotland, building on a consideration of the more substantial assemblage recovered from Easterton of Roseisle in Moray (Henshall 1983; Walker, I C 1968).

This was followed in 1993 by a survey by Cowie (Cowie 1993b) of earlier Neolithic pottery in the old local authority Regions of Tayside, Fife and Central (and therefore covering the core area of my research).

The later Neolithic Impressed Wares for the area were discussed by Cowie in the pottery reports for North Mains and Balfarg (Cowie 1983; 1993a).

Henshall had reviewed the Grooved Ware from the area in her reports of the material from two campaigns of excavation at Balfarg in Fife (Henshall 1993; Henshall and Mercer 1981). Further important assemblages in the study area were described by Cowie - Barbrush (Cowie 1992), MacSween - Beech Hill House (MacSween 1995; Stevenson, S 1995) and Sheridan - Littleour (Sheridan 1998); a survey of all the Scottish material has recently been prepared (Cowie and MacSween 1999).

Carved Stone Balls

Dorothy Marshall, in two papers (1977; 1983) provided the first detailed corpus of these unusual artefacts. They have been further considered by Edmonds (1992). They may act as a marker of regional variation in the late Neolithic (Objective 4 below; figure 4.4).

Conclusion

Fieldwork in the Neolithic of east-central Scotland has carried on at a steady but relatively low level in the last 30 years. The sites that have been investigated have confirmed the variety and wealth of the archaeological resource of this period in Perthshire, Fife and the surrounding local authorities.
Objective 2

*To document and explain the long histories of use and change on Neolithic/early Bronze Age ceremonial/burial sites*

Until around 30 years ago the complex histories of some ceremonial sites were explained by reference to the dominant model - invasion or colonisation. The excavation report for Cairnpapple (Piggott 1950) illustrates this well, with changes in the nature of the site being explained by the influence of successive culturally distinct peoples. One further feature recognised at Cairnpapple was early Neolithic activity, represented by pottery and possibly by pre-henge hearths. One of the most significant observations arising out of my research is the recognition of the frequency with which early Neolithic activity is to be found in places in which major late Neolithic complexes later develop. Although individual discoveries of earlier material (usually small quantities of pottery) have been made, the scale and extent of the phenomenon had not hitherto been commented upon. At sites excavated more recently, where the area explored extended beyond the more obvious features, more substantial explanations for complex site histories and for early Neolithic presences can be suggested.

**North Mains**

The henge was shown to have 5 phases:

I - pre-henge activity - including 1 burial

II - the bank and ditch of the henge, including a massive ring of 24 timbers

III - a range of types of inhumation and cremation burials in pits, cists, urns, mainly of the early to mid 2nd millennium BC uncal.

IV - *in situ* cremation burials of the late second millennium BC (uncal)

V - an early Christian long grave cemetery

Since the publication, a review of the evidence has suggested that a second timber ring (not related spatially to the Period II enclosure, and assumed to postdate it) was actually constructed before the Period II monument (Barclay 1999; Gibson 1998).

The henge at North Mains (Barclay 1983) was the first to be excavated where account was taken of Burl’s urging (Burl 1969) that excavation should extend to the areas around such sites, rather than, as hitherto, concentrating on the ditches and interiors of the enclosures.
One result of extending the excavated area well outside the enclosed area, was in the discovery of the Period IV (late Bronze Age) burials, represented only by the remains found outside (and apparently deliberately avoiding) the henge enclosure.

Illus. 2.1 North Mains henge at the end of the excavation.

To the west lay a vast burial mound, whose construction was radiocarbon dated to the early 2nd millennium BC uncal; it too had a very complex history of construction and later use, and was of a kind not hitherto known. Its origins lay in the earlier Bronze Age and it is therefore not dealt with further here.

**Balfarg**

Although the North Mains report is not one of the publications submitted for examination, its results had a considerable influence on the conduct of another project. At the larger ceremonial complex at Balfarg in Fife (Barclay and Russell-White 1993), excavation
revealed an even more complex sequence of development spread over a far larger area:

1. Pit-digging and the structured deposition of early Neolithic pottery, in two parts of the site [late 5th to mid 4th millennia BC cal]

2. Erection and use of two timber enclosures, containing timber structures (interpreted as exposure platforms) [early to mid 4th millennium BC cal].

3. Burial of the later timber structure under a mound containing Grooved Ware; construction of a henge monument around it [late 4th to mid 3rd millennia BC cal].

4. Construction of a complex of cairns over the end of the other timber structure [mid 3rd millennium BC cal]

5. Insertion of burials at various places on site [late third to late 2nd millennia BC]

6. Creation of an urned cremation cemetery [mid 2nd millennium BC cal]

The results from the complex were also related to the sequences recovered by excavation from two specific elements excavated earlier, before the presence of the rest of the complex was suspected: the 1978-79 campaign at Balfarg Henge (the second henge in the history of the complex) (Mercer 1981a) and the 1969-70 excavation of the Balbirnie Stone Circle (Ritchie, J N G 1974).

The discussion associated with the Balfarg report was a major contribution to the growing appreciation of longevity and complexity of ceremonial sites, as well as the ways in which changing demands led to significant developments in the nature and appearance of parts of the monument group and the abandonment and re-use of parts of the complex. The significant points made here for the first time were:

- The importance of the changing nature of the appearance and definition of spaces
- The consideration of the occurrence of structured deposition in the Scottish Neolithic (the concept was developed to deal with the Grooved ware assemblages at Durrington Walls in Wiltshire (Richards & Thomas 1984).
- That traditional concepts of individual 'monuments' could be broken down in some complexes, where there were large-scale spreads of features and activity beyond traditional site boundaries, undetectable prior to excavation

Cairnpapple

Using the insights provided by the henge at North Mains and the complex at Balfarg it was
possible to reconsider in detail the observations made and interpretations put forward by Piggott for Cairnpapple half a century before (Piggott 1950).

Illus. 2.2 Cairnpapple – Piggott’s Periods I to III
Illus. 2.3 Cairnpapple – Piggott’s Periods IV and V

In the 1999 paper, using comparable material from elsewhere in Scotland, I argued for a revised phasing:

Phase 1, comprising the deposition of earlier Neolithic plain bowl sherds and axe-head fragments, with a series of hearths. This is comparable to ‘structured deposition’ noted at Balfarg (above) and on other sites of this period. Phase 2 involved the construction of the henge - a setting of 24 uprights - probably of timber rather than stone, probably followed by the encircling henge ditch and bank. The ‘cove’ is discussed in the context of comparable features in Scotland. Phase 3 saw the construction of a series of graves, including the monumental ‘North Grave’, which was probably encased in a primary cairn (which Piggott
had tentatively identified). Piggott's 'Period III' cairn was then built, followed by the 'Period IV' cairn. The urn burials seem likely to have been inserted into the surface of this mound, which may have covered a burial (since disturbed) on the top of the Period III mound, or may have been a deliberate monumentalising of it. The four graves identified as Iron Age by Piggott seem more likely to be from the early Christian period.

Illus. 2.4 Cairnpapple – Barclay(1999) Phases 1 to 3b
The re-assessment of Piggott’s report emphasises the value to possible reinterpretation of the writing of a clear, and sufficiently detailed account. While no report can be wholly objective it can be seen that Piggott’s striving for objectivity led him to write a paper that is of lasting value.

Illus. 2.5 Cairnpapple – Barclay (1999) Phases 3c to 4
Objective 3

To set the rich ceremonial/burial evidence into a more rounded settlement and environmental context

In the study area, as in most of the rest of Britain, the rich suite of burial and ceremonial monuments have little in the way of domestic context. In Orkney, in the later Neolithic at least, there is equally rich surviving domestic settlement evidence; in south-western England some enclosures, such as at Stepleton (part of the Hambledon Hill complex in Dorset) or Carn Brae in Cornwall, there are domestic aspects, although not in any sense ordinary ‘farms’.

The lack of coherent domestic evidence in southern Britain, particularly the absence of anything that matches the traditional idea of a settled farm, has led some influential workers in the area to erect an alternative hypothesis - a Neolithic based not on settled arable agriculture, but on a more mobile economy, perhaps based on the herding of cattle. The rich cattle assemblages from causewayed camps (Mercer 1980) has been used in support of this hypothesis, the viability of which outside its area of origin is considered in Objective 5 below.

In lowland Scotland unambiguous domestic evidence is rare. There are only five known sites that can be said to have a largely domestic character in eastern Scotland; the only recent survey of the Neolithic domestic structures of Scotland is that prepared for Barclay 1996 [submitted for examination].

- Raigmore (Barclay 1996, 71; Simpson 1996)
- Balbridie (Barclay 1996,71; Fairweather and Ralston 1993)
- Kinbeachie (discovered since publication - Dalland 1998)
- Cowie (discovered since publication)
- Wardend (Russell-White 1995)
There are also three comparable timber structures which have been excavated and have been found not to have a domestic function:

- Balfarg 1 & 2 (Barclay 1996)
- Littleour (Barclay and Maxwell 1998a)
To the south and west further probably domestic sites have been excavated:

- Auchategan (Barclay 1996, 72)
- Arndadam (Barclay 1996, 72)
- Dunloskin (Barclay 1996, 72)
- Beckton (Pollard 1997) (Barclay 1996, 72)
- Wellbrae (Barclay 1996, 74)
- Biggar Common (Johnston 1997)

Unexplored – Clash, Stirlingshire

Illus. 3.2 A range of Neolithic structures. 1 – the Raigmore building; 2 – the Knap of Howar houses, Orkney; 3 – the building at Balbridie; 4 – one of the ?mortuary structures at Balfarg.
The excavation at the North Mains enclosure (Barclay and Tolan 1990) was designed specifically to test the hypothesis that there was a tradition of enclosed settlement in the Neolithic or Bronze Age (a possibility suggested by the small-scale excavation at Kinloch (Barber 1982)). The work did reveal that the enclosure had its origins in the Bronze Age. The excavation of the Littleour structure was undertaken specifically to determine whether it was a local variant of the Balbridie structure - on a similar scale but of different structural form.

In 1999 the remains of a small timber building were excavated at Kinbeachie on the Black Isle. The site bore a strong resemblance to the site excavated in my study area in 1965, at Grandtully, where a mass of pits - dating from both Neolithic and EBA - was excavated (Simpson and Coles 1990). In retrospect it seems possible to suggest that the Grandtully site may have represented the same sort of structure as was identified at Kinbeachie.
Objective 4

To assess the evidence for, and establish the extent and nature of inter-regional variation throughout the Neolithic

The last decade has seen a growing appreciation of regional differences in the inception of the Neolithic (Armit and Finlayson 1992) and in its development (Sharples 1992) in the north and west of Scotland. My research has made a significant contribution to the knowledge of diversity in the Neolithic of eastern Scotland. The first clear indications of regional variation were provided by the distribution of two classes of late Neolithic monument - henges and Recumbent Stone Circles.

Henges

In 1993, during the preparation of a comprehensive assessment of the Neolithic in Scotland (Barclay 1997a) I prepared an up-to-date distribution map of henge-type enclosures in Scotland. The distribution of henges in Scotland has been mapped on six occasions, on its own or as part of a Britain-wide survey: Atkinson et al (1951); Daniel (1962); Burl (1969); Wainwright (1969); Catherall (1974).

The distributions of Atkinson, Daniel, Burl and Harding are summarised on illus. 4.1. The most recent survey was that of Harding (Harding, A F 1987). For the Scottish material the catalogue was based, first, on a critical review of the sites previous workers had noted, and second, on a trawl through the data held in the National Monuments Record for Scotland, in particular the substantial collection of oblique aerial photographs, largely taken since 1976. The data collection reflected photographs taken up to c. 1982-83 (subsequent material not having been accessioned). Thus, Harding’s survey could include only the results of 6-7 years of active aerial photography in Scotland.

The creation of the new list of henges for the new survey involved, as had Harding’s, a trawl through every accessioned aerial photograph in the NMRS collection, and the comparison of each potential enclosure against the criteria established by Harding, with minor amendments. The raw data on which the distribution was based have never hitherto been published; I have continued to update the list and the current version (with additions and deletions since 1993 marked) is attached here as Appendix B. At the time of its preparation it included photographs taken up to 1990-91, thus taking account of 14-15 years of productive aerial reconnaissance in Scotland. It now takes account of flying up to 1993-94.
It was also possible for me to review critically some past workers’ inclusions in their lists, where it was clear that a purely desk-based assessment had perhaps taken inadequate account of on-site realities, particularly in the relationship of sites to their topography. For example Hill of Tuack was described by Harding (Harding, A F 1987) as ‘Sub-circular enclosure, surviving as an earthwork, situated at c. 61m above OD on a south-facing slope near the foot of Tuack Hill’ with internal diameter of 7.3m within a ditch 3.65m wide. The site is badly disturbed, making its precise nature in doubt, but its location terraced into a steep slope is unlike any other henge known to this author, and has therefore been omitted.

Illus. 4.2 RCAHMS (1994) distribution of henges etc (Crown Copyright: RCAHMS)

In 1994 RCAHMS published its survey of South-east Perthshire (RCAHMS 1994). The attempt to map possible henge sites in part of eastern Scotland was problematic. Because Class I (single entrance) henges might be interpretable as other forms of enclosure, RCAHMS took what may be considered a very conservative view of what constituted a henge (1994, 13), resulting in the exclusion of six of the nine Angus sites, all of which appear, to this author, worthy of inclusion. RCAHMS suggested that the South-east Perth study area lay ‘on the boundary between two different style-zones of ceremonial monuments’, based on the mapped distributions of a range of monuments: recumbent stone circles, henges, ring cairns and four-poster stone settings. As noted above, the RCAHMS
distribution of henges is likely to be incomplete, and there are also problems with the mapped distribution of RSCs; for example, the long-attested RSC at Colmeallie in Angus (Barclay and Ruggles 1999) is shown merely as a 'stone circle', and no RSCs are shown south of the Dee Valley, omitting the variant group identified by RCAHMS itself (Gibson 1998; RCAHMS 1982). Comparison should be made between the RCAHMS distribution (RCAHMS 1994) and illus. 4.3 (the RSC distribution is based on Ruggles 1999). Additionally, the comparison of ring-cairn and four-poster distributions with those of henges and RSCs is problematic, as the former classes are generally dated to around a thousand years later than the henges.

The final list of possible henges and small hengiform enclosures prepared by GJB contains, in its current form (updated 1999) 85 sites. A number of striking points were clear from the mapped distribution that, if anything, has been reinforced by the discovery of new sites since the map was first created. First, there are significant concentrations of sites, in particular in lowland Tayside. Second, there were areas where henges are few and far between. In some cases this could be explained by geography - some areas are uninhabitable; some areas may not have been densely settled in the Neolithic; in some areas sites might not be visible as cropmarks, due to a lack of sympathetic cultivation regimes. However, the dearth of henge sites in the north-east of Scotland, beyond a line cutting somewhere across northern Angus, cannot be explained in any of these ways. To the south of this line henges are very numerous; to the north, in an area that has seen much aerial photography and the discovery of many cropmarks of other types of sites, only three are known that this author would consider met Harding's criteria, and these are unusual in a number of ways.

1. Wormy Hillock. This monument is tiny, the enclosed area measuring only 6m across, defined by a deep ditch 3.5 to 5m across and an external bank c.3m wide. It lies in a classic henge location, on a valley bottom, near the end of a natural gravel mound closely resembling a long barrow.

2. Broomend of Crichie. This monument is a classic, but rather small, Class 1 henge (the enclosed area measuring 15.25m across) containing a circle originally of six stones. It is very unusual in being associated with an avenue of standing stones running to the S, these stones apparently being related to concentrations of later burials (Ritchie, J 1920).


To the north-west, towards Inverness, the survey threw up two hengiforms with very narrow
ditches in relation to the area enclosed. One of these monuments survives as an upstanding earthwork, although surveyed only recently (Dalland 1997). The enclosure has the characteristic external bank of a henge but its upland location is unusual (cf. Cairnpapple).

Recumbent Stone Circles

The distribution of recumbent stone circle has been known for far longer than that of henges, as they are especially distinctive upstanding sites surviving today or known from recent accounts (cf. Coles, F R 1900; 1901; 1902; 1903; 1904; 1905; 1906; 1907; 1908). Until recently Burl’s distribution was the most complete (Burl 1976); it has now been superseded by that of Ruggles (Ruggles 1999), whose information is included in illus. 4.3 above.

Henges and stone circles were for many years considered to be monuments of the full Bronze Age (e.g. Childe 1935; Piggott 1950). Excavation and radiocarbon dating of henges has placed them firmly in the later Neolithic but no modern excavation of a RSC has been published, and the few radiocarbon dates are unhelpful. It has been argued by Atkinson (Atkinson, R J C 1962) and Shepherd (Shepherd, I 1987), and largely accepted, that the RSCs too originated in the later Neolithic. Current work may provide reliable information for the first time (Bradley 2000a).

On the basis of the distributions, assuming until otherwise demonstrated that the two types of monument were broadly contemporary, I made a number of original suggestions (Barclay 1997a, 135-139), which I expand on here.

First, when the distributions of RSCs and henges are overlaid, it can be seen that they are almost mutually exclusive.

The different nature of henge and RSC might imply different needs in the siting and practices of ritual activity. Henges are predominantly found on flat, valley bottom sites. They occasionally occur in complexes in close proximity to each other (e.g. as at Balfarg and at Westfield in Angus). In contrast the RSCs never occur in immediate proximity; however, they can occur within a few hundred yards of each other and are not infrequently intervisible. They are generally more densely distributed across the landscape than henges.

It has been argued that the creation of the henges marked social changes related to the developments of more hierarchical social structures supposed to be characteristic of the later Neolithic. It can be suggested that the distribution of RSCs (of which there are c.100 known in a relatively small area) may indicate that each site served a different form of social grouping - perhaps reflecting the needs of individual farming communities of the kind often assumed to characterise the early Neolithic.
There is further support for some cultural variation in the distribution of carved stone balls (illus. 4.4) (Edmonds 1992; Marshall 1977; 1983). It can be noted that the distribution of this category of object matches that of the RSCs quite closely. It may be that this peculiar artefact type represents another facet of divergent social development in the north-east - the balls perhaps acting as objects of prestige or worth in formal exchanges. Edmonds' survey (1992) draws carved stone balls and henges into a broad-brush, normative consideration of social change, taking little account of the regional variation apparently indicated by their respective distributions.
Illus. 4.4 Distribution of carved stone balls (after Marshall)

The recent survey of Grooved Ware pottery has confirmed that the distribution does not include the north-east (Cowie and MacSween 1999). While it is possible that the gap in the distribution merely reflects a lack of fieldwork, it seems likely that it reflects another dimension of the same regional variation suggested by the henge/RSC distribution.

**Burial Features of the Early Neolithic**

Subsequent to the identification of the apparent regional differences in distribution of henges and RSCs in the later Neolithic, my attention turned to the distribution of burial monuments of the earlier Neolithic. This interest was prompted by the research on the Cleaven Dyke, which at its northern end had the following structural sequence:

1. a round or oval barrow;
2. a long barrow with defining ditches close to its base, attached to the round barrow;
3. the addition of the segmented bank barrow with widely spaced ditches.

There was therefore a need to set phases 1 and 2 in their regional context. Since the 1950s the Royal Commission has undertaken a considerable amount of terrestrial survey in Perthshire and the areas around, which has filled in the distribution of chambered tombs. In their influential 1994 SE Perthshire survey volume (RCAHMS 1994) they mapped the distribution of earthen long barrows in the east, and chambered tombs in the west, identifying an area where the expected types of Neolithic burial monument had not been constructed.

Illus. 4.5 RCAHMS distribution map of early Neolithic burial mounds in east-central Scotland. The round barrow distribution includes only the single excavated round mound, at Pitnacree. (Crown copyright: RCAHMS)

The most recent overall consideration of round barrows in the Neolithic of Britain is that published by Ian Kinnes (1979). In common with more recent regional studies of these sites the implications of the excavation of the early Neolithic round mound at Pitnacree (Coles, J M and Simpson 1965) are perhaps inadequately highlighted; in an area containing many mounds on the same scale as Pitnacree, for Kinnes to publish a distribution map which showed Pitnacree as the sole Neolithic round barrow in Tayside was perhaps misleading.
In 1994 the Royal Commission specifically resisted ‘the temptation to assume that many of the large lowland round barrows [in Perthshire were] of Neolithic date’; however, their map (RCAHMS 1994) suggests that only one was - Pitnacree again.

In the field, I had observed that individual round barrows in Perthshire, Angus and Fife seemed to fall into one class or the other - broad and low, like Pitnacree (Neolithic), or bowl-shaped, like North Mains (Early Bronze Age).

In publishing our work on the Cleaven Dyke Gordon Maxwell and I wished to establish whether it was possible to identify which of the many round mounds might be Neolithic, like Pitnacree, and which might be Bronze Age, like North Mains. The Pitnacree mound had a ratio of diameter to height of about 12.7:1. Another excavated and published early Neolithic round barrow, at Fochabers in Moray, had a ratio of 14:1. Both were therefore low, flattish mounds. North Mains, in contrast, had a ratio of 7.2:1. Although there are problems with some of the data for the height of mounds, we mapped the lower flatter mounds - those with a diameter to height ratio of 12:1 or more.

To this distribution of possibly early Neolithic round mounds may be added other sites which may have had similar functions - on the map they are referred to as Narrow Ditched Enclosures and Small pit-defined enclosures. One of the narrow ditched enclosures was excavated at Inchtruthil about 10 years ago, proving it to be of early Neolithic date (Barclay and Maxwell 1991). There is a marked concentration of these sites in Tayside and Fife.
Although no burial remains have yet been found in them, their close relationship in size, shape and orientation to the long burial mounds of the same period has suggested that they fulfilled a related burial function. For this reason they are often referred to as ‘long mortuary enclosures’ (cf. Kinnes 1992).

*Illus. 4.7 The early Bronze Age burial mound at North Mains, Strathallan*
The *Small pit-defined enclosures* are a type of monument so far only found in Tayside and Fife. They are different from the structure excavated at Balbridie in Kincardineshire (Fairweather and Ralston 1993). Three have been excavated - one at Littleour near Blairgowrie (Barclay and Maxwell 1998a) and two at Balfarg in Fife (Barclay and Russell-White 1993). The Littleour structure was simple, with only a single large post near one end. The Balfarg sites had a more complex arrangement of internal posts, which have been tentatively interpreted as being related to the exposure of bodies prior to final burial, a practice for which there is evidence in the Neolithic.

If these sites are taken together - the chambered long cairns, the long barrows, the round mounds and the ditched and pit-defined enclosures (illus. 4.8), we perhaps get a clearer idea of what filled the apparent gap in Perthshire between long barrows in the east and chambered cairns in the west, as well as an impression of a regionally restricted set of burial practices.
Objective 5

To determine whether past explanatory models have been appropriate and to establish whether locally appropriate explanatory models can be developed.

As the research progressed, it became clearer that the writing of prehistory of the study area, and of the lowlands in general, itself had an interesting history, that had influenced perceptions of, and approaches to, interpretation. The survey is mainly limited to the period from the 1940s to the 1980s – it is difficult to take a perspective on more recent writing.

Within the last few years the extent of regional variation in the Neolithic has become clearer: for example we can see that farming was adopted in different parts of the British Isles in different ways and at different rates - work in the Western Isles (Armit and Finlayson 1992) suggests a very gradual adoption, in contrast to the structure and the cereal assemblage at the massive Neolithic building at Balbridie, on Deeside, which has been described as ‘almost continental’ (Fairweather and Ralston 1993). We can examine the local and national context of interpretation of the Neolithic in the lowlands, from the first part of the 20th century to the present day.

The 1940s to the 1960s

Fox

The publication in 1932 of the first edition of Fox’s The Personality of Britain marked a major development in British prehistoric studies. Fox revived the Highland/Lowland division of Britain by Mackinder (1902) and took a broad view of the geography, geology, environment and archaeology of prehistoric and ‘Dark Age’ Britain and examined their inter-relationship, in particular the environmental constraints on human settlement. The main thesis was expressed thus:

‘The structure of Britain has exerted a powerful influence on her prehistory. South of the Forth Clyde isthmus the island consists of two parts, the Highland Zone to the west and the Lowland Zone to the east. A diagonal line drawn from Teesmouth (Durham) to Torquay (Devon) roughly indicates the boundary of the two areas.’

His impact on the study of prehistory until the 1960s or even the 1970s should not be underestimated; after substantial revision for the third edition in 1938, the book remained in print until 1959, when the 4th edition (of 1943) entered its third impression (with minor amendments). The interpretative structures of Childe, Piggott and others were significantly influenced; in the context of this study the effect of his views of the availability of land in the ‘Highland Zone’, in which all of Scotland and Wales, and much of northern England fall, was particularly pronounced.
The overprint shows probable sea routes, the natural boundary between the Highland and the Lowland Zones of Southern Britain, certain prehistoric landways, and the physiography of the Lowland Zone. Dots indicate "damp oak" forest; wavy lines fen or marsh.
The book was published by the National Museum of Wales: Fox was its Director. And to some extent it can be suggested that the ‘Highland’ under discussion was mainly that of Wales and the east midlands of England, and that the relevance to Scotland was slight. For example, the statement ‘In the Highland Zone, high plateaux and mountains are characteristic’ (1943, 87) is inaccurate, as far as northern England and much of Scotland are concerned. In the context of the relationship between perceptions of the ‘British’ landscape (under Objective 6) Fox’s statement that the ‘centre’ of the Lowland Zone was ‘the chalk plateau formed by Salisbury Plain and the White Horse Hills’ tells us more about his world view than about the lowlands of England, and reflects his undue concentration on solid geology, rather than the drift geology which has a greater impact on topography and soils in many glaciated areas. It might also be suggested that his early work in Cambridgeshire (1923) influenced his view of the lowlands outside this ‘core’ area. One can also detect a ‘metropolitan’ viewpoint. The following quotations catch the tone of much of the book:

‘The unbroken wide extent of the lowland of the Secondary and Tertiary rocks, and its position nearest the continent, renders it far more important than the low-lying areas of the Highland... For the development of individual cultures an adequate economic setting, such as the Lowland Zone provides in full measure, is needed; but the intermont and coastal lowlands of the Highland Zone are for the most part too scattered and too limited in area to provide the necessary economic bases for independent development. Wealth is based mainly on broad tracts of land, and a numerous peasantry. Such limited lowland areas, then, either illustrate the Highland culture at its best, or, if accessible from the Lowland Zone, reflect lowland zone culture.’ (Fox 1943, 29).

‘...taking Britain as a whole the most important centres of any culture or civilization are likely to be in the south of the island.’ (Fox 1943, 38).

Whether or not it was his intention, Fox’s approach can be interpreted to mean that the Highland Zone could only receive, rather than develop, cultural influences. It is clear that his contemporaries used it thus.

Fox’s influence on a ‘geographical possibilist’ like Childe (Trigger 1994), in his consideration of the capacity of the Scotland to accommodate Neolithic settlers, was profound. Fox categorises too many different types of landscape together in the Highland Zone, and, although his text contains complex considerations of the interaction of people and soils, it can be seen that an oversimplified reading was applied by those who followed him - in particular Childe and Piggott. Specifically, Fox did not recognise the extent of well-drained fluvio-glacial parent materials in the eastern Scottish lowlands, giving the impression that it could be lumped in with the ‘ill-drained clay soils’ where ‘the natural vegetation is... “damp” oakwood... the undergrowth being very dense.’

However, Peate (1961, 251) has noted:

‘The application of the broad generalizations of physical geography to particular problems is always dangerous. The original adaptation, however brilliant as a theory,
becomes debased in the hands of subsequent writers who try to fit their own particular problems into its mould. The Highland-Lowland Zone theory has now resulted in a conception of Britain which may fairly be called a false dichotomy.'

Gordon Childe

Childe was Abercromby Professor of Archaeology at the University of Edinburgh from 1927 to 1946. In 1935 he published the first modern account of The Prehistory of Scotland. The account is of considerable interest. There are, however, flaws in some of the basic premises:

1. (1935, 1): ‘...Scotland is not an arbitrary political division but possesses...a personality of her own.' Scotland's southern border is by no means geographically determined, and within its border it is certainly not homogeneous.

2. Childe has been described as a ‘geographical possibilist’, who believed that ‘the natural environment limits but does not determine the nature of individual cultures’ (Trigger 1994, 13). Childe (1935, 7) states: ‘As a land suitable for primitive agriculture Scotland was at a disadvantage. Like the rest of Upland Britain [sic] Scotland is...capped in many cases by boulder clay...' Following Fox (above) he drew the conclusion that much of the country was covered by impassable ‘wet oak’ forest and bog. While recognising that ‘...the first settlers...had perforce to select patches of light well-drained soils...' (Childe 1935, 7) he did not have the advantage of modern Soil Survey of Scotland information, and he seems to have grossly underestimated the considerable extent of the light well-drained parent materials available in many lowland areas. We can now see how misleading was Childe's suggestion (1935, 8) that ‘...Scotland cannot have been an inviting country for agricultural settlement.' (Ballantyne and Dawson 1997; Soil Survey of Scotland 1982a; b; Walker, A D et al. 1982).

3. Childe's saw the colonisation of Scotland as in two parts - a movement along the west coast to the Northern Isles by builders of collective chambered tombs; and a colonisation of the east coast, a few generations later by users of Beaker pottery who buried their dead in individual graves. The isolated long cairns ' on the eastern coastal plain of North-east Scotland may be attributed to stray settlers who had crossed the Moray Firth from Caithness or Sutherland' (Childe 1935, 51).

4. ‘It appears...that the “Neolithic” culture of Scotland is fundamentally homogeneous and, apart from certain elements that may be secondary accretions, is essentially identical with the Windmill Hill culture of England.'

In 1940 Childe produced his Prehistoric Communities of the British Isles, which contained significant advances in understanding. He clearly expressed his recognition of a continuing
problem: (1940, 4)

‘Wessex, Sussex, the Upper Thames, East Anglia, eastern Yorkshire and South Wales have been thoroughly and scientifically explored. More recently the Orkney Islands and a small district round Kilmartin in Argyll have become well known...Such gross disparities in archaeological documentation are liable to distort prehistory...one must ask...how far the prominence of Sussex and Wessex in prehistory is due to Aubrey, Stukeley, Colt Hoare, Pitt-Rivers, the Cunningtons, the Curwens, Crawford, Hawkes, Stone and Piggott.’

He pursued the idea of a largely ‘national’ Neolithic culture. The colonisation of western Scotland was now assigned to a ‘Megalithic Religion’. In this account the areas without chambered tombs merely drop out of view. However, he also clearly appreciated the tentative nature of his ‘story’ when he presciently surmised that (1940, 80):

‘The long barrow, and even perhaps collective burial itself [thus] become integral traits in the original Windmill Hill culture. The whole ‘megalithic religion threatens to vanish in smoke!’

He reiterated the view inherited from Fox (1938, 76) that ‘clay lands’ supported impenetrable forest and that the chalk and limestone hills appeared to be ‘areas of primary settlement’ (Childe 1940, 4-5).

Childe uses Skara Brae more fully to explain the Neolithic of Scotland (1940, 58). It is instructive to note that the ‘large number of carved stone balls from the coasts of the Moray Firth and Aberdeenshire may...be taken as proof of a strong Skara Brae population in north-eastern Scotland.’

In 1944 Childe gave the annual Rhind lectures, on the subject of the prehistory of Scotland. The lectures were published under the title Scotland Before the Scots in 1946. In the Preface he marks an important departure from accepted approaches to the interpretation of Scottish prehistory (1946, v):

‘The prehistory of the British Isles was undoubtedly punctuated by a series of invasions. Accounts of [British prehistory] are liable to be so engrossed with tracing the successive invading groups to their Continental cradles and defining what contribution each introduced, that they have little space left to relate what the several societies did when they got here.’

Childe instead sought to put more emphasis on how societies developed and to investigate how this might be reflected in the archaeological record - very much the approach favoured today. He deliberately eschewed speculation about processes of colonisation based on tomb typology, instead describing ‘the observable activities of the several societies as they appear already established on our coasts and islands.’ (1940, 25) Unfortunately his approach was not widely adopted in Scotland, and consideration of the Neolithic period (with the exception of the geographer Kirk’s often overlooked survey of 1957) remained until the 1960s
concerned with accounts of successive invading colonists and the types of monuments they built (see 'Margaret Stewart' below).

He also took a more geographical approach to the country - defining a series of 13 'provinces' (Childe 1940, 21: Table II). In eastern Scotland he defined Fife, Kinross and Clackmannanshire, north to the Tay, as one, and the area from the Tay north to the Grampians and the Mounth as another. Strathearn and the Upper Tay do not figure as part of any of the provinces, nor is the very significant barrier formed by the hills between Kinross and Clackmannan on the one hand and the Tay on the other considered. The North-east beyond the Mounth is, more appropriately, considered a further 'province'.

As in Prehistoric Communities (1940) Childe used Skara Brae and Rinyo to provide an explanatory model (1940, 25): 'The whole life of Neolithic society is revealed with such an unique wealth of detail in the miraculously preserved domestic sites of Skara Brae and Rinyo that a description of Stage II [the Neolithic] can begin most conveniently there...'. However, he does not ignore eastern Scotland, noting that typical 'western' Neolithic pottery occurs in Moray and Aberdeenshire - beyond the 'megalithic provinces' - associated with scattered long cairns; although he sees these as 'the only direct indications of the existence of societies of stage II' he surmises that there 'must have been villages like Skara Brae between the Forth and the Pentland Firth.'

Hawkes

Jacqueta Hawkes has published (1945, 1951) a number of general accounts of 'British' prehistory, notable for their romanticism. Early Britain (1945) is a very general survey, straightforwardly demonstrating the continuity (despite invasion) of England, each successive wave of invaders being more 'nordic' or 'Teutonic' (thus presumably negating the otherwise disruptive effects of 'invasion'). The way that Scottish and Welsh monuments are included (though without any coherent local historical context, especially in the early historic period, which is wholly celebratory of Anglo-Saxon ethnicity) provides support for Craig's (1996) contention (discussed further below) that core traditions absorb what they wish from the peripheral traditions, making them their own.
CBA 1940s research agendas

In 1948 there appeared a valuable summary of the state of current knowledge, and an agenda for future research, in the form of the Council for British Archaeology’s *A Survey and Policy of Field Research in the Archaeology of Britain* (Council for British Archaeology 1948). The book was laid out in two parts. First, a period by period outline of the state of knowledge. Second, a statement ‘of the outstanding problems which appear to the writers to have primary importance for any systematic Policy of field research, and some practical recommendations bearing upon them.’ The survey was seen as providing a foundation for the resumption of fieldwork after the 1939-45 War. It was edited jointly by Piggott and Hawkes, who also wrote the Neolithic to Iron Age sections, with the assistance of Childe, Fox, Grimes, O’Neil and Varley.

The survey commences with a classic bipartite Windmill Hill (eastern) and Megalithic (western) colonisation model, taking the Peterborough ‘culture’ as a migration across the North Sea, and the Clava tombs as ‘Boyne culture’ derivatives. The final phase of the Neolithic is seen as that pertaining to Grooved Ware, arriving c. 2000 BC in southern England ‘and (but not demonstrably so early) in Northern Scotland’ (Council for British Archaeology 1948).

In the ‘outstanding problems’ section, it was suggested that progress had to be made in the provision of ‘Absolute chronology’, where greater correlation with environmental sequences was seen as the answer; ‘relative chronology’ as between the Mesolithic and early Neolithic, within the Neolithic and between the late Neolithic and Early Bronze Age, was considered as the other main issue. In the ‘Practical Recommendations’ the opportunity was to be taken to follow up any discovery of Neolithic habitation sites, and further, preferably complete, scientific excavation of burial sites was considered vital.

In the ‘Bronze Age’ section ‘circle sites’ (including henges) were given some prominence as being very productive of information about the Neolithic and Bronze Age - ‘more such monuments [should] be excavated, particularly simpler stone, timber or earthen circles in districts not hitherto explored by such excavation.’ (Council for British Archaeology 1948)

Scott

In 1951 Sir Lindsay Scott (1951a) surveyed the evidence for ‘The colonisation of Scotland in the second millennium BC’. In many ways he looked at the issue from first principles, in particular using analogies from anthropological literature. Unfortunately some of the
underlying assumptions head the discussion down a dead end. For example, the survey of the social complexities of trading relationships is interesting; however, the dominant ‘trading settlement’ model (where a ‘higher culture’ - clearly Wessex-based here - sets up trading stations in the territory of ‘lower cultures’) seems inappropriate in the Neolithic as we now know it.

**Piggott**

The year 1954 saw the publication of Stuart Piggott’s survey, *Neolithic Cultures of the British Isles*, the writing of which had actually been completed in 1951 (Piggott 1954). Piggott’s account of the detail of the Neolithic of Britain and Ireland is masterful - the scope and scale of the material presented is of a different order from any previous, and every subsequent, account. The relative lack of progress in Neolithic studies in the decades following 1954 is perhaps reflected by the lack of any synthesis to replace it until 1974 (Smith 1974), and that restricted in its coverage outside the south of England.

Piggott had a greater awareness of the extent of forest clearance (1954, 9) but the vision of ‘damp oak forests of the clays and the undrained morasses of the larger river-valleys’ (1954, 19), the legacy of Fox (1932, 1938, 1943) still survives, albeit Piggott suggests ‘not such a simple untutored response to an inability to clear the woodland as sometimes seems to have been assumed’ (Piggott 1954, 18).

After dealing with southern England in his earlier chapters, in looking north and west, Piggott stated clearly that he was moving from an area where there appeared to be adequate evidence to one where knowledge had to be derived from the ‘frequently equivocal, always unsatisfactory’ source of the chambered tombs and the ‘bewildering complexity’ of tomb architecture (Piggott 1954, 122). He had a realistic understanding ‘that ... elaborate typological schemes...may have only the peculiar academic interest of an ingenious supposition based on inadequate premises’ (Piggott 1954, 123).

The chambered tombs, where they occur in the east, as in Perthshire, were seen as the end product of a degenerative process (Piggott 1954, 182). Piggott’s consideration of the material for Perthshire and most of Scotland east and south of the Clava tombs was confined to a few burial sites - unchambered long cairns that could not be associated with any known grouping - for example, the long barrow at Longman Hill in Banffshire (Barclay and Maxwell 1998a).

At that time the recumbent stone circles of North-east Scotland were seen as being of the full Bronze Age and were therefore excluded from the survey. There were no settlement sites to be mentioned and Perthshire played no part in the synthesis of established knowledge. The
whole of eastern Scotland, containing some of our richest agricultural land, was virtually unknown territory, the only hints of Neolithic activity being the considerable numbers of stone axe and arrowhead finds. The henge monuments were beginning to be seen as later Neolithic, but here the broad brush approach to ‘British’ prehistory is exemplified by the assignment of the Cairnpapple (W Lothian) site to the ‘Dorchester culture’.

**Fairhurst**

In 1954 Horace Fairhurst, a geographer and archaeologist, published an account of ‘The geography of Scotland in prehistoric times’. This was the first geographical perspective on the Neolithic settlement since Fox. The account is notable for its more environmentally sensitive approach to the settlement capability of the lowlands – noting (1954, 8) the lighter woodland that would have been encountered on glacial sands and gravels, in contrast to the ‘relatively dense oakwood’ of the ‘heavy clay soils’ of central Scotland. As he wrote ‘Such country would be by no means difficult to colonise’.

**Kirk**

In 1957 Kirk published another geographer’s perspective in a paper entitled ‘The primary agricultural colonisation of Scotland’ (1957). The appreciation is explicitly based on contemporary archaeological accounts but has a far more broadly based appreciation of environmental and ecological factors.

Kirk’s awareness of the potential of the lowlands for settlement was far greater than the contemporary, Fox-influenced, prehistorians; however, as he had only pre-aerial photography monument distributions to work with, he adopted a diluted Foxian view of the lowlands (Kirk 1957, 78-9):

‘In eastern and southern Scotland for example, the heavier lands of the Tweed, Forth and Tay lowlands...and parts of the coastal lowlands of Aberdeenshire and Strathmore provide little evidence of farmers during the colonial period. The majority of the signs of occupation coincide with well-drained soils of a light to medium character - light loams of the middle slopes...; light silts overlying terrace gravels...; dry point sites in the lowlands, often provided by glacial mounds; and sandy coastal zones.’

Kirk devoted a whole section to ‘Regionalism’ in a conscious effort to identify valid regions; Kirk suggested that the geological division into Highlands, Central Lowlands and Southern Uplands were of little relevance. He split the country into two macro-regions - ‘Atlantic’ and ‘Continental’ Scotland. In the east there were three regions - Moray Firth, Aberdeenshire and Tay/Forth - specifically acknowledging the separate trends of development highlighted in 1955 (Atkinson 1955, 1962, see below).
Margaret Stewart

That Childe’s approach, as set out in 1946, had little effect on the writing of prehistory, can be seen in a paper by Margaret Stewart on the subject of upper Strathtay in the Neolithic and Bronze Age (Stewart 1959). The importance of this paper, which was the first survey of the Neolithic and Bronze Age of even part of Perthshire, should not be underestimated. But, as in the approach criticised by Childe, explanation was centred on distributions of monuments, each seen as directly reflecting the migration of different peoples. The account is therefore of little except historical interest. However, Stewart drew attention to the remarkable concentrations of large round barrows and cup and ring markings in Strathtay, both of which were later subjected to further study by others.

Atkinson and Daniel

Shortly after Stewart’s article there appeared, in 1962, an influential book called The Prehistoric Peoples of Scotland, the delayed (but updated) publication of papers given at a summer school in 1955. In one of the essays in the volume Richard Atkinson (Atkinson, R J C 1962) provided a wide-ranging summary of the Neolithic of Scotland, giving due weight for the first time to the material in the lowlands, but still relying heavily on southern English models to explain the Scottish evidence. For example, he continued to identify the long barrows of the east and the chambered tombs of the west as separate colonisations by southern ‘cultures’ (Atkinson, R J C 1962, 7). He went so far as to state that the late Neolithic material ‘can...all plausibly be regarded as intrusive, representing the northwards migration from England of cultures already fully formed before their expansion.’ It is clear how unimportant Perthshire was in the interpretative context of the time, from the map in his paper showing the distribution of early Neolithic pottery in Scotland (fig 1, p9) which shows Perthshire as blank. The eastern material was seen as the result of the Windmill Hill Culture coming north from Yorkshire combining with Irish influences moving along the Great Glen, both in search of Buchan flint.

Atkinson’s paper was in other ways very forward looking - he was the first to suggest a late Neolithic date for the recumbent stone circles of the North-east of Scotland (although he followed his predecessors in seeing an external, Irish, source for their design). He also took further Childe’s recognition of regional variation - in identifying what was going on the North-east in the ‘secondary’ Neolithic of Scotland as owing ‘little to influences from outside’ (1962, 32).
The continuation of the long-standing division between ‘Neolithic’ and ‘Megalithic’ colonisations is reflected by Daniel’s chapter in the same volume, entitled ‘The Megalith Builders’ (Daniel 1962). The paper is largely made up of typological analysis now seen as of limited value. As early as 1951 Scott had tellingly exposed the weaknesses of the typological approach to the interpretation of chambered tombs, and the application of these interpretations to the wider Neolithic, in a critical review of Daniel’s *The Prehistoric Chamber Tombs of England and Wales*. As he expressed it: ‘...the very merit of Dr Daniel’s exposition of his thesis has shown that the typological study of the ground-plans of the chambers of their tombs will carry us but a little way towards who the settlers were and whence they came.’ (Scott 1951b, 39)

Daniel’s paper is useful in providing a distribution map of the 14 then known henge monuments in Scotland (fig 9, p71) - the nearest to the study area being, to the south, Balfarg in Fife, and to the north, Broomend of Crichie near Inverurie in Aberdeenshire.

**Coles, Piggott & Simpson**

Margaret Stewart had drawn attention in her survey of Upper Strathtay to the considerable number of earthen round mounds in lowland areas of Perthshire and the adjacent counties: she interpreted these, inevitably at that time, as belonging ‘to an intrusive [Bronze Age] culture penetrating inland from the east coast’. Stewart was also active in persuading others to undertake archaeological investigation of sites in the area (Coles pers. comm.). One of the large mounds, at Pitnacree, on the floodplain of the Tay, attracted the attention of John Coles and Derek Simpson, (Coles, J M and Simpson 1965). The round mound covered the sort of timber mortuary structure normally found under Neolithic long burial mounds, but it had later been surrounded by a bank. The mound was radiocarbon-dated to the early Neolithic.

Piggott and Simpson undertook further work, on the stone circle at Croft Moraig; a roughly circular timber setting of the Neolithic had been replaced by a stone circle surrounded by a stony bank, and then further elaborated by the erection of a second circle of stones.

**Tayside in Prehistory**

In 1971 a brief regional overview, forming the introduction to a catalogue of the artefacts in Dundee Museum appeared, entitled *Tayside Before History* (Coutts 1971). It was designed to complement the same author’s *Ancient Monuments of Tayside* which had appeared the previous year, but rather it supersedes it. It provides an account of the distribution of various types of site and artefact in the study area, taking account of the most recent work (including
the discovery of the Dalladies and Capo long barrows). Its theoretical framework is broadly diffusionist, following Atkinson (1962) with a continued emphasis on invasion as a means of explaining change.

*The Beginning of the End: diffusionism in decline*

*Renfrew/Smith*

In 1974 there appeared (Renfrew 1974a) the first authoritative summary of British prehistory in the aftermath of the radiocarbon calibration revolution and Clark’s ‘Invasion’ paper (Clark 1966). The dual ‘western Neolithic’ and ‘megalithic’ colonisations were no longer believed to be relevant; however, it is interesting to note that, within the otherwise strictly period-based chapter structure, a chapter titled ‘Scottish chambered tombs and long mounds’ (Henshall 1974) was slotted in between ‘The Neolithic’ and ‘The Bronze Age’, as though the megaliths were still separate identifiable parts of the equation. While Renfrew (1974b) quotes Hodson (1962) ‘The first step should be to define groups in their own right…ancestry and affiliation…should only be sought after this definition’ the story is still of a restricted region of England, with the addition of miscellaneous material from elsewhere in Britain, lacking much in the way of regional context.

Smith, in her survey of the Neolithic of Britain (Smith 1974) noted that of the 150 radiocarbon dates then available, 60% were from southern England and 20% from Ireland, leaving the rest of Britain with sparse information. Her survey was new, in that it concentrated more on material culture than on monument (especially tomb) typologies. Once again sparse representation of pottery in eastern Scotland is reflected in the amount of attention the area receives.

Henshall’s survey of the tombs treads some new ground, but justifies the continued intense study of the tombs because they are effectively the only pre-Beaker monuments available apart from a few henges and the Orcadian material (Henshall 1963, 137). The two classes of chambered tombs (passage tombs and gallery graves) as well as the long mounds in the east (related to the eastern British tradition) still ‘presumably reflect the presence of culturally distinct peoples’ (Henshall 1963, 137).

It is ironic that the first page of the chapter on ‘The Bronze Age’ (Burgess 1974) includes the statement: ‘The relevance of Fox’s highland and lowland zones in the bronze age must be stressed in view of the growing tendency to dispute the division.’ While the most telling attack on Fox was published in the following year (Stevenson, J B 1975), that paper had
originally been given at a conference in March 1974, and Burgess’ comment may well refer directly to that. As an historical footnote it can be noted that Fox has not yet been wholly displaced: Burl (2000, 36) continues to value the highland/lowland division.

**The abandonment of the Highland and Lowland Zones 1961-1975**

As noted above, in 1961 Iowerth Peate (1961) had, in a review of a book about English cottages, criticised Fox’s binary classification of Britain into Highland and Lowland zones. In 1963 Daniel drew the attention of a wider readership to Peate’s argument, in a review of Fox’s legacy (Daniel 1963): ‘It is unfortunate that Fox’s theses…have been referred to, sometimes as though canonized, as “Fox’s Laws” and particularly unfortunate and unhappy when his suggestions are used with a strong flavour of geographical determinism…’ (1963, 9).

In 1975 Stevenson’s brief but very influential paper titled ‘Survival and Discovery’ (Stevenson, J B 1975) was the first to look seriously at land use in relation to the perceived distributions of monuments. For the purposes of this review the most important points related to Fox’s divisions. Stevenson (1975, 104) suggested a new definition:

‘…one way of redefining the zones may be to see the Lowland Zone as the area with little land-use variation per unit area and a high proportion of agricultural land; while the Highland Zone has much greater variation in land-use and a high proportion of marginal or unenclosed land. Such a definition differs fundamentally from that of Fox, as the country could be broken down into a large number of small units and not into two large blocks.’

This seems fundamentally more sustainable than the arbitrary lumping together of large and unlike landscapes as either ‘Highland’ or ‘Lowland’: for example, the lowlands of eastern Scotland have more in common with the east of England than with the Scottish Highlands. Stevenson’s paper marks an important turning point in Scottish prehistoric studies - the recognition that complex patterns have to be read in a more sophisticated way.

**Megaw/Simpson**

In 1979, with the publication of *Introduction to British Prehistory* (Megaw and Simpson 1979), it was still possible for Derek Simpson to write of ‘the Windmill Hill culture province’ (1979, 103), and to describe the evidence in the area beyond it as ‘scarce’. This volume was really completed in 1976/7; it therefore came too soon to take account of the results of the sudden upsurge in aerial photography or rescue excavation in Scotland from 1977 onwards. In this period, early in the campaign of RCAHMS aerial photography in Scotland, the lowlands still seemed sparsely scattered with monuments and the lack of
causewayed camps was seen as a major hindrance to data gathering and interpretation (Megaw and Simpson 1979, 103). The account concentrates on description but hazards little in explanation.

The Pitnacree-type round mounds are mentioned and described as being part of a major concentration of presumed Neolithic round barrows in Perthshire (Megaw and Simpson 1979, 107). The volume is also significant in marking the first occurrence of the suggestion that henges may have originated outside Wessex (1979, 155).

Summary - 'Diffusionist' and 'Universalist' Prehistories of the 1940s to 1970s

The treatment of the Neolithic of eastern Scotland in the various pre-1980s accounts informs us in two ways about the operation, until recently, of Neolithic and wider prehistoric studies in Britain. First, in the distribution of archaeological material.

The Distribution of Archaeological Material

Until the 1970s the Neolithic of Scotland was, like most of its prehistoric archaeology, perceived as situated either in the uplands or in the Northern and Western Isles, and usually made of stone. Where archaeological sites were known in the lowlands, they were seen as upstanding islands in arable deserts, in which few other sites survived. There was little aerial photographic evidence, the Royal Commission had undertaken no survey in the eastern Scotland since the 1930s, and the only Neolithic sites known were the few chambered tombs at the western edge of the county, surveyed by Audrey Henshall in the 1950s and 1960s and published in her authoritative survey of the chambered tombs of Scotland (Henshall 1963; 1972), or were puzzling anomalies, like Grandtully (Simpson & Coles 1990).

Even many upstanding monuments in the lowlands had not been recognised. In areas seen as containing only stone monuments there was no expectation, and therefore no conceptual capacity, to identify earthen monuments of a kind common elsewhere in Britain. For example a prominent earthen barrow was only noticed in 1989 (Harden 1989) although it lies only 30m across the arable field from the Corrimony cairn, excavated in the 1950s (Piggott 1956) and subsequently displayed as a Property in State Care. Lowland Scotland was seen to have only relatively sparse distributions of Neolithic monuments, and those of kinds with few characteristics to encourage classification or further study. The problem was exacerbated by other considerations. Monuments might be too large to be recognised as man-made, or there could be disagreement in some areas about the interpretation of mounds in the countryside, either as burial mounds, or merely as glacial hillocks. For example, in 1968 a possible long cist was noted in the flank of a low, narrow glacial ridge near Callander. It was
only in 1991 that Lorna Main, the local authority archaeologist, realised that the so-called ridge was actually a 350m long cairn - the longest in Britain, with a chamber at the east end, and another part-way along (Main 1991).

Most recently, the nature of the Herald Hill long barrow, in Perthshire has been a matter of contention - some archaeologists believed that it was a classic long barrow, despite RCAHMS' dismissal of the site as natural in a recently published survey of the area (RCAHMS 1994). The matter has been resolved by the excavation of a test-pit in the mound, which has shown both views to have had some right on their side - the mound is substantially artificial, but it is built on a pre-existing natural rise (Barclay and Maxwell 1998a; b).

**Diffusionism**

Until the 1970s, as has been demonstrated in the summaries above, it seemed possible to deal with the Neolithic of Britain as a relatively unified phenomenon, and it was accepted; in fact it was the normal expectation, that explanations devised in one area, usually using relatively well-studied sets of data, could be exported wholesale to explain sites and finds in other areas. The result was that throughout Britain Neolithic material was interpreted on the basis of excavated evidence and field survey largely in the area round Stonehenge - the area known as Wessex - and the Upper Thames Valley.

This approach underpinned Childe's various accounts and that of Piggott (Piggott 1954). It must be said that they and their contemporaries had little alternative to using these limited data-sets, but the process of spreading sparse data thinly tended to create homogenous, broad brush prehistories that underemphasised regional variation and promoted a diffusionist approach. It is possible to see now that the sites drawn together to create a 'British Neolithic' are probably parts of different regional 'Neolithics' throughout Britain and Ireland (Barclay 1997b; 1999; Cooney 1991; Harding, J et al. 1996; Kinnes 1985).

**From the mid 1970s**

The emphasis of our survey changes in the mid 1970s, from rather general surveys where the limited amount of data for the eastern lowlands is clear, to the sudden upsurge in rescue archaeology and aerial photography, dealt with in more detail under Objectives 1 to 3 above.

**Round Mounds**

In 1978 a round burial mound, even larger than Pitnacree, was excavated at North Mains, on the Strathallan estate, in Strathearn. Before excavation it was expected to be broadly comparable in structure and date to Pitnacree. However, on excavation, the mound was dated
to around a thousand years later (Barclay 1983). After a phase of agriculture indicated by ridging of the soil (Barclay 1989) the pre-mound activity culminated in the creation of a timber enclosure at the focus of 18 radial fences. Within the bays formed by the fences, and around the enclosure, a ring-bank was erected. Within the enclosure it is presumed that a burial took place - indications on the ground, and the results of a phosphate survey suggest only one or two bodies (Barclay 1983).

Interestingly, the Clava cairns found in the area round Inverness seem also each to have been for the burial of an individual, and they have been recently re-dated (Bradley 2000b), making them broadly contemporary with North Mains. We may perhaps speculate that there is a tradition in eastern Scotland of vast mounds covering burials of important individuals at the end of the Neolithic.

Most recently of all, the excavation of a round mound at House of Dun in Angus, by the National Trust for Scotland (Peterson and Proudfoot 1997), has shown again the dangers of assuming that sites of apparently similar surface appearance are of the same period or design. Here, excavation has shown yet another sort of mound substructure, hitherto not seen anywhere in eastern Scotland, where a stone chamber was built in a pit dug in the subsoil, and possibly covered by a corbelled roof - broadly similar to, but apparently earlier than, the Clava cairns. The chamber was subsequently covered by a mound which was later remodelled.

The way that these mounds fit into the larger picture is considered under Objective 4.

**Summary - 1970s Onwards**

Although not now so overt, the practice of trying to understand the Neolithic of the whole of Britain and Ireland using explanations built on data from these limited areas still continues. For example, in 1996 a set of papers appeared under the title *The Neolithic in no-man's land* (Frodsham 1996) prompted by the lack of any synthesis of the Neolithic in northern England and southern Scotland. In that volume it was noted that: ‘...while recent interpretative accounts acknowledge the fragmentary nature of the Neolithic they continue the traditional focus upon those intensively studied parts of England and Scotland - the Wessex chalkland and Orkney...the reader of recent accounts would be hard pressed to find discussion of direct relevance to other regions’ (Harding, Frodsham and Durden 1996, 189). So this problem - the lack of locally relevant interpretative structures, is a problem faced by much of Britain. Wainwright’s survey of *The Henge Monuments* (1989) is, despite its subtitle (‘ceremony and society in prehistoric Britain’), almost wholly concerned with the henges of Wessex.
MacKie's paper on the Neolithic of Orkney (1997) has an unreconstructed diffusionist basis. One of the bases of the problem is one faced in many areas of archaeological endeavour: it is normal to assume that where a phenomenon is first recognised and studied is where that phenomenon actually originated. For example, for over a century Attic black figure pottery was assumed to be Etruscan in origin, because the best and most complete examples were found in tombs in southern Italy, rather than in Greece (Boardman 1974). In this country, henge monuments - major ceremonial enclosures of the later Neolithic, for example Cairnpapple in W Lothian - were first noted and studied in southern England, and were assumed to have originated there and to have spread elsewhere. Origins for the henge tradition were sought until less than a decade ago in the massive causewayed enclosures of midland and S England (e.g. Harding, A 1987). Radiocarbon dating now suggests that henges in the south were generally built later than those in the north, so they are not likely to have originated in the causewayed enclosures of Wessex (Parker Pearson 1993). But some archaeologists now assume that if henges did not originate in one well-studied area - Wessex - the point of origin must now slide to the other end of the axis - to the other well-studied area - Orkney, rather than to any point between (Parker Pearson 1993). An Orcadian origin for Grooved Ware is in danger of becoming an orthodoxy (Harding, J 2000), despite there being no evidence to single out Orkney in northern Britain (Cowie & MacSween 1999).

Archaeologists working in Scotland have begun to work more with material on a regional scale (e.g. Bradley 2000b, Thomas 1999), looking outside that area only once a regional model has been sketched out. However, it may be suggested that scholars working in the so-called 'core-areas' of Wessex and Orkney are still working on the assumption that entire sequences of development are present there. This was underlined at the international conference on the Neolithic in Orkney 1998 (Ritchie 2000), where it was clear that the conceptual framework of most speakers assumed only local development of all features of the Orcadian Neolithic: it appears also that there is an unwillingness to see 'core' areas as recipients rather than exporters of change. The possible deeper cultural reasons for this are discussed further in the next section.
Objective 6

To set the study and perceptions of lowland archaeology in a wider historical and cultural context

This Objective is considered in two parts. First, a survey of general issues. Second, a consideration of how these issues impinge on the writing of prehistory.

General Issues

The process of writing history cannot be separated from the cultural, historical and indeed political milieu in which it is written. It has been recognised in recent decades that 'In fact, archaeology is a highly political practice' (Ucko 1989) but that '...the examination of the relationships between archaeology and politics has generally been avoided' (Ucko 1989, xiv). It is noteworthy that recent considerations of the political and historiographical aspects of archaeology have concentrated on the effects of Eurocentrism on the Third World or on native peoples in areas settled by Europeans (e.g. the USA). Consideration of current 'political' archaeology in Europe has been limited, in one of the most recent surveys (Kohl & Fawcett 1995) to three fascist dictatorships (Arnold & Hassmann 1995; Diaz-Andreu 1995; Lillios 1995). There seems to be little literature in British archaeology which recognises the ways in which regionally restricted visions of identity, landscape and history have influenced the development of archaeological thought in the British Isles, and in particular for Scotland.

Since 1979, when a referendum on a devolved parliament for Scotland did not achieve an adequate majority in favour, historians and cultural commentators have looked far more critically at the nature of Scotland before the Parliamentary Union of 1707 with England and how perceptions of Scotland's place in Britain have changed through the 18th, 19th and 20th centuries. There is now an enormous literature on the nature of Scotland's political, historical, literary and cultural identity, and how the Scots' own perceptions of themselves have been reflected in the three centuries of Union. While much of this material deals directly with the writing of history, there has been little consideration of the writing of prehistory. At the Nationalism in Archaeology conference in 1994, the proceedings of which were subsequently published (Atkinson et al. 1996) a handful of papers addressed the issues of identity and the writing of history (Atkinson 1996; Banks 1996; Dennell 1996; Sharples 1996) but none looked in depth at the historiography of Scottish prehistory. While Champion (1996) provides a separate account of the development of archaeology in relation to
nationalism in each of England, Wales and Scotland, his consideration of the interaction between these nationalisms is limited.

The absence of a developed archaeological contribution to the wider debate may in part be explained by the lack of any university Department of Scottish Archaeology or Prehistory (in contrast to the numbers of Scottish History departments), and by the limited number of Scots working in the two established archaeology departments in Scotland (Sharples 1996). Whatever the reason, the historiography of Scottish archaeology has not been a high priority.

Cooney, in his influential paper of 1997 asked many of the questions I ask here: who defines what evidence is ‘core’, ‘typical’ or the ‘norm’ and what is ‘peripheral’, ‘atypical’ or ‘abnormal’, in relation to Wessex-oriented prehistories, yet in comparing the Irish experience, he sees the other half of the equation as something called ‘British archaeology’, something that many archaeologists working in this island would not recognise as existing.

We must consider the way that terms such as ‘British’, ‘Scottish’ and ‘English’ are used, in discussions of the development of shifting perceptions of historical thought and ethnicity.

Scottish Identities

The modern entity known as Scotland occupies the northern third of mainland Britain. Scotland has a complex identity within the ‘United Kingdom of Great Britain and Northern Ireland’. Between the Parliamentary Union of 1707 and the establishment of the new devolved parliament in Edinburgh in 1999, it was a nation with a capital and its own legal system, but with no means of passing its own laws; not a colony, but not sovereign; an active participant in, rather than a victim of, 19th century imperialism (Davidson 2000). Since the Union the writing of the history of Britain has been a more or less political process, the viewpoint of the historian depending on the individual’s position on the meaning and consequences of the Union and on the process of securing the creation of ‘North Britain’ and ‘South Britain’ - ‘the wider experiment to construct a new genuine British identity which would be formed from the two nations of Scotland and England’ (Finlay 1998).

While there was a real willingness to embrace the idea of ‘Britain’ in Scotland, with the adoption of the name ‘North Britain’, there was no parallel willingness to replace England with ‘South Britain’ (Colley 1992, 121; Finlay 1998); indeed, there were periods of pronounced anti-Scottish feeling. At the same time, in the late 18th century, Scottish Enlightenment historians, as part of the process of securing the creation of ‘North Britain’ were, it is argued, undermining Scottish historical confidence and assertiveness by
promoting a view of pre-Union Scotland as a poor and barbarous country, riven by religious sectarianism and plagued with famine (Beveridge & Turnbull 1989). Few aspects of the Scottish past escaped their critical scrutiny, effectively removing it as a repository of political and institutional value; as a result, Beveridge and Turnbull (1989, 96-7) claim that by the 1830s Scotland had been deprived of the kind of intellectual and symbolic material required (and used elsewhere in Europe) to create the raw material of a romantic, liberal nationalism. Scotland’s ‘missing nationalism’ in the 19th century has been the subject of considerable discussion (see Morton 1998); it has been seen as a notable exception to the rest of Europe (Kidd 1995). While, it is argued, Scottish history was thus deconstructed and devalued, the idea of a coherent nation was also under threat from another direction, the accentuation of ethnic divisions within Scotland.

Political and cultural differences between the lowlands, which had early come under the control of the Crown, and the highlands, where royal control was nominal, if that, had been growing since the late 15th century (Pittock 1999). By the 18th century Highlanders were being routinely characterised as a ‘race sunk in vice, indolence and slavery’ (MacDougall 1982), in contrast to the ‘industrious and libertarian’ Teuton/Saxon/Goth lowlander (Kidd 1995). In the 19th century the view was further promoted that lowland, largely Protestant, Scots were descended from Anglo-Saxon stock, and were therefore more closely related to the inhabitants of England, while being superior, morally and physically, to the Celtic, predominantly Catholic, populations of the west (Kidd 1995). This Scottish Teutonism (still reflected in the nickname of the largely protestant-supported Glasgow Rangers Football Club - ‘the Huns’) is a branch of the scientific racism characteristic of 19th century Europe, and Scottish thinkers played a direct, and in retrospect shameful, role in these wider developments (e.g. John Pinkerton (Ferguson 1998) and Thomas Carlyle (Kidd 1995)). The promotion of a Lowland Scots consciousness tied to Teutonist ethnic arguments reinforced the association of post-Union Lowland Scots with England (e.g. in their prominent role in the expansion of the British empire (Kidd 1995)).

There was, paradoxically, during the late 18th and 19th century a widespread adoption in the lowlands of ‘tartanry’ or a romantic pseudo-Jacobitism (e.g. that evident in the London journal of James Boswell - cf. entry for 17 January 1763 (Pottle 1950)); this has been characterised as a ‘weekend’ identification with the exotic culture of Gaeldom and the latterly Catholic royal house of Stewart, deposed in 1689 in favour of a protestant succession, the result being a sentimental rather than a nationalist view of Scottish culture (Kidd 1995). The paradox is very striking – the paraphernalia and a sanitised version of the
identity of the highlands was being adopted as a national archetype, while at the same time the real inhabitants of the Highlands and islands were being redefined as inferior beings, useful only in the military service of the Empire.

This representation of the whole of Scotland by the paraphernalia of the Highlands - dress, scenery and even language, in the frequent assertions of the primacy of Gaelic over other tongues, and in the context of this discussion, archaeology (Chapman 1978; Womack 1989; McCrone 1992; Atkinson 1996) is a reflection of a well-recognised problem in the determination of Scottish identity - the idea of Highlandism, to which I will return.

British Identities

To try to explain the problem of the meaning of ‘British’ identities I find I can do no better than to quote Pittock (1999, 104), and to include a quote within a quote:

‘Organicism was (and to an large extent still is) one of the major postulates of a British identity: the indissolubility of Britain through common experiences, common struggles... This rhetoric does, however, systematically subvert itself by its interchangeable use of ‘England’ and ‘Britain’, which, more than a harmless slip of the tongue, is a deeply held semantic preference which has historically indicated the limits of real British integration. As Gwynfor Evans put it in 1981:

“What is Britishness? The first thing to realize that it is another word for Englishness, it is a political word... which extends Englishness over the lives of the Welsh, the Scots and the Irish.”

From the 1750s there has been a deep vein of resistance to the replacement of ‘England’ with ‘Britain’. For example ‘John Took... used his Petition of an Englishman (1765) to warn [government and king] against melting “the English name... down to Britain”’ (Colley 1992, 121).

This leads us inevitably to considerations of English identities.

English Identities

Craig (1996) argues that some major cultures see themselves as ‘organic’ or ‘unified’ cultures – those which see themselves as having an unbroken tradition, which can describe themselves as one of a handful of ‘major’ cultures. Such cultures come to believe that their progress comes to define the very idea of progress itself. He identifies England as one of
these. He notes the way in which narrative and other traditions within such cultures are assigned a primacy (as, I would argue, is the case with the archaeology of southern England).

In the sense that most of the rest of the world would recognise nationalism – for example in the routine prominent display of national flags in and on public buildings, or on special ‘national days’, or the frequent public avowal of loyalty to a nation or its flag, England indeed shows few signs. ‘English nationalism’ is commonly associated with the activities of a racist minority, rather than with an understandable pride in country. But that is not to say that an almost unconscious but powerful English national consciousness does not manifest itself. Paxman (1998) has said ‘...very little at all has been written on the subject of English nationalism’ and also that there is no nationalist movement in England. This he ascribes to a lack of foreign occupation and any attempt to extinguish indigenous culture. However, this is to miss the point about what Craig (1996, 103) has described as the rare, or perhaps unique, kind of national consciousness of the English:

‘English experience is... defined, over against the other nations, as undeflected by its nationality: it represents a history whose nationality is not in question, and to which national issues are therefore irrelevant. “The English Question” is not, like the ‘Irish Question’, part of the problem of British history.’

The perception that ‘English nationalism is very weakly developed’ is widespread (Diaz-Andreu & Chapman 1996, 15), the explanation being that ‘England has rarely been seriously threatened’ (Diaz-Andreu & Chapman 1996, 15), taking no account of the effect that this very security can have on the development of national consciousness. That is, the national identity of England is so secure and English culture is felt to be so ‘organic’ (that is, in an unbroken tradition) that its conscious defence is rarely felt to be necessary; there are notable exceptions, for example at any time from the 18th to the 20th centuries, when Scots are perceived to have disproportionate power in the UK government, gutter journalists can launch virulent and vicious attacks (e.g. Wilkes in the 1750s; Paul Johnson ‘A poisonous lowland pox on our nation’ – Spectator 2000).

Ideals of landscape

The wider problems of Scottish and English identities are clearly reflected in perceptions of their respective landscapes. Scottish landscapes in general, as expressed in painting, were, in the 19th century, taken to be those of highland scenes. To quote:

‘During the nineteenth century the popular image of Scotland was created by the painters of the vast panoramic landscapes... [which] conformed with, and encouraged, the romantic notions of the Highlands evoked in a populace brought up on the novels of Sir Walter Scott and his imitators’. (Billcliffe 1987)
Where the life of the people was shown, it was that of the picturesque Highlander, not the prosperous lowland farmer. The highlands are the ‘archetypal landscape’ of Scotland, although it could be argued that this too was as much a product for the ‘Balmoralised’ English upper middle classes as any native perception. It is interesting to note that in the 20th century this ‘archetypal landscape’ was the one that had most archaeological investigation in Scotland (Barclay 1997), a point I will return to below.

In contrast, Pittock (1999, 7) notes that ‘expressions of English identity in modern times have been strongly bound up with concepts of essential national worth inhering in an idealised and well-ordered rurality’ and that (p9) a ruralism, particularly southern and south midlands, has become an increasingly important component of discourses of Englishness. He notes the power that visions of landscape can exert, but that they are part of the experience of a minority of the English population:

‘... the deep-seated ruralist quality frequently expressed in appeals to Englishness is also... overwhelmingly southern, often evoking rolling downs... This envisioning... seeks to account totalisingly for the nature of Britishness in terms which are geographically limited and by definition experienced only by a minority’.

As Craig puts it (1996, 128)

‘Landscape is not, in English culture and English writing, just the setting, the background, or the unavoidable context: it is the very embodiment of human values.’

Paxman (1999, 161) has used the poetry of Thomas (1878-1917) to exemplify this vision:

‘Of course, it is not England that is reflected in his poems. It is a part of England. Thomas’s England, the England of rolling hills, village greens and hedgerows is what he termed The South Country... below the Thames and the Severn and east of Exmoor: it included Kent, Sussex, Surrey, Hampshire, Berkshire, Wiltshire, Dorset and part of Somerset. To all intents and purposes this is the essential England. Over time it has expanded to include Oxfordshire.’

Craig also (1996, 130) quotes Forster’s pseudo-religious vision of English landscape:

‘Chalk made the dust white, chalk made the water clear, chalk made the clean and rolling outlines of the land, and favoured the grass and distant coronals of trees. Here is the heart of our island: the Chilterns, the North Downs, the South Downs, radiate hence. The fibres of England unite in Wiltshire, and did we condescend to worship her, here we should erect our national shrine...’ (The Longest Journey, 1907).

Champion has argued (1996, 125-6) that the growing role of this archetypal landscape in English consciousness, and the importance given to its preservation, stems from a late 19th century passing of imperial certainties. The archetypal ‘rolling hills’ figure prominently in 20th century visions of ‘British’ prehistory e.g. (Hawkes 1945; 1951) as the suppose cradle of the early Neolithic in Britain and some of the language used seems to stem from this ‘deep
vein of rural nostalgia’. It is surely this politically-loaded reactionary harking back to an ‘eternal British [i.e. southern English] countryside’ that Thomas was rejecting in his deconstruction of the traditional agrarian view of the Neolithic (Thomas 1991).

**Inferiorism – ‘Core’ and ‘Periphery’**

A decade ago Beveridge and Turnbull (1989) argued that views of Scottish history and culture could be paralleled in Fanon’s studies of the psychological and cultural dimensions of colonial domination in the Third World. Fanon argues that the native comes to internalise the message that local culture is inferior to that of the coloniser, and Beveridge and Turnbull used his ideas of ‘inferiorism’ to reconsider the way Scotland’s history before and after the Act of Union had been treated. Sharples drew on their argument in his 1996 paper about Stuart Piggott’s career in Scotland.

Whether one agrees or disagrees with the historical points made by Beveridge and Turnbull, their suggestion that many areas of intellectual endeavour in Scotland are seen, by Scots themselves, from a London-metropolitan perspective, may be more widely accepted. That is, we can see manifestations of our own culture as parochial and peripheral, even though we live in that periphery; for example, Craig (1996, Ch. 4) argues that we judge Scottish culture not on the basis of comparable ‘peripheral’ nations (such as Norway or Denmark) but by the standards of a larger ‘organic’ culture, like England or France. Beveridge and Turnbull conclude with a contemplation of a world view in which the themes, the typologies and periodisation perceived within the history of the core cultures come to define, not only for themselves, but for their satellite cultures, the very way of knowing what history is (Beveridge and Turnbull 1989, 50). I would argue (below) that this description can fairly be applied to recent writing in Scottish/British prehistory, and its effect has not yet dissipated.

Craig (1996, 116) puts it thus:

‘It is because the consequences for the core cultures of being core cultures have been taken, from within an evolutionary, developmentalist perspective, to be normal, that they have been assumed to set a standard by which we should judge all culture. Core cultures are not normal: they are, by definition, abnormal, since cores are few and peripheries many. It is because core cultures presented themselves as being advanced that they assume that the history of culture ought to be written around their development, around their periodisation.’

Craig develops the argument set out above to examine the way in which a large ‘core’ or ‘organic’ culture will relate to a smaller ‘peripheral’ culture with which it is joined in a political Union, and, effectively, a cultural union. In particular he considers the absorption of
elements from the periphery to the core – his argument is based on traditions of literary and political narrative.

He sets out a convincing argument that contributions from the ‘periphery’ are absorbed into the core. Thus F R Leavis (1948) could assert that ‘The greatest English novelists are Jane Austin, George Eliot, Henry James and Joseph Conrad’ – Craig (1996, 18) notes that the last two are American and Polish!

Craig provides further examples: in Williams’ Marxist Culture and Society (1963, 85) we learn that: ‘In 1829, in the Edinburgh Review, Carlyle published his important essay Signs of the Times [which] was to establish itself in the general thinking of many other writers, and as a major element of the tradition of English social criticism.’ Craig (1996, 21) notes that Williams separates the origin of Carlyle’s work from its ‘real’ meaning. In Williams ‘we see, as in so many ‘English” critics, the construction of a paradigmatically whole history whose every step must be matched’ in any culture that is to be considered ‘organic’, as England’s is.

Craig notes ‘It is not so much by the actual loss of artists that the peripheral culture is impoverished, though this is bad enough, but by the fact that any significant work consumed within the core culture is then assimilated to its tradition and is denied any role within the culture from which its creator derived’ (1996, 19). As he continues (Craig 1996, 21) ‘Failures of the core culture to provide evidence are made up from the peripheries and so complete its organic wholeness’. It is this that allows Skara Brae to be routinely absorbed into surveys of a largely southern English Neolithic, although, as noted by Cooney (1997) where its evidence contradicts that from the core, it can be redefined as ‘peripheral’.

Craig suggests that the movement is in one direction only, from periphery to core – for example, it would be unthinkable to say that Dickens’ Hard Times is a work of Scottish literature because it is so influenced by Carlyle: ‘...only the core culture is allowed a perspectival tradition that entitles it to incorporate everything into itself that is required to prove its fundamental continuity’. That this has affected archaeological writing is demonstrated, in the past, by writings such as Hawkes’ (1945, 1951) and in the present, by the unwillingness (noted above under Objective 5) of scholars working in the so-called ‘core’ area of Wessex (and to a considerable extent, Orkney) to deal effectively with the possibility that entire sequences of development may not be present in these places.

It is informative that in a review of Cooney’s critique of this core/periphery model of archaeological writing, Thomas accused him of ‘a whiff of nationalism’ (Thomas 1998) – it
is ironic that Thomas seems unaware of the impact of his own, presumably, unconscious nationalism.

Finally, the operation of ‘core’ absorbing ‘periphery’ but not vice versa, can be illustrated by the titles of books relating to prehistory in the parallel Batsford book series published with English Heritage and Historic Scotland.

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*Table 6.1 Titles of parallel texts in English Heritage’s and Historic Scotland’s book series with the publisher Batsford*

‘...Scotland cannot have been an inviting country for agricultural settlement’ (Childe 1935, 8)

In the first section I tried to summarise the relevant parts of an extensive literature to set out a range of general issues that seem to affect the way that perceptions of the identity, culture and history of a ‘peripheral’ culture can be affected by its related ‘core’. In this case the way in which Scotland relates to Britain and to England.

They are:

1. The difficulty of separating the concepts of ‘British’ and ‘English’ and the wholly unconscious functioning of England’s peculiar nationalism, which is perceived in England as not even being ‘nationalism’ of the kind found in other cultures (cf. Craig 1996, 103) ‘it represents a history whose nationality is not in question, and to which national issues are therefore irrelevant.’
2. the tendency to erect English patterns as a norm against which other patterns can be seen to be abnormal (cf. Craig 1996, 102-3);
3. the role of a regionally restricted conception of an archetypal landscape in the English national consciousness (cf. Pittock 1999) – the south, ‘the Lowland Zone’, the chalk, the downs.
4. the conception of England as one of a few, or perhaps the only ‘organic’ culture with an unbroken tradition (cf. Craig 1996), which operates as a powerful ‘core’ which draws evidence from ‘peripheries’ to fill gaps in its evidence and redefines ‘peripheral’ as ‘core’ when convenient (cf. Craig 1996; Beveridge & Turnbull 1989);
In recent times one school of nationalist thought has tried to turn the clock back, to ‘replay’ the development of a 19th century Romantic nationalism, by downplaying ethnic diversity and to define ‘Scottishness’ as ‘Celticness’; unfortunately this effectively, but perhaps not deliberately, devalues the ‘Scottishness’ of those things that are shared with the English, no matter how much they are part of Scotland (Beveridge & Turnbull 1997).

Highland and Lowland: Fox’s Visions of Landscape

Above I outlined the almost mystical power of the vision of the regionally constrained archetypal English landscape. Fox’s influential Personality of Britain (discussed above) built on the same foundations. I have argued that he had a powerful influence on contemporary and later writers on the prehistory of Britain and of Scotland, portraying the Highland Zone as the inevitable recipient of cultural influences, and Scotland as an area not inviting to early settlement. The effects are considered in detail under Objective 5.

‘...a history which seeks conformity and minimizes difference and nuance.’
(Pittock 1999, 98)

This description of what is often called ‘Four Nations History’ – the history supposedly of the constituent parts of the United Kingdom - can fairly be applied to some so-called ‘British’ prehistory (e.g. Hawkes 1945; Dyer 1990).

As noted above, until the 1970s it was the normal expectation, that explanatory models could be applied uncritically across Britain and Ireland. The relatively small amounts of data necessitated the pulling together of sparse data, thinly spread across most of Britain, creating homogenous, broad brush prehistories that underemphasised regional variation and promoted a diffusionist approach. Interpretative models were developed in areas with larger or better studied data sets, Wessex and the Upper Thames Valley. Just as the greater part of archaeological endeavour in the 20th century in Scotland was concentrated in the highlands and islands - the archetypal Scottish landscape - I believe that it is no coincidence that this is also true of the concentration of resources in the heart of the archetypal ‘English landscape’ of Wessex.

Although the problem of interpreting the whole archaeology of Britain based on the archaeology of one or two heavily-studied regions has been recognised, the accommodation to this new perspective has been incomplete. For example, in the last decade a model of settlement in the Neolithic based on the evidence of one region - Wessex and Sussex - where remains of domestic structures and cultivated cereals are rare, has been extended to cover the
whole of Britain and Ireland, apparently with scant regard to the evidence elsewhere (Barrett 1994; Edmonds 1995; Parker-Pearson 1993; Thomas 1991). The absurdity of this has been very elegantly exposed by Gabriel Cooney (1997) who notes that the abundant Irish evidence for settled agriculture in the Neolithic is underplayed, or like evidence from regions of Britain itself that does not fit this mobility model - and Orkney is the example he uses - it is redefined as exceptional or peripheral rather than something that offers evidence for a different interpretation of the Neolithic. We can see therefore that while the fragmentary nature of the Neolithic is accepted at one level there is still strong pressure for a generalised ‘normative’ ‘four nations’ pattern of settlement, based on an area, the evidence from which is consciously or unconsciously assigned a primacy. As Cooney notes, this ‘mobile Neolithic’ model has become another orthodoxy, driven, as Beveridge and Turnbull might say, by those same ‘ubiquitous institutional and ideological pressures exerted by core powers on their satellites’ (1989). Cooney laments that the normal response to his arguments would be that such evidence comes from peripheral areas. But then he asks, who defines what is the core and what is the periphery?

It appears to be a recurring pattern that ‘British’ narratives where, as they more closely approach the present, deal less and less coherently with variation across Britain. That is, the relatively homogenous earlier Neolithic material of Britain dealt with fairly evenly, but by the end of the Neolithic the area under consideration has contracted, and by the later Bronze Age is effectively restricted to the southern part of Britain (e.g. Parker Pearson 1993). The most striking example is Hawkes’ Early Britain (1945) where the final chapter of the book, on the early historic period deals solely with the ‘Anglo-Saxon nation’ (i.e. the roots of England); Ireland and Scotland merely figure as the source of and disturbing raids from the periphery on the ‘core’, rather than as part of the story of ‘Britain’. The apparent disruption of the ‘organic’ nature of English culture by invasion appears in this account to be tempered for the author by the increasingly ‘nordic’ racial characteristics of the invaders. More recently the volume Archaeology in Britain Since 1945 (Longworth & Cherry 1986) illustrates the survival of this approach: the three chapters covering Britain from prehistory to AD 1100 are titled:

1. Prehistoric Britain
2. A Roman Province AD43 - AD410
3. Anglo-Saxon England AD400-AD1100.

Until the 1970s the predominant explanatory models for the inception of the Neolithic in what is now Scotland were founded on a bipartite colonisation – megalith builders in the
west (their point of origin changing throughout the 20th century) and long barrow builders in the east (from Wessex via Yorkshire). Explicit diffusionism is now rare (cf. MacKie 1997) but the assignment of primacy to material in the south has been harder to shift as a tenet.

**Core and Periphery**

How does the core/periphery problem affect the writing of prehistory? In the paper referred to above by Harding, Frodsham and Durden identified two core-areas in Neolithic studies — Wessex and Orkney.

It may also be suggested that scholars working in the ‘core-areas’ of Wessex and Orkney expect unquestioningly that entire sequences of development must be present there. In a recently published volume about the Neolithic of Orkney in its European context (Ritchie 2000) it is clear that the conceptual framework of many authors assumed only local development of all features of the Orcadian Neolithic: it appears also that there is an unwillingness to see ‘core’ areas as recipients rather than exporters of change.

As early as 1940 Childe (1940) could write in his *Prehistoric Communities of the British Isles*, (page 4)

> ‘Wessex, Sussex, the Upper Thames, East Anglia, eastern Yorkshire and South Wales have been thoroughly and scientifically explored. More recently the Orkney Islands and a small district round Kilmartin in Argyll have become well known...Such gross disparities in archaeological documentation are liable to distort prehistory...one must ask...how far the prominence of Sussex and Wessex in prehistory is due to Aubrey, Stukeley, Colt Hoare, Pitt-Rivers, the Cunningtons, the Curwens, Crawford, Hawkes, Stone and Piggott.’

As noted above, one of the bases of the problem is one faced in many areas of archaeological endeavour: it is normal to assume that where a phenomenon is first recognised and studied is where that phenomenon actually originated.

Craig has written of the way in which the ‘core’ absorbs elements from the periphery, particularly if by doing so the completeness of the ‘core’ is completed. The Orcadian Neolithic has become an annex to the ‘core’ except when, as Cooney has noted, it becomes convenient to make the evidence there ‘atypical’ when it contradicts that from Wessex.

There are two contrasting ways in which the core/periphery relationship discussed by Craig affects the writing of prehistory. The first is the appropriation of material from periphery to core to enhance the apparent completeness or ‘organicism’ of the core. Childe was the first to use Skara Brae and Rinyo as a model to explain fully the Neolithic beyond Orkney (Childe 1940, 25): ‘The whole life of Neolithic society is revealed with such an unique
wealth of detail in the miraculously preserved domestic sites of Skara Brae and Rinyo that a
description of Stage II [the Neolithic] can begin most conveniently there...'. He also
surmised that there ‘must have been villages like Skara Brae between the Forth and the
Pentland Firth.’ The Orcadian evidence is still used to fill in the gap in the settlement record
to the south, in the creation of largely southern English narratives of the Neolithic (cf. Simon
Schama’s recent ‘A History of Britain’ (Schama 2000).

The other way in which ‘core’ areas react is to change interpretative models so that an
absence of data of a particular kind can be explained by that class of data never having been
present, rather than being attributable to the ‘core’ having a damaged or otherwise
incomplete archaeological record. The clearest example of this is the ‘mobile Neolithic’
hypothesis, described above, in which it was argued that the lack of any evidence for houses
and settlements in the south could be explained by the Neolithic being based on a mobile
cattle-herding society. It was not possible that the ‘core’ could be deficient in evidence of a
kind found in the ‘periphery’.

_Inferiorism and Highlandism in Scottish Prehistory_

The history of writing about Scotland’s prehistory shows that it has also been seen in
‘inferiorist’ terms, viewed perhaps from the ‘rolling downs’ of Wessex, in the heart of the
archetypal English landscape. Beveridge and Turnbull suggest that ‘the development of
alternative views of the Scottish past is rendered difficult in face of the social and intellectual
power’ of the southern English intellectual world which updates and embellishes the
traditional inferiorising view in contemporary works (1989). It could be argued that Scottish
prehistory, indeed all regional prehistories, including those of Northern England (Harding, J
et al. 1996), find themselves in the same position.

I have argued elsewhere (Barclay 2000) that the appearance of both Highlandism and
Inferiorism in prehistory written in Scotland can be identified in Niall Sharples’ critical
paper about Stuart Piggott’s career in Scotland (Sharples 1996).

First, Sharples stresses Piggott’s ‘diffusionist’ approach to the prehistory of Scotland,
presenting it as his particular flaw, rather than a reflection of a universally held belief about
Scottish prehistory. As Childe is given such prominence in Sharples’ paper, it seems
pervasive not to mention his diffusionism (e.g. ‘It appears...that the “Neolithic” culture of
Scotland is fundamentally homogeneous and, apart from certain elements that may be
secondary accretions, is essentially identical with the Windmill Hill culture of England.’
(Childe 1935) or that of more recent writers (Atkinson, R J C 1962).
Sharples (1996, 81) criticised Piggott for avoiding 'sites which could be regarded as having particularly Scottish [sic] characteristics', comparing his work with Childe's. Sharples made it clear that he felt that truly Scottish monuments lay beyond the Highland Boundary fault, and were of a kind not found elsewhere.

Childe was praised for excavating a recumbent stone circle, while Piggott's work on the Clava tombs, the Dalladies long barrow and the Cairnpapple henge did not meet Sharples' criteria (although it is not clear why the Torwoodlee broch (Piggott 1951) is not mentioned positively). Unfortunately, contemporary archaeologists saw both RSCs and Clava tombs as the product of diffusion, and therefore hardly 'Scottish' (Atkinson, R J C 1962; Carter and Russell-White 1993; Childe 1935). Also, Piggott was responding to a clear perception that the archaeology of the lowlands was under threat (e.g. Piggott 1971).

Sharples also takes up an inferiorist position in interpreting henges such as Cairnpapple and the Dalladies long barrow as of alien origin, coming from what he perhaps instinctively considers the core area of Wessex, rather than as an important part of the indigenous Neolithic of southern and eastern Scotland.

Sharples has in common with one school of nationalist historiography the stressing of difference from England: it can be seen as acceptable to downplay ethnic diversity in favour of a simpler 'Celtic' vision of Scotland that can, it is asserted, provide a more compelling 'history' on which to base a nationalist politics (Beveridge & Turnbull 1997). In the same way, only features found solely in Scotland are truly Scottish and features found in both Scotland and England in effect are labelled non-Scottish, even though they may be as much part of Scotland's past as of England's.

Sharples also criticises Piggott for seeking to marginalise the evidence from Orkney, to promote the extension of a Wessex-based interpretative model to the rest of the Neolithic of Scotland. He quotes Piggott with disapproval 'it would be wrong if because Skara Brae shows Stone Age architecture in astonishing detail, and a state of preservation unparalleled in contemporary Europe, we then went on to generalise from it as typical of Britain or even of the rest of Scotland...' (Piggott 1958). But Piggott was surely right – the Neolithics of Orkney and Wessex have no universalist value; they do not somehow sit above the Neolithic of anywhere else; they have value in themselves as part of the pasts of their areas, not a greater value than the past of any other area.
Conclusion

We can relate the writing of much 20th century prehistory to a range of wider cultural issues:

1. The difficulty in separating the concepts of ‘British’ and ‘English’ and the wholly unconscious functioning of England’s peculiar nationalism, which is perceived in England as not even being ‘nationalism’ of the kind found in other cultures (cf. Craig 1996, 103 ‘it represents a history whose nationality is not in question, and to which national issues are therefore irrelevant’; this can manifest itself as the dismissal of alternative narratives from the periphery as ‘nationalistic’.

2. The tendency to erect English patterns as a norm against which other patterns can be seen to be abnormal (cf. Craig 1996, 102-3); this can be seen in supposedly ‘British’ prehistories where non-core material is included inconsistently and with limited local interpretative context (e.g. Parker Pearson 1993);

3. The particular place of ‘landscape’ in the English tradition, and the almost mystical role of a regionally restricted conception of an archetypal landscape in the English national consciousness (cf. Pittock 1999). The effect on archaeology can perhaps be seen in the way that the same area, the ‘core’ of Wessex and other parts of southern England have become archetypal in their turn in the writing of prehistory, and have continued to attract a disproportionate concentration of research. The effect of the supposed ‘primacy’ of this area and its material in narratives of northern English, Welsh, Irish and Scottish prehistory continues.

4. The conception of England as one of a few, or perhaps the only ‘organic’ culture with an unbroken tradition (cf. Craig 1996); combined with the regionally restricted approach, this manifests itself in the writing of prehistory as an apparent incapacity to deal with the possibility of incomplete sequences of development in ‘core’ areas, or the absence of material in the core which is better preserved on the ‘periphery’;

5. The operation of a powerful ‘core’ which draws evidence from ‘peripheries’ to fill gaps in its evidence and redefines ‘peripheral’ as ‘core’, or vice versa, when convenient (cf. Craig 1996; Beveridge & Turnbull 1989); for example, the continued drawing into narratives largely concerned with the southern Neolithic of the settlement evidence from Orkney.
Objective 7

To identify and quantify the threats to the survival of the Neolithic archaeological resource

The concern with the survival of the archaeological resource in its widest sense arises from my long professional involvement with statutory and non-statutory monument conservation, at a general policy level and in day-to-day casework.

In the study area the archaeological resource takes four main forms:

1. upstanding monuments predominantly of stone;
2. upstanding monuments predominantly of soil, turf or gravel;
3. monuments visible only as cropmarks in arable land;
4. scatters of artefacts, mainly occurring on arable land.

The main threats to the survival of the resource are (not ranked in any order):

1. tree-planting and natural regeneration of woodland;
2. subsoiling and other routine agricultural practices, and the soil erosion associated with them;
3. agricultural developments outside the town and country planning system, such as drainage, ditch-digging, limited gravel extraction, building;
4. developments within the town and country planning system, such as roads, housing, industrial development;
5. the burrowing of animals, mainly rabbits;
6. the destruction of peatlands by extraction or dessication.

Forestry

As part of my duties I published (Barclay 1992) the authoritative account of the way in which modern consultative arrangements should ensure that government-aided forestry does not damage ancient monuments. Unfortunately, many sites are under existing long-standing planting, particularly broadleaves planted in the 19th century for landscape reasons. The roots of these trees may cause considerable damage. Small-scale new or replacement planting without Forestry Commission grants or with locally-administered grants continues, and on occasion archaeological features are planted. The round burial mounds that are such a feature of the Perthshire landscape were very often planted as landscape features, Indeed,
many may owe their survival to these crowns of beech or Scots Pine; if they had not been planted many of the lower mounds at least would have been put under the plough.

Illus. 7.1 The ‘ideal’ (a) and the ‘real’ (b) rooting patterns of trees. It is clear that the upper, more destructive pattern of tree rooting does occur in circumstances favourable to tree growth; e.g. in earthen burial mounds.

The damage caused to archaeological features by forestry practices and tree growth has been documented most thoroughly in Scotland. As part of the effort in the 1970s and 1980s to demonstrate the considerable amount of damage being done to Scotland’s archaeological resource, work was undertaken to find out how many sites were being lost (Proudfoot 1989) and how much damage forestry practices were causing (Mercer 1981b). Within the forestry community it was occasionally asserted that the amount of damage caused was exaggerated, or that so-called ‘shallow-rooted’ species could be planted safely on sites. Recently these views have found more formal expression in the form of a draft discussion paper emerging from the Research Division of the Forestry Commission (Crow 1999).

A significant element in the argument is that considerations of damage caused have been based on a ‘mythical’ pattern of deep tree root development, which has been assumed to be typical, whereas roots are more likely to be distributed in the upper areas of the soil. However, this matter had already been addressed by archaeologists (Barclay and Maxwell 1998a). While it is accepted that the ‘shallow’ root pattern is typical, this distribution of roots is still deep enough to cause damage. Further, the supposedly ‘mythical’ pattern illustrated
does occur in circumstances favourable to tree growth - for example the beech trees growing on the North Mains mound, where relatively loose mixed gravels, sands, and redeposited turf provided ideal growth conditions.

My research in Perthshire has provided much of the up-to-date published information on the effects of trees (rather than of cultivation methods); my contribution in Barclay and Maxwell 1998a (126-9) is the only published account of the precise processes.

**Agriculture**

The most widespread threat to sites in the lowlands is that posed by normal agricultural ploughing and the movement of soil associated with it, and the more damaging process of subsoiling.

![Diagram of subsoiling](image)

*Illus. 7.2 The effects of subsoiling using (a) a normal and (b) a winged tine subsoiler, at an interval of c. 1m and to a depth of 0.4m (after Spoors 1980).*

The damage caused by ploughing and subsoiling was discussed in an important paper arising from a seminar in Salisbury in 1977 (Hinchliffe and Schadla-Hall 1980). During the 1970s Mercer noted and recorded the patterns of plough-scoring at Balfarg henge (Mercer 1981a). At the Cleaven Dyke the parallel tracks of two episodes of subsoiling, and their effects, were noted (Barclay and Maxwell 1998a).
Conclusion

The research has documented the variety and demonstrated the wealth of the archaeological resource relating to the study period, and has related that growth in knowledge to wider issues in the exploration of the past.

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are still disproportionately concentrated on the western and northern isles and in upland areas on the mainland.

Perhaps the most far-reaching element of the research is the part that has shown, through a survey of 20th century prehistorical writings, and a careful consideration of trends identified by scholars working in the fields of Scottish Literature, Scottish History and Politics, that the writing of 'British' prehistory is, as Ucko has said of archaeology '...a highly political practice (Ucko 1989).
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Thomas, J, 1998, Review of Neolithic Landscapes. Antiquity 72, 455-6


ANNEX A

List of Publications

Those in bold form part of the submission.

In Press

‘Neolithic enclosures in Scotland’, in Darvill, T & Thomas, J (eds) [volume on enclosures in Neolithic Britain and NW Europe]

‘The Neolithic of Tayside: a landscape revealed’ in Proceedings of PSNS Archaeology Section Anniversary Conference.

Published

2000


1999


1998

with Maxwell, G S The Cleaven Dyke and Littleour: monuments in the Neolithic of Tayside (Society of Antiquaries of Scotland Monograph 13).

Davidson, D A, Grieve, I G, Tyler, A N, Barclay, G J & Maxwell, G S

Farmers, Temples and Tombs: the first farmers in Scotland. Canongate
With Grove, D Cairnpapple Hill [Historic Scotland guidebook]

1997

'The Neolithic', in Edwards (ed) Scotland: environment and archaeology 8,000 BC to AD 1,000.


With Stewart, M E C 'Excavations in burial and ceremonial sites of the Bronze Age in Tayside', Tayside and Fife Archaeological Journal 3 (1997), 22-54.

1996

with S Foster 'Burrowing threat to our archaeological heritage', Farming and Conservation 3.2, 19-22.


1995


1994

'The excavation of pit circles at Romancamp Gate, Fochabers, Moray, 1990'


1993

Balfarg: the Prehistoric Ceremonial Complex. Fife Regional Council: Glenrothes. [Winner of the 1994 Robertson Prize for interpretative material by an institution]

1992

'Forestry and archaeology in Scotland', Scottish Forestry 46 (1992), 27-47.


'Vegetation management on ancient monuments in forestry and other areas', Aspects of Applied Biology 29: Vegetation management in forestry, amenity and conservation areas, 105-111. Association of Applied Biology.


1991


1989


1987


1984


'The excavation of a settlement of the later Bronze Age at Myrehead, Falkirk District', Glasgow Archaeol J, 10 (1983), 41-71. [1984]

with Fairweather, A D 1984 'Rye and ergot in the Scottish later Bronze Age', Antiquity, 58 (1984), 126.

1983


1982

'Late Neolithic and early Bronze Age burials: their treatment in salvage and rescue archaeology', Scot Archaeol Rev, 1 pt 1 (1982), 21-23.

1981

'Newmill and the "souterrains of Southern Pictland"', pp 200-207 in Watkins, T. F.

1980

# Annex B

Henges and Hengiform Enclosures forming the basis of the distribution mapped in illus. 4.3

## Henges (>20m diameter)

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STATE-FUNDED 'RESCUE'
ARCHAEOLOGY IN SCOTLAND
Past, Present and Future

Edited by Gordon J Barclay

Contributors: I Armit, P J Ashmore,
G J Barclay, D J Breeze, S M Foster, D Hall,
R Hingley, L Macinnes, O Owen

HISTORIC SCOTLAND
ANCIENT MONUMENTS DIVISION

OCCASIONAL PAPER Number 2
1997
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   The Modern Archaeology Programme
   The 1995 Review
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   The Development of Rescue Archaeology: 1945-75 and 1975-95
   The Changing Scale and Cost of Excavation
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FOREWORD

STRUCTURE

This paper is intended to serve two purposes. The first is to set the Archaeology Programme of Historic Scotland in the wider context of Scottish and British archaeology. The second is to make explicit the curatorial and research considerations that affect the choice by Historic Scotland of projects to initiate or support within the Archaeology Programme. The parts of the document can be summarised as follows:

- a consideration of the way in which our understanding of Scotland’s past has developed in recent decades;
- a historical survey of the development of rescue archaeology in Scotland and the effects of this development on the way in which the modern Archaeology Programme operates;
- discussion of the changes in rescue archaeology set in train by the introduction of modern business practices and the expansion of developer-funding;
- an analysis of the general and specific curatorial criteria which affect the selection of sites and projects for financial support.

In the Appendix we present period-specific summaries setting out a range of views on the gaps in our understanding of Scotland’s past.

RESCUE ARCHAEOLOGY

Rescue archaeology is the process by which irreplaceable information is recovered from archaeological sites prior to destruction, damage or alteration. The first such excavation to be funded by the state in Scotland was in 1945 at Loudon Hill Roman Fort, threatened by gravel quarrying. In the 1970s and 1980s levels of threat to the archaeological resource increased, the threats were more widely recognised and the response of the state grew. This in turn put increased pressure on the limited number of archaeologists available to undertake excavations in Scotland and placed great strain on the under-resourced infrastructure of archaeology in Scotland. A range of problems led to failure to publish the results of much of this fieldwork thus creating a backlog of unpublished excavations (Barclay and Owen 1995).

In recent years archaeology has begun to be operated in a more businesslike way (see below) and private developers have begun to fund rescue archaeology in advance of their own work (cf. National Planning and Policy Guideline 5: Archaeology and Planning (Scottish Office 1994a); Planning Advice Note 42: Archaeology – the Planning Process and Scheduled Monument Procedures (Scottish Office 1994b)). Scottish archaeology in the mid 1990s is as a whole better organised, resourced, and more productive than at any time in the past.

THE MODERN ARCHAEOLOGY PROGRAMME

Although in the past the Archaeology Programme was synonymous with 'rescue', in the last few years its aims, in common with those of the other UK heritage agencies, have broadened beyond the simple concentration on sites under immediate threat. Historic Scotland, in partnership with other agencies such as Scottish Natural Heritage, has used the Archaeology Programme to reinforce its work in the conservation and management of sites and landscapes (Historic Scotland 1996a).

The Programme is governed by regularly reviewed and widely distributed Operational Policy Papers (Historic Scotland 1994a, 1994b, 1996b, 1996c, 1997) and Procedure Papers (e.g. Historic Scotland 1996d).

THE 1995 REVIEW

This paper arises directly from the presentation, in February 1995, of a paper to the Ancient Monuments Board for Scotland; that paper was written in response to a request from the Board for a review of the achievements of Historic Scotland’s Archaeology Programme since 1945 and its future priorities. The review was warmly welcomed by the Board (Ancient Monuments Board for Scotland 1995; paragraph 43 and recommendation 11).
The review encompassed the past, present and future of state-funded rescue archaeology, including:

- rescue archaeology's contribution to our understanding of our past;
- the development of rescue archaeology 1945-75 and 1975-95;
- the changing scale and cost of excavation;
- the role of the universities and the public in excavation;
- the balance in funding between excavation-related fieldwork and post-excavation/publication;
- developer-funding and the role of state-funded rescue archaeology.

It was decided that the review should be made publicly available; the first sections of this Occasional Paper include a revised and updated version, taking account of the Board's comments, and also of subsequent developments.
The nature of our understanding

Rescue archaeology is mainly reactive and therefore has not operated at the same level or with the same effect in all parts of Scotland. However, if we are to assess properly the achievement of rescue archaeology, our work has to be seen in the context of our overall understanding of Scotland's past. This in turn requires the consideration of all excavation in Scotland, regardless of its funding source.

In 1978, 1984 and 1992 the Ancient Monuments Board for Scotland received papers reviewing rescue archaeology and the priorities for research and spending, prepared by the Inspectorate of Ancient Monuments. None were formally published. The papers concentrated on the positive achievements of rescue archaeology, describing the results of excavations on individual sites. In adopting this positive approach such reports perhaps reinforced the assumption that our understanding of the general structure of the prehistoric and proto-historic periods of Scotland was more complete than was the case: information gained from one site was often assumed to be more generally applicable to other sites of (apparently) the same type than was probably true. It can be demonstrated with reference to three examples below, that the understanding we believe we have of...
important areas of Scottish archaeology is based on very small quantities of reliable data. This data may relate only to small geographical areas and may represent only a limited part of the range of variation present within the archaeological record.

Figure 1 shows the distribution of sites where significant activity of the Neolithic period, in the form of apparently domestic remains and/or structures, has been revealed by excavation on a more than minimal scale, mainly since 1945. Not only are there very few, but their distribution across Scotland is uneven. It is generally accepted that there was considerable regional variation in the period; evidence from excavated settlements in, for example, Orkney therefore cannot be used for any sort of detailed interpretation of the Neolithic, say, in Dumfriesshire, where there is ample evidence of burial and ceremonial activity in the period, but only limited evidence for settlement. Consequently, our knowledge of the domestic life of the first farmers in most of Scotland for a period of 1500 years is limited, to say the least. We are also not in a position to identify or understand regional variation in many, if not most, periods.

Figure 2 shows the distribution of excavated medieval or later rural settlements (i.e. not high-status sites such as castles or abbeys). The results of very few of these excavations have been published and, because a significant proportion of them were undertaken as research excavations in the 1960s and 1970s by under-resourced groups, final publication of the majority is now unlikely.

The third example, illustrated by Figures 3 and 4, compares the distribution of certain and possible henge monuments, small hengiform enclosures, cursus monuments and recumbent stone circles in Scotland with the number excavated to a modern standard since 1945. For classes of monument with such proven diversity of form and function, our interpretations, based as they are on such a small sample, must be rather fragile.
These examples are taken from information immediately to hand at the time of the 1995 review proper. Similar problems can be demonstrated in other periods, for example the sparsity of excavated later prehistoric sites north of the Tay.

The maturity of knowledge in any discipline can perhaps be measured by the extent to which the fundamental understanding of a whole area of research can be overturned by the results of one investigation. In archaeology we must ask ourselves how resilient archaeological interpretations are to the new information that comes from the excavation of a single site. To take four examples:

- At Balbridie, a cropmark site was interpreted as a Dark Age timber hall (Fairweather and Ralston 1993) (Figure 5). Excavation proved it to be a structure, probably a roofed building, the largest in Britain, of the Neolithic period. While this discovery represented an exciting expansion of our knowledge, it raised serious questions about previous appreciations of the nature of the Neolithic.

Figure 5. The discovery that the Balbridie timber hall was Neolithic and not of the Early Historic period overthrew current understandings of the nature of Neolithic settlement on mainland Scotland.
• At the North Eildon, Borders (Figure 6) trial trenching in the famous hill-fort overlooking the Roman complex at Newstead proved that it had been built not in the later Iron Age, but over half a millennium earlier, at the end of the Bronze Age, so undermining perceptions of the nature of larger hill-forts and their relationship to the period of and just before the Roman invasion (Owen 1992).

• At Balfarg in Fife, three apparently isolated Neolithic and Bronze Age ceremonial sites were found to be merely a very small proportion of the remains of far more complex activities which lay around and between the immediately visible sites (Barclay and Russell-White 1993). The concept of the 'landscape' rather than 'the site' may be more appropriate in many circumstances.

Figure 6. The hill-fort at the North Eildon, perched above Roman military sites at Newstead, was believed to be broadly contemporary with the Roman presence. Late Bronze Age dates came as a considerable surprise.
- At Bu in Orkney, excavation showed that monumental round houses/brochs might have been constructed 500 years earlier than previously thought with a correspondingly longer period of use, so necessitating a radical reinterpretation of Atlantic Iron Age settlement (Hedges 1987) (Figure 7).

There has also been a tendency to date all sites apparently in a class to the span indicated by only one or two excavated examples, relying largely on identification of similarities in structural morphology. However, supposedly diagnostic structural features may be simple constructional elements (e.g. a palisade trench) which may have been in use over an extended period.

In summary:
- The excavated data may represent a far smaller and less representative part of the overall data set than we might like to believe.
- The data set may be more varied in date and type than is usually assumed.
- Our excavated data may be biased towards certain periods, types of structures and geographical areas.
- Our interpretations may be based on such a small sample of the data set that we must continue to expect frequent major disruptions to established understanding.

Figure 7. The massively constructed and complex stone building at Bu.
THE DEVELOPMENT OF RESCUE ARCHAEOLOGY: 1945-75 AND 1975-95

Although the previous section may have presented a pessimistic view of the state of our knowledge, we must consider how much better we now understand Scotland's past than we did 20 years ago. In that time rescue archaeology has been the means by which most new data has been collected through excavation. Non-state-funded excavation has been limited to the resources available to the universities, and the very small, but, pound for pound, often extremely productive, sums that can disbursed by learned societies. In recent years concern has been expressed about the high proportion of British Academy funds being spent by British universities on excavation of sites abroad, rather than within the UK (Biddle 1994).

A few examples of the importance of state-funded rescue work will suffice:

- Some of the most substantial excavations of Mesolithic sites have been funded through the Archaeology Programme, for example, the excavations on Rum (Wickham-Jones 1990) (Figure 8) and those in the Oban area (Bonsall and Macklin in preparation).
- Either in rescue archaeology or on properties in the care of the Secretary of State, excavation of Neolithic settlement sites has almost exclusively been undertaken with Historic Scotland funds; Calder's campaign of research excavation in Shetland in the 1950s is one of the honourable exceptions (e.g. Calder 1956). Without rescue input, the only extensive investigation of a Neolithic settlement site in northern Britain since World War II, the excavation of the settlement at Barnhouse (Richards 1992), could not have taken place (Figure 9). Barnhouse, however, is a good example of the value of the limited funding available from the learned societies - the site was discovered during fieldwork funded wholly by the Society of Antiquaries of Scotland.
- Virtually all significant excavation of Bronze Age settlement sites has been undertaken under the rescue umbrella. For example, without rescue we would have no more than a handful of radiocarbon dates for most site types, the unenclosed platform settlements, hut circles and field systems; indeed we would have little idea of the nature of most types of site of the period.
- For the Roman period, rescue activity has been concentrated on the Antonine Wall, where the opportunity has been taken to undertake numerous rescue excavations (regularly recorded in the Proceedings of the Society of Antiquaries of Scotland) from small sections across the Wall, through the excavation of small enclosures and forlets, to the examination of whole forts and annexes, thus considerably expanding our understanding of this internationally important frontier system and its associated installations.

Figure 8. A reconstruction drawing by Alan Bandy of how the Mesolithic settlement at Rum might have appeared.
Figure 9. The Historic Scotland excavation of the complex Neolithic settlement at Barnhouse; the site was discovered during a project sponsored by the Society of Antiquaries of Scotland.

Figure 10. Urban sites can provide a picture of medieval town life not available from documents. The potential for the preservation of organic materials, as here in Perth, is high.
Rescue archaeology has quite simply made possible the whole subject of urban archaeology, without which our knowledge of the medieval burghs would rely wholly on documentary sources (Figure 10).

What is clear is that the achievement of rescue archaeology in the period before the mid-1970s was limited, because few sites were excavated. It is necessary to look at how this situation occurred, not only to put the operation of rescue into context, but also to consider the continuing effects on the operation of rescue archaeology in Scotland.

Rescue Funding 1945-75 and its Effects 1975-95

At first sight, the consideration of this piece of now distant history might seem irrelevant. However, the effects of past funding on current rescue archaeology, on our understanding of Scotland's past and on the efforts to conserve that past cannot be underestimated; they continue to affect the work of Historic Scotland on a daily basis.

In 1974 Iain Crawford presented a table showing relative expenditure on rescue in England, Wales and Scotland for the years 1966/7 and 1967/8 (Crawford 1974). At that time some 1.8 per cent of UK mainland rescue funds was being spent in Scotland (£2700 out of a total spend of £148100 in 1967/8). In the mid-1970s the situation was improving, as is shown by an analysis prepared within the Inspectorate of Ancient Monuments in 1977 (Table 1).

It is also worth examining the number of excavations in Scotland, England and Wales (Table 2); this information is available for a longer period (from Department of the Environment and Council for British Archaeology published sources).

The differences expressed in the figures in Table 2 are even greater than would appear at first – some of the later English grants are for a whole historic town (involving many individual sites), while a significant number of the Scottish sites are tiny trial trenches. In the debate that surrounded the levels of funding in the late 1960s and the first half of the 1970s, representations were made to Government that the levels of funding were too low; the picture painted to justify the relatively low expenditure in Scotland (‘few sites are being destroyed in Scotland, therefore less money is needed’) can now be seen to be unrealistic, reflecting the lack of information about the level of destruction, for example by forestry, coastal erosion and agriculture, let alone by development, such as large-scale gravel quarrying, unpoliced due to the lack of local authority archaeologists at that time. Mercer (1978) in his review of rescue archaeology and its needs in Scotland expressed strongly the widespread feeling that ‘...the belief held widely in London and sometimes, we believe, in Edinburgh that the amount of work to be done in Scotland is less than that which will occur in a proportionate area of England and Wales’ had to be challenged. It might also be argued...
that the infrastructure of Scottish archaeology was so little developed at that time that the body of local societies, museums and archaeological umbrella organisations crucial to the early direction and growth of rescue archaeology in England not only did not exist in Scotland, but could not have been brought into being at that time.

The late development of aerial survey in Scotland (commencing seriously only in the early 1970s) also contributed to the underestimation of the number of sites in lowland areas being destroyed by development. The impact of the publication in 1960 by the Royal Commission on the Historical Monuments of England (RCHME) of A Matter of Time, a survey of the sites at risk from gravel extraction in England, cannot be underestimated in any study of rescue funding in England in the 1960s and 1970s. The information required in order to prepare an equivalent survey to show the level of destruction was simply not available in Scotland.

Therefore, while a bare handful of rescue excavations took place in Scotland, the number of rescue projects in England rose rapidly from the early 1960s; three decades of a high intensity of archaeological work did not happen in Scotland. It can be argued that the vast quantity of data that flowed into English archaeology in those years put the understanding of the prehistory and history of at least the southern part of England on a better footing than that of Scotland.

To return to the point made above about the maturity of our interpretations, it can be suggested that our interpretations in Scotland are less mature and stable, because we have far less data on which to work. This in turn can lead to a reliance on explanatory models erected using more abundant data from one region, but perhaps of limited value in another (cf. Barclay 1995, 4).

In summary, it can be suggested that there were three significant consequences of the far lower level of rescue activity in Scotland, particularly in the late 1960s and early 1970s:

- stunted development in Scotland of the type of local archaeological structures that grew directly or indirectly out of rescue funding in England (locally based archaeological units, locally based archaeological trusts; local museum development and, most important for the long-term development of archaeological structures, county archaeologists);

- the destruction of an unknown number of important sites without archaeological excavation;

- a smaller quantity of archaeological data for all periods, through the restricted scale of Government-funded archaeology before the mid-1970s.

### Table 2: Number of excavations or grants awarded in Scotland, England and Wales, 1961-76.

<table>
<thead>
<tr>
<th>Year</th>
<th>England</th>
<th>Wales</th>
<th>Scotland</th>
</tr>
</thead>
<tbody>
<tr>
<td>1961</td>
<td>73</td>
<td>7</td>
<td>6</td>
</tr>
<tr>
<td>1962</td>
<td>50</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>1963</td>
<td>60</td>
<td>7</td>
<td>3</td>
</tr>
<tr>
<td>1964</td>
<td>88</td>
<td>11</td>
<td>2</td>
</tr>
<tr>
<td>1965</td>
<td>110</td>
<td>14</td>
<td>5</td>
</tr>
<tr>
<td>1966</td>
<td>143</td>
<td>9</td>
<td>4</td>
</tr>
<tr>
<td>1967</td>
<td>126</td>
<td>9</td>
<td>4</td>
</tr>
<tr>
<td>1968</td>
<td>142</td>
<td>9</td>
<td>1</td>
</tr>
<tr>
<td>1969</td>
<td>173</td>
<td>9</td>
<td>4</td>
</tr>
<tr>
<td>1970</td>
<td>141</td>
<td>9</td>
<td>10</td>
</tr>
<tr>
<td>1971</td>
<td>136</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>1972</td>
<td>201</td>
<td>?</td>
<td>9</td>
</tr>
<tr>
<td>1973</td>
<td>133</td>
<td>12</td>
<td>14</td>
</tr>
<tr>
<td>1974</td>
<td>155©</td>
<td>7</td>
<td>17</td>
</tr>
<tr>
<td>1975</td>
<td>133©</td>
<td>7</td>
<td>23</td>
</tr>
<tr>
<td>1976</td>
<td>172©</td>
<td>13</td>
<td>32</td>
</tr>
<tr>
<td>TOTAL</td>
<td>2,036</td>
<td>136©</td>
<td>147</td>
</tr>
</tbody>
</table>

© includes multiple sites; © plus 1 year's figures not available.
The point about differentials in funding and their effects is made in order to put into context the issues that this paper seeks to cover in dealing with the past and future of rescue archaeology. First, looking back, the achievement of rescue in the period 1945-75 is very limited, because very few sites were dug and the projects were underresourced. There were exceptions, for example the campaign of excavation mounted in advance of the development of the Government rocket range on South Uist (e.g. Young and Richardson 1960), the failure to consolidate this work being seen by some as lost opportunity.

Second, looking forward, the different state of development of the data sets collected in the past means that policy agendas for the future arising elsewhere in the UK may not be relevant in Scotland.

The idea of enforcing strict research frameworks, channelling funds to a limited number of projects, to limited areas, to a small number of large sites, or even to a limited number of people, is suggested occasionally, the intention being to maximise the effect of our expenditure. Historic Scotland prefers a different approach, as has English Heritage in its latest paper (Olivier 1996). Why is this?

In the past Historic Scotland and its predecessors have attempted to set the results of rescue archaeology in a very general research framework, reflecting English approaches (e.g. English Heritage 1991) rather than forcing research down narrow tracks. In the paper presented to the Ancient Monuments Board in 1992 more general research themes were discussed, rather than any firm framework. In addition, it was stated:

*Figure 11. Lilia in front of the Antonine Wall.*
'Whatever the research priorities, it proved very difficult to ignore the desirability of excavation of well-preserved threatened sites and those decisions which appeared to run against the priorities did, by and large, show themselves to be well justified.'

and

'There is a strong school of thought that a strategy with a large reactive element...will contribute more to our knowledge than a strategy based solely on sites...selected according to pre-existing research designs.'

In targeted research, excavation sites are usually chosen very carefully in order to answer specific questions; the scale of work is often constrained by limited funding. In rescue archaeology a greater range of sites is brought forward for consideration for excavation. The result is that new types of site and unexpected discoveries often emerge from the serendipity of rescue: for example, the timber mortuary structures at Balfarg (Barclay and Russell-White 1993), the discovery of *Iliia* (defensive pits containing sharpened stakes) on the berm of the Antonine Wall, together with structures behind it (Bailey 1995) (Figure 11), the teind barn at Kebister (Owen 1988), the sunken Anglian building at Hoddom (Lowe 1991) (Figure 12), and the Anglian settlement underlying modern Dunbar (Hall and Holdsworth 1990).

Historic Scotland has a responsibility to ensure an adequate characterisation of archaeological deposits over the entire country, to establish procedures to monitor the erosion of that resource, and, where possible, to establish procedures of mitigation, and to facilitate or initiate properly designed research which utilises that resource. The investigation of the prehistory and archaeology of one part of the country is neither more nor less worthy than that of another.

*Figure 12. The remains of complex timber buildings on the Early Historic period site at Hoddom.*
The consequence of adopting rigid research frameworks might be to concentrate only on certain geographical areas or certain periods, leading to the restriction or multiplication of work in areas or periods not included in the chosen projects. This approach could also remove the opportunity for younger archaeologists with radical ideas to revolutionise approaches and understanding (e.g. Richards’ work in Orkney).

Our detailed knowledge of Scotland’s past is so limited that where preservation has not been possible and where funding permits, the opportunity should be taken to excavate almost any threatened well-preserved site regardless of its period. Awareness of this has informed the operation of the rescue programme in Scotland for almost 20 years and it seems sensible to continue with this flexible, responsive, even opportunistic, approach, within very general overall research themes. However, taking a realistic view of the resources available, prioritisation is necessary.

THE CHANGING SCALE
AND COST OF EXCAVATION

In this section a number of related issues are dealt with:

- the changes in the scale and cost of rescue excavation;
- the different roles of contract and grant-aided archaeology;
- professionalisation, commercialisation, and the role of the universities and the public.

The paper presented to the Ancient Monuments Board in 1984 noted: ‘The rising cost of excavation is partly due to the increasing involvement of scientific techniques in archaeology. The increasing sophistication of such techniques, unfortunately, has rendered most past excavation of limited value. Thus one modern excavation can provide more information about a particular type of site than very many earlier investigations’. Since then there have been even greater rises in costs as hidden costs in Historic Scotland and in other organisations have been exposed. Full accruals-based costs of work have had to be paid for excavation and post-excavation work (‘accruals-based’ costings) take into account the full costs of tasks – salary, expenses of employment, office accommodation costs, support services, other resource costs, and profit – where appropriate).

The 1978 Ancient Monuments Board paper suggested that it was preferable to excavate a few sites completely rather than ‘dissipate effort in the partial excavation of a larger number of monuments’; the 1992 paper suggested a rephrasing: ‘it is important to dig a few sites both intensively and extensively as well as sampling small sites and threatened parts of extensive sites in the context of their environment’. Within present resource levels, costs restrict most modern excavations to a relatively small size, undertaken rapidly and efficiently by small professional teams at any time of the year. Now there are very few of the large-scale rescue excavations, with large low-paid teams, so common in the 1970s and early 1980s.

What then is the future of large-scale excavation? Large sites are still threatened and small-scale work is not the answer to every threat. It should be noted, first of all, that of the large-scale excavations undertaken in the 1970s and the early 1980s (whether nearly ‘complete’ or extensive samplings of landscapes) a significant proportion have not yet appeared as coherent published accounts (Barber et al., 1995, 157) and the impetus they might have given to regional studies has been dissipated. Many factors play a part in delayed publication – the sheer size of projects, their complexity and the difficulty of coordinating all the sources of information, poor resourcing, failures in project management, career development of the directors, the tendency of archaeologists to move on to the next project or to be perfectionist. These matters were considered in more detail in a paper on the backlog project, presented to the Ancient Monuments Board in October 1994, and subsequently published (Barclay and Owen 1995).

The major lesson from the excavation of large, or artefact- and ecofact-rich, sites or landscapes is that paying the full economic cost of even limited work puts a great strain on the available resources.

From this the implications are clear:

- Within current financial constraints few large-scale excavations can be afforded on the basis of full cost recovery commercial contracts.
- In view of this, it is likely that large-scale excavations will be undertaken more often by grant-aid in partnership, when the necessary conditions are met.

Therefore, the profitable relationship between state rescue funding and university-driven research (insofar as the universities have their own funds) much praised in the 1984 Ancient Monuments Board paper, should still be seen as the model for the future of relatively large-scale rescue excavations undertaken by Historic Scotland. Benefits of
cooperation are that Central Government contributes to legitimate rescue and/or site management elements of an existing, active, large-scale research project, undertaken by the university, or other charitable research organisation, with other funding.

An important by-product of this sort of partnership project is the provision of opportunities for the practical training of archaeology undergraduates and for the involvement of local people, as for example, in the National Trust for Scotland’s Ben Lawers Project, grant-aided by Historic Scotland. Whatever role students may play in archaeology after graduation, it is vital that they, and indeed all archaeologists, understand the processes and limitations of data retrieval in the field (Biddle 1994). Opportunities to do so are fewer than they were, owing to the professionalisation of rescue excavation. The commercial pressure on archaeological units has also affected the extent to which non-professionals, particularly local people, can become involved with archaeological excavation. Small professional teams working under cost and time constraints cannot easily accommodate the voluntary input of local people. Where practicable, i.e. where timing and resources allow, Historic Scotland can address this by setting contract or grant conditions, for example specifying local voluntary involvement.

This paper is not an appropriate place to raise the larger issue of the provision of research capacity in the Scottish universities, where there are only two archaeology departments, one of which is not primarily based on research into, or teaching of British archaeology. But it is generally accepted that rarely in the last three decades has there been the field research capacity in Scotland to balance the rescue effort, which is essentially reactive rather than targeted. Rescue archaeology funded by the state, including archaeology undertaken in advance of Trunk Road construction, has too often been the primary source, rather than only one source, of information about Scotland’s past through the medium of excavation. Since the end of the Royal Commission on the Ancient and Historical Monuments of Scotland (RCAHMS) excavation programme, the only other Government sector funder of projects is the National Museum of Scotland, whose work at Newstead (Roman and Iron Age – Jones 1990), Craig na Caillich (Neolithic stone extraction – Edmonds, Sheridan and Tipping 1992), and Boddam Den (Neolithic flint extraction – Saville 1994) has added significantly to our knowledge of sites associated with large artefact assemblages, or the production of artefacts (Figure 13).

Partnership with local authorities has also been valuable. Specific projects have been initiated and funded in

Figure 13. The National Museums of Scotland’s project at the Neolithic flint mines at Boddam Den has revolutionised our understanding of stone exploitation in Scotland.
The 'BACKLOG' AND THE BALANCE BETWEEN EXCAVATION AND POST-EXCAVATION FUNDING

A common heritage of the early years of rescue archaeology in mainland Britain is a backlog of sites excavated but not published (Cunliffe, in Butcher and Garwood 1994). However, the problems in Scotland differ in quantity and nature from those elsewhere in the UK. For example, the backlog in Scotland came about far later than in England, because of the late start of rescue archaeology in Scotland. Approaches appropriate to local circumstances have been developed successfully to deal with them.

The backlog of unpublished excavations in Scotland has been dealt with in more detail by Barclay and Owen (1995); this paper was published in a double volume of the Proceedings of the Society of Antiquaries of Scotland, the size of that volume made necessary by the success in bringing Historic Scotland sponsored excavations to press. The present position is shown in Table 3.

As discussed in Barclay and Owen 1995, over recent years the balance of the Archaeology Programme between actual excavation and the processing and publication of the results of excavation has tended very much towards the latter, as Historic Scotland has endeavoured to deal with the backlog of unpublished sites from the 1970s and 1980s.

Ideally, we feel, the spending balance on rescue archaeology should be apportioned about 30-40 per cent on excavation and 60-70 per cent on post-exca-vation. A stable balance between fieldwork and post-exca-vation is crucial to the maintenance of a balanced archaeological infrastructure available not only to Historic Scotland but to the private sector. A recent survey of developer-funding in Scotland has shown that funding from contracts let by Historic Scotland (for itself and for the National Roads Directorate of The Scottish Office) is important to the survival of many commercial units in their present form. Without this funding, private sector developers would have great difficulty finding an adequate archaeological resource to undertake the work they need to do in advance of development. For example, it requires a significant throughput of work to maintain artefact conservation facilities, or the continuous employment of the great range of specialists now needed in archaeology.

Table 3: The number of excavation reports not yet completed, including traditional 'backlogged' projects.

The figures do not include projects destined only for archiving. The figures from 1996-7 onwards are projections from Historic Scotland's Corporate Plan.

Work is in hand further to accelerate the reduction in numbers.
THE CONTRASTING ROLES OF DEVELOPER-FUNDED AND HISTORIC SCOTLAND-FUNDED RESCUE ARCHAEOLOGY

Developer-funding is sometimes presented as the panacea for funding problems. This is a misconception. Developer-funded archaeology is generally:

- concentrated in areas of economic development;
- restricted to developments controlled by planning law (e.g. it does not include agriculture or forestry);
- concentrated in urban areas;
- of restricted scale and often has its ‘vision’ blinkered by funding constraints, limiting the information value flowing from projects;
- not involved in funding excavation of ‘natural’ threats.

In some cases, developer-funded archaeology is less productive, owing to the nature of the projects, for example, in undertaking work under planning conditions where the archaeological value of an area is unknown, and turns out to be limited.

Therefore, developer-funding does not address some of the greatest threats to our archaeological heritage - those with a ‘natural’ cause (e.g. coastal erosion) or those where ‘developers’ or users of ground are not expected to meet all the costs consequent upon their operations (e.g. agriculture, forestry). The publication of the National Planning and Policy Guideline 5: Archaeology and Planning (NPPG5) (Scottish Office 1994a) has virtually completed the split in function between developer-funded archaeology and work funded by Historic Scotland. The prominent role of Local Authority archaeologists in obtaining developer-funding, before and since NPPG5, should be acknowledged here.

Developer-funding now takes care of most archaeological work in advance of commercial development controlled by the planning system, and also of major public works such as the Trunk Roads programme, managed by Historic Scotland on behalf of the National Roads Directorate of The Scottish Office. The background to developer-funding by Government departments is described in The Care of Historic Buildings and Ancient Monuments by Government Departments in Scotland (Historic Scotland 1994).

In contrast, Historic Scotland-funding is now directed almost exclusively to sites where the threat has no identifiable developer, or where development is non-commercial; in 1995/6 most of the sites excavated were threatened by coastal erosion, rabbit burrowing, and agriculture (Figure 14). In addition, the rescue archaeology programme still has to deal with many of the consequences of pre-NPPG5

Figure 14. Coastal erosion is a major threat to the archaeology of parts of Scotland - the Western and Northern Isles in particular.
This site at St Boniface shows the sort of very substantial remains at risk.
planning consents that did not make adequate archaeological provision. One benefit of this change is that the threats may be measured in months or years, rather than days or weeks, allowing the opportunity to test sites by small-scale excavation, prior to any decision to commit further resources. A significant portion of programme expenditure is on projects designed to enhance our knowledge or capacity to conserve sites, through better understanding of site types or the effects of site management. The bar chart (Table 4) shows the way the programme monies have been split between 1993-4 and 1996-7.

OTHER REVIEWS

In 1992 a seminar entitled 'What kind of archaeology do we want?' was held in Edinburgh. Four of the papers, presented by archaeologists from commercial, museum and university archaeology in Scotland, were published in 1995 (Barber, MacSween and Mills 1995; Barrett 1995; Cowie 1995; Watkins 1995). These papers must count as the only recent published, public review of the present state and possible future, of Scottish archaeology as a whole. The delay in publication allows a review of developments in the four years since the seminar.

A number of themes emerged. Some were within Historic Scotland’s power to influence – those we have acted or are acting upon are:

• the need for a regional approach to Scotland’s archaeology;
• the consideration of the landscape as well as the site;
• redress of past geographical biases;
• the need for more information on the ecological context of human settlement;
• the need for better synthesis of existing knowledge, particularly in artefact studies and environmental information;
• improved dissemination of information to a wider public, better grounding of archaeology in the community, and a higher national and international profile for Scottish archaeology.

Historic Scotland is funding national and regional synthesis of archaeological and palaeoenvironmental information, is seeking to ensure a broad geographical coverage, and is sponsoring publication for the popular market (e.g. the successful Historic Scotland/Batsford series).

Table 4: The allocation of funds within the Archaeology Programme 1993-4 to 1995-6. The Archaeology Programme benefits within most financial years from being allocated a proportion of the extra income earned by Historic Scotland. This substantially increased expenditure in 1994-5 and 1995-6.

1 - rescue archaeology post excavation; 2 - rescue archaeology field work; 3 - archaeology at Properties in Care; 4 - projects directed towards protection, conservation and management of sites and landscapes; 5 - conservation of artefacts at Properties in Care and from excavations.

Category 4 includes coastal erosion and forestry surveys, support for the scheduling programme, etc.
PRESENT AND FUTURE

PURPOSE

Historic Scotland's approaches to the archaeological resource are clearly driven primarily by the curatorial basis of its work. We require to characterise the archaeological resource, assess the threats to its survival and attempt to mitigate them. Historic Scotland's primary aim is to preserve sites and landscapes that are capable of documenting their own history, to provide a resource from which future generations can create their own interpretations of Scotland's past.

Curation, as used here, does not imply a sterile prevention of change, nor an unthinking prevention of all disturbance to sites and landscapes. To preserve or conserve effectively we must understand what it is we are preserving, and why, and how it can best be preserved. This necessitates some exploration of the resource.

Our aim is to avoid unnecessary disturbance of sites and landscapes. In sponsoring archaeological projects we can seek to combine the achievement of a greater understanding of the past, a greater understanding of the nature, extent and date of the archaeological resource and of the threats to it, and the 'rescuing' of information prior to its destruction by development or natural forces.

Part of our role is also to ensure that information on the characteristics of the archaeological resource is widely available to assist others in their curatorial (and research) work. The Scottish Burgh Survey is perhaps the most developed of our projects in this area. Its purpose is to attempt to characterise the state of the archaeological resource in our historic burghs, with a view to helping to shape preservation and excavation strategies. Here, as in other areas, Historic Scotland will increasingly be assisting with the synthesis of results from projects funded from many sources.

The budget of the Archaeology Programme of Historic Scotland currently stands at over £1.6m. Expenditure is split between work related to the agency's conservation efforts and archaeological fieldwork (including post-exca¬vation, publication, and artefact conservation), usually on sites or classes of sites threatened by non-developer threats, such as agriculture or coastal erosion, or on Historic Scotland's 'Properties in Care'. Increasingly, information on conservation and monument management issues is being sought from our rescue excavations. There are always more calls on our funding than can be met, although the Archaeology Programme has benefited considerably in recent years from the transfer of income from other agency activities.

Historic Scotland's sponsoring of excavation and rescue survey is at present the largest input of funds to Scottish archaeological fieldwork. The way in which this money is spent must take account therefore of the overall shape of our understanding of Scotland's past. This is addressed to some extent in the Appendix to this paper.

The following sections set out the themes within which Historic Scotland sees its funds being spent. This is in two parts: first, the general considerations that Historic Scotland will take into account in initiating or sponsoring projects; second, a review of the major individual curatorial and strategic themes that will shape the Archaeology Programme.

GENERAL CONSIDERATIONS

Understanding the Nature of the Archaeological Resource

To aid Historic Scotland in its curatorial responsibilities, a prime aim of the Archaeology Programme must be to assess the nature of the archaeological resource — the nature, date, extent, and origin of deposits and structures — in order to provide appropriate and adequate protection of monuments and landscapes of all periods.

Contribution to Conservation Aims

The aim following from that immediately above is the assessment of the threat to the archaeological resource. Specific projects to examine these issues will be initiated and sponsored; other projects will be designed to provide information of use to consideration of the larger issues. All appropriate projects will be designed to include obtaining
information of use to Historic Scotland's conservation aims. For example, all excavations in rural areas should be planned to record the nature and extent of damage by animals, vegetation, or agricultural processes.

**Contribution to Research Aims**

Initiation or sponsorship of a project will be significantly affected by the contribution it could make to filling the gaps in our understanding (set out in the Appendix below). For example, there are many areas of Scotland where our understanding even of the nature and period of the commonest sites is rudimentary.

**Regional Approaches**

Throughout the operation of the Archaeology Programme, Historic Scotland has a duty to ensure that the distinctive prehistoric and historic archaeologies of all of the regions of Scotland receive attention (Figure 15). The concentration on rich sites in one part of Scotland, no matter how valuable to the archaeology of that area, may have little meaning in studies of the same period elsewhere in the country. We should always consider the broad picture, through wide-ranging projects covering large areas non-intensively, to identify regional contrast. Such projects may be preferable (in the present state of knowledge) to intensive, large-scale, single-site excavations, although such projects still have an important place.

**Multi-period Studies**

Sites or landscapes that can offer insights into the long-term development of aspects of human activity, or into processes of change are of particular importance. An example of the former might be the development of lowland settlement between 1000 BC and AD 1000; of the latter, the interface between Mesolithic and Neolithic.

*Figure 15. The recumbent stone circles of north-eastern Scotland are one of the clearest indicators of regional variability in the archaeology of Scotland.*
Contributions to Technical Development

Projects that offer the likelihood of significant developments in technical approaches to archaeological work in its broadest sense (e.g. predictive models for site location) may attract greater support.

International Links

It is important that Scotland’s prehistory, proto-history and history are seen in the wider context, in their relationship to the rest of Britain and Ireland, continental Europe and Scandinavia. Our archaeological interests in areas once, but no longer, part of Scotland (e.g. Berwick upon Tweed) should also be remembered.

Overarching Research Themes

Some areas seem to Historic Scotland to be of overarching importance and to require particular attention. Some are period-specific; others transcend the traditional period divisions. They are:

- the date and nature of the first human settlement of Scotland;
- the transition from hunter-gatherer to agricultural ways of life;
- the nature of human interaction with and responses to environmental change, particularly in the later Bronze Age;
- the relationship between Iron Age communities and Roman invaders;
- the contribution of archaeology to an understanding of the formation of the Scots kingdom;
- the contribution of archaeology to an understanding of the industrialisation of Scotland.

CURATORIAL ISSUES

Historic Scotland’s Archaeology Programme deals increasingly with threats and other curatorial problems where no developer-funding is available – in the case of natural or semi-natural threats to sites (e.g. coastal erosion and rabbit damage) or where the land user is not responsible for funding archaeological work (e.g. agricultural threats, non-commercial development). The work of the Archaeology Programme is, of course, integrated into the other, mainly monument management, work of Historic Scotland (cf. Macinnes 1992).

Land Management Issues

a. Effects of Forestry

Considerable damage is caused to buried archaeological remains by the processes of modern forestry (ploughing and other ground preparation, drainage, tracks) and by root development (Barclay 1992). Even 'shallow-rooted' species establish roots deep enough to cause considerable damage. Windthrow of mature trees can cause further damage. Although the general problem is understood, little work has been done to learn more about the extent of the damage and the processes involved. A few foresters still claim that the damage caused by forestry is unproved.

A paper to draw together information currently available is in preparation and new excavation and associated work, designed specifically to answer some of the questions, has begun. New contract and grant conditions have been introduced to ensure reporting of relevant information from all sites.

b. Damage by Vegetation other than Trees

Evidence from excavations suggests that some plant species may cause considerable damage to buried archaeological remains. For example, bracken may cause underground damage to soil layers, destroying the archaeological information contained therein. New contract and grant conditions have been introduced to ensure reporting of relevant information from all sites.

c. Damage to Ploughed Sites

Many hundreds of sites have been ploughed flat and are visible only from the air. Much information survives immediately below the plough soil (Hanson and Macinnes 1991). Any agricultural operation that goes below the plough soil (e.g. deep ploughing, panbusting, drainage) may further damage such sites. Occasionally, sites are excavated because of a specific threat of damaging activity. Sites in raised positions may be more vulnerable, because of soil erosion. A pilot project on measuring rates of soil loss from sites has begun (Tyler, Davidson and Bradley 1995). New contract and grant conditions are now in effect to ensure the reporting of relevant information, for example, the
extent to which agricultural operations are damaging features, from all excavated sites. These actions will instruct appropriate management measures.

d. Erosion of Coastal Sites

Many coastal sites are under active marine and wind erosion. The latter problem is exacerbated by rabbit and other animal erosion and, in some cases, poor land management (Ashmore 1994). Historic Scotland’s recently promulgated coastal strategy (Barclay and Fojut 1995) outlines the approach in partnership with others - work is actively underway on the understanding of coastal processes. Strategic surveys are being undertaken and threatened sites are being excavated.

e. Archaeology in Wetlands

Drainage of wetlands forms a serious threat to waterlogged archaeological deposits. Because the buried deposits are dependent on continued waterlogging to retain their stability, a wetland archaeological site can be damaged by drainage operations at some distance (Figure 16). Other forms of development, including road construction, house building, peat extraction and ploughing, also threaten wetland deposits. Other threats include natural erosion of peat, acid rain, and other artificially induced changes in soil chemistry. An archaeological database for the Raised Bogs of Scotland has been created through a joint project with Scottish Wildlife Trust in 1994-5. This database is now being extended to cover the other wetlands of Scotland and the work should be completed by Summer 1996. The intention is to create a database of known archaeological finds and sites in order to inform future decision-making. It is intended that this database will be integrated with the database for palaeoecological records from wetlands.

f. Damage Caused by Animals

The problem of damage by domestic and wild animals is acute (Berry and Brown 1994; Barclay and Foster 1996). In

Figure 16. The complex and well-preserved waterlogged timber structures at Buiston crannog.
particular, damage caused by rabbits has become a major conservation issue in large areas of Scotland, particularly the arable lowlands and the islands (Figure 17). Trampling by stock is also a problem. Some sites are being excavated specifically because of rabbit or cattle damage, where management efforts have failed or are unlikely to succeed, or to determine the extent of the damage. On all sites new contract and grant conditions now in effect will ensure reporting of relevant information.

Development Issues

a. Urban Archaeology – National Priorities in Urban Archaeology and Excavation

Sites in towns are threatened by development proposals of all types, including restoration works and environmental improvements. The conservation of sites in towns is more difficult than in rural areas, partly because their nature and extent is often little understood before they are disturbed. Scheduling is rarely appropriate and sites are more often excavated than preserved. Individual threats to the urban archaeological resource are dealt with through the planning system, but Historic Scotland has an important role in providing a strategic overview. Historic Scotland will soon be revising its Policy Statement for Urban Archaeology (Historic Scotland 1994a) and is working on a range of initiatives, including the removal of the backlog of unpublished urban excavations.

Scottish Burgh Survey The provision of adequate historical and archaeological information to aid informed decision-making, in a form useful to planning authorities and archaeological curators, remains a crucial aim. The Scottish Burgh Survey sets out to provide such information and to increase public awareness of the importance and vulnerability of the urban archaeological resource. In a parallel initiative, some of the earlier burgh surveys are being archaeologically updated.

Figure 17. The rising rabbit population is a major threat to archaeological sites made of turf and soil – burial mounds, settlements, earthen banks. Their burrowing destroys fragile archaeological information. At Maryton Law the Area Inspector of Ancient Monuments surveys the damage.
Perth: Development and Archaeology Study

Perth is unique amongst Scottish towns both in the quality and quantity of its medieval archaeological deposits and in the number and extent of archaeological investigations which have taken place. Historic Scotland has commissioned an in-depth study, the aims of which are: to understand how topography, natural processes and historic development have interacted to create the town's archaeological heritage; to map the location of known and conjectured natural features underlying the town; to map the date, nature and extent of man-made deposits; and to assess the likely impact of modern development and the effects of different foundation types on archaeological deposits. Some of its conclusions may also help in protection of the urban archaeological resource of other Scottish towns.

b. Antonine Wall Forward Protection Programme

The Antonine Wall is Scotland's foremost Roman monument and a site of international importance (Figure 18). It formed the north-western frontier of the Empire for a 20-year period in the 2nd century AD. It is under particular threat from development as it runs through the heavily occupied central belt of Scotland; for example, all pipelines and roads that run north-south through Scotland have to cross the line of the Wall at some point. The Wall was scheduled during the 1960s and 1970s but the currently scheduled areas are not adequate to provide full protection. In addition, an Amenity Area has been defined to protect the setting of the Wall. Although this has been in place for over 20 years and has had some effect, development continues to occur within this area. The rescheduling of the whole of the Antonine Wall began in 1995 and is expected to continue until 1997, providing modern and accurately applied protection. A historic landscape impact assessment involving developments affecting the Wall and its Amenity Area was carried out in 1995 as a background to further investigation of an enhanced protection strategy for the setting of the Wall. The application of Geographical

Figure 18. A typical well-preserved section of the Antonine Wall, under excavation at Rough Castle.
Information Systems to aid the protection and management system is also being investigated.

**Strategic Issues**

*a. Medieval or Later Rural Settlement*

Sites and landscapes of this type are very common in Scotland and form extensive landscapes across much of the uplands (Hingley 1993; Foster and Hingley 1994) (Figure 19). They are an archaeological resource of international importance. However, archaeologists did not take the protection of this resource into serious account until the 1960s, or later. As a result we have very little information on which to base a preservation and management strategy and few excavations to tell us about the nature of settlement and associated activities. A number of projects have been carried out since 1991 and analyses published; these have increased our understanding and appreciation of Medieval or Later Rural Settlement (MOLRS) sites and landscapes. Current projects underway which are receiving Historic Scotland support include a project aimed to assess the potential of post-medieval field systems and a landscape-based project at Ben Lawers. Historic Scotland's policy statement on MOLRS will be produced in the near future. Future projects may be directed towards investigation of MOLRS, particularly on a regional basis. As a first step to quantifying the resource more effectively, Historic Scotland is funding the First Edition Survey Project in RCAHMS (the extraction of MOLRS data from the first edition maps of the Ordnance Survey into a Geographical Information System).

*b. Predictive Models*

Cultural resource managers are commonly required to assess what cultural remains may survive in areas for which there are few archaeological records. They use their experience and general knowledge of the topography and vegetation of the areas and apply a set of assumptions about past

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*Figure 19. A deserted farm in Kincardineshire, typical of many such sites, testifying to an earlier agricultural lifestyle (Crown copyright: RCAHMS).*
societies and environments to guide them. However, it is difficult for cultural resource managers to test the success of their models or to convince others of their reliability, particularly if there are strong pressures for development, and it is difficult for them to pass on their experience. The general point, that we cannot predict consistently where the vestiges of past societies may survive, applies generally. However, the problems of locating settlements, cemeteries and ritual sites are particularly acute with regard to hunter-gatherer and other mobile groups, who rarely leave remains of structures which are visible on the surface (except where shell mounds survive, or flints occur on the surface of ploughed fields).

Two approaches towards prediction are employed in the Southern Hebrides Mesolithic project, based at Reading University (Mithen in preparation): one is to build a model based on ethnographic data for hunter-gatherer groups in similar environments to that of the Southern Hebrides of over 6000 years ago and apply it to local circumstances; the other is to build on the fieldwork which has located flint scatters and habitation sites, and on descriptions of modern and ancient topography, vegetation, etc. to predict the occurrence of other flint scatters and structures. Since there must be doubts about the applicability of a model devised for west coast islands to the valleys and hills of eastern Scotland, Historic Scotland hopes to sponsor a project to assess and modify or redesign the model developed for the Southern Hebrides in south-eastern Scotland.

c. Historic Landscape

In addition to dealing with specific sites and relict landscapes, cultural resource managers are increasingly called upon to consider the conservation needs of the wider landscape – the historic dimension of the landscape extends beyond specific features to such areas as field patterns and semi-natural elements, like ancient woodland. Historic Scotland is concerned to apply research by historic geographers in practical conservation and planning contexts. It seeks to identify methodologies which can be used to inform decisions affecting landscape change. A pilot project is being designed.

d. Synthesis

If the results of fieldwork are to be fed back into the curatorial process and are to be made available to researchers, then the results of groups of projects (types of site or feature, excavations in a region, etc.) must be synthesised. This is particularly important if the results of developer-funded excavation are to be exploited fully. Historic Scotland accepts that one of its strategic roles is to initiate or sponsor synthetic approaches to data recovered from ranges of projects, regardless of their original funding source. Synthesis must be done at both academic and popular levels (Figure 20).

**TAKING CURATORIAL ISSUES FORWARD**

Historic Scotland will develop projects within these themes to tackle specific areas of work, combining the assessment of the archaeological resource and the extent and nature of threats to it, the development of mitigation strategies and the extraction of archaeological information from threatened sites and landscapes.

These projects will be developed in partnership with research organisations, archaeological units and individuals, as appropriate, within the resource constraints outlined in the earlier parts of this paper.

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**Figure 20.** The Historic Scotland/Batsford book series has been very successful in providing easily accessible summaries of recent research, including the results of rescue excavations.
4

CONCLUSION

This paper has ranged widely over the changing nature of Historic Scotland’s archaeological work and the structures in which it operates. It has also looked generally at the ways in which rescue archaeology fits into the wider research context. It has examined the curatorial concerns of Historic Scotland and the ways in which these will affect our initiation or sponsorship of projects.

In summary, state-funded rescue archaeology has provided the major and, at times, in some areas virtually the only, input to the advancement of archaeological knowledge through modern excavation in Scotland. The most significant advances in knowledge have come about through this work, in particular since rescue funding in Scotland began to expand in the mid-1970s. Without the rescue effort of the last 20 years, our knowledge of Scotland’s prehistory and history through excavation would in many ways be even more rudimentary. Developer-funded archaeology now contributes significantly in certain areas, but because of the constraints outlined above can never replace the work undertaken by Central Government-funded excavation.

The Archaeology Programme plays an important part in achieving the aims of Historic Scotland in promoting the understanding of the archaeological resource, assessing the threats to its survival, and developing mitigation strategies. Without an active programme of investigation into the archaeological resource we seek to conserve, albeit on sites threatened with destruction, the very point of that conservation effort would be compromised significantly.

Some indications can be put forward for the future of Historic Scotland’s Archaeology Programme:

- Historic Scotland rescue funds will deal increasingly with the threats for which no ‘developer’ can be identified, or where the developer or user of ground is protected from the consequences of their actions.
- There will continue to be a need for Historic Scotland funding for non-commercial developments and in cases where the planning system has not made adequate provision for archaeology (e.g. in pre-NPPG5 cases).
- Rescue excavation and survey projects will be designed to provide information of use to Historic Scotland’s broader curatorial purposes (e.g. in the measuring of agricultural damage, or the effects of burrowing animals).
- Historic Scotland will sponsor, where appropriate, the preparation of syntheses of results from groups of archaeological and palaeoenvironmental projects it, and others, have funded.
- Because fewer costs are now absorbed elsewhere, fewer large-scale excavations on threatened sites can now be funded within current budgetary constraints.
- Where possible and appropriate, those large excavations that are undertaken should be in partnership with institutions prepared to apply resources themselves.
- The reactive or ‘opportunistic’ approach to the selection of sites, which has worked so well, should continue, within general curatorial and research themes kept up-to-date by constant monitoring.
- Even greater care will be taken in assessing the value of threatened sites (through trial excavation, where possible) before more substantial funding is put into a project.
- The current project management procedures should be maintained and improved.
- The creation of new backlogs will be avoided through improved contract management and the use of contract and grant conditions.
- Wherever possible, opportunities for training archaeology students and for the participation of local people should be built into rescue projects; likewise, the results of excavations and other projects should be made available to a wide cross-section of the public, through the press, TV and radio, popular publication and exhibitions; realistic opportunities to use the Internet and World Wide Web for dissemination of information will be explored.
5

POSTSCRIPT:
Frameworks for Our Past:
RESEARCH FRAMEWORKS IN A UK CONTEXT

Just as this document was being finalised English Heritage's paper Frameworks for Our Past: a Review of Research Frameworks, Strategies and Perceptions (Olivier 1996) was published. Although the documents were prepared separately, the authors of Frameworks and this paper were relieved to see how closely aligned was the thinking behind both documents.

The English Heritage paper provides a valuable review of English archaeological structures and the way in which research aims are articulated within them. Some of the problems identified are also experienced in Scotland, others are not. The greatest differences are those of scale: in Scotland communication, coordination, collaboration and planning are all easier, because of the relatively small size of our archaeological community. We are fortunate in not yet suffering the 'fragmentation' within the profession perceived as being at the root of so many of the problems discussed in the paper. On the other hand, our local authority archaeological structures are far less developed. Olivier suggests that there is a need to 'take stock and assimilate the vast amount of evidence accumulated during the past few decades'. As discussed above, this 'problem' is not one that we share to the same extent in Scotland.

Olivier states that, 'one of the most important consequences of the implementation of PPG-16 (the English equivalent of NPPG3) has been to enable the expenditure of public money on research by freeing a proportion of the English Heritage archaeology budget from the proactive role of funding rescue archaeology, permitting a redirection of resources to strategic considerations'. While this has been possible to some extent in Scotland, the demands of non-developer threats to specific monuments has restricted what can be done to fund strategic projects.

The English Heritage paper has much in it that is relevant to the UK and Scottish situations, for example, the need for locally relevant research frameworks to support curatorial decisions. What is necessary, however, is that the approaches and solutions adopted here are tailored not only to our local organisational structures (e.g. reflecting the fact that we have few locally based archaeological units and few strong local societies) but also to the state of development of our understanding of our past (as set out in the second part of this paper). At the same time it is necessary to ensure that frameworks set up to deal with the realities in Scotland articulate with those established elsewhere in the UK. Historic Scotland will work in partnership with sister organisations in the UK and Europe to promote the development of appropriate integrated and collaborative programmes of research in regional, national and international contexts.

Historic Scotland has urged the extension of 'regional' umbrella organisations in Scotland, using the Tayside and Fife Archaeological Committee (TAFAC) as a model, to enhance communication, particularly in the light of recent Local Government reform. Such a committee provides a forum for communication between local authority archaeologists in planning and museum services, educationalists, local societies, non-affiliated local amateurs, the representatives of national organisations currently working in the area (e.g. the AreaInspectors of Ancient Monuments, or field staff of RCAHMS), researchers currently working in the area, and interested members of the public. TAFAC runs a very successful annual conference to make current archaeological work available to a wider public, has coordinated the provision of educational material to schools in its area, has recently started a journal and is to begin to publish its own monograph series. This sort of forum is the natural seedbed for the creation or enrichment of locally relevant research frameworks.
APPENDIX:
PERIOD-SPECIFIC SUMMARIES

INTRODUCTION

The following sections have been prepared, in consultation with colleagues, by individual members of the Inspectorate of Ancient Monuments, whose staff include active researchers in all periods of Scottish prehistoric, proto-historic and historic archaeology. The brief was to identify gaps in our knowledge that they felt should be tackled, broadly in the traditional period divisions, even where Historic Scotland’s capacity to address these problems was limited. Because of the very limited knowledge we have about much of Scotland’s archaeology, there are perhaps more ‘priorities’ than would make for comfortable reading, but it should be borne in mind that work not considered high priority may simply have been omitted from these necessarily brief surveys. What follows is not a statement of Historic Scotland policy but is intended only as a contribution to overall considerations of research frameworks for Scottish archaeology.

HUNTER-GATHERERS

All sites of immediately Post-Glacial or earlier date will have a high priority. Early hominids were present in Britain around 500,000 BC at Boxgrove in West Sussex. Traces of settlement of similar or later ages may survive in Scotland in caves or deeply buried river valley deposits, inland or offshore and therefore studies of Late-Glacial raised shorelines and caves above the Late-Glacial and Main Post-Glacial Transgression limits will be of great importance. Buchan, Caithness, Orkney and Shetland were deglaciated early and research in these areas is a priority. More generally, sites with flints, implying hunter-gatherer activity before 7500 BC, the date of the earliest known settlement in Scotland, are of considerable importance.

The latest glaciation caused major fluctuations in land and sea levels and also in the amount of land covered year-round by ice. Current models of the varying shape and state of the Scottish landmass must be tested. Vegetation cover and the distribution of marine and land animals, upon which hunter-gatherers depended, varied greatly over time and space. It is important to understand the nature of the changes; the degree to which people used these resources and changed their environment; and the relationship between ecological zones and dwelling places.

During the whole hunter-gatherer period, populations were small. Those which survived must have practised exogamy (marriage outside their own group), implying long-distance connections. For this and other reasons it is a priority to identify sources of raw materials. Little is known about the relationship between the stone tools which form the bulk of evidence for hunter-gatherer communities and other aspects of their way of life. Resources should be directed to sites with well-sealed and stratified deposits, including buried land surfaces, as well as to those with structures. Any such sites with both stone tools and organic remains, including tools and food refuse, must have a high priority.

Excavation of a large area around stone tool and waste scatters is needed, because dwellings and activity areas may have been close to each other but concentrated in slightly different areas. These areas will normally have left slight remains which are difficult to pick up in small sample trenches. That said, large-scale test-pit surveys in both upland and lowland areas may offer the best prospect of locating hunter-gatherer sites. In all this, good absolute dating is a high priority.

There are few known inland hunter-gatherer sites and there is little evidence for exploitation of the uplands or of the outer islands of Scotland. Such sites and areas deserve considerably greater attention. Evidence of contact with hunting and (on the continent) farming communities in other parts of the British Isles or north-western Europe should be sought. Excavation of sites with evidence for management, or even domestication, of deer or other beasts and those with evidence for exploitation of plants, or even cultivation, should be a priority.

Models for the introduction of farming in Scotland range from quasi-independent invention, through acculturation of the indigenes or a trickle of incursions of farmers, to large-scale colonisation. Probably only large-scale DNA testing of human bone will answer these questions. For this and for other reasons it is important to extract the greatest
amount of information from finds of burials with good organic preservation.

NEOLITHIC/EARLIER BRONZE AGE

Our understanding of this period is based to a great extent on a limited number of modern excavations of burial and ceremonial sites, with a few regionally restricted exceptions. Only in Orkney, Shetland and, to a lesser extent, in Argyll, are there many known excavated roofed buildings, and agricultural systems are even rarer. The location and identification of settlement sites through fieldwalking for artefact scatters, aerial photography and excavation is a high priority. Understanding of the nature and origins of farming in Scotland is limited. A high priority for excavation must be any domestic or potentially domestic site, particularly in areas where there is known Mesolithic activity.

Artefact studies are an important part of this effort; the value of artefact studies (and arable fieldwalking) in locating and characterising settlement sites cannot be underestimated. On the larger scale, investigation of manufacturing and dispersal of artefacts is needed. On the smaller scale, excavated assemblages should be examined using appropriate proven methods: the examination of residues of organic material on pottery vessels from burial, ceremonial and domestic contexts should become routine. Further understanding of the origins of metalworking, particularly through the identification and investigation of metalworking sites, are an additional priority. The investigation of agricultural systems (ditches, walls, lynchets, soil erosion) where they can be located is urgently needed.

Despite a concentration on ceremonial and burial archaeology, our knowledge of this subject is also limited. The way in which the contents of chambered tombs and other mounds accumulated is little understood. There has been little work on the use of forecourt areas or in the periphery of tombs where links to the contemporary landscape (e.g. field walls) may be found; the excavation of undisturbed chambered tombs (because of the inadequacy of much earlier excavation) remains necessary. Our understanding of the range of probable ceremonial sites revealed by aerial photography is limited (e.g. cursus monuments, pit circles, ring ditches).

No modern excavation of a recumbent stone circle, one of the crucial monument classes for the understanding of regional variation in the later Neolithic, has been published; the better understanding of these sites is a priority. The nature, function and period of most stone circle types and other stone settings (e.g. stone rows) in Scotland remains obscure.

Our understanding of the nature of flat cemeteries is still influenced by past recovery patterns dominated by cist and urn burials. The proper investigation of burial finds (not only the salvaging of cist contents) is a high priority; greater attention must be given to the recovery of environmental evidence relating to burial ritual (e.g. floral tributes). Important type sites (e.g. enclosed cremation cemeteries) remain largely uninvestigated – the dating and characterisation of, and assessment of variation within, such supposedly classic site types is needed.

Henge monuments appear to have been well served by excavation in the last 25 years. However, care must be taken in selecting further threatened sites for excavation as the catch-all classification appears to embrace a wide variety of site types.

In general, there are few studies of regional variation in the Neolithic and Early Bronze Age, despite clear evidence that considerable variation exists throughout the period; one of the clearest examples is in eastern Scotland, north of the Tay. Projects which further such studies are a high priority.

LATER BRONZE AGE/IRON AGE

In this period (c. 1200 BC to AD 100) traces of domestic settlement and agricultural systems become increasingly common. In the earlier part, a severe decline in environmental conditions may have caused stress to human communities, especially in the uplands.

Regional models must encompass variations in the climate and the economic response of later prehistoric populations across Scotland: for example, the balance of crops to animals and the role of hunting, changes in settlement patterns, including colonisation and abandonment in both uplands and lowlands. Archaeological investigations can contribute significantly to the broader scientific debate on environmental change. The study of change in agricultural systems remains a priority, as does work on the development of crops.

Our understanding of the nature of the common and heterogeneous circular buildings, particularly in the uplands, is still rudimentary. A more detailed understanding of the chronology and interrelations of various types of roundhouses throughout Scotland (including brochs, wheelhouses, duns and crannogs) is a high priority. Further
information on the primary use and internal structure of brochs in a regional context is needed.

Souterrains, mainly associated with Iron Age settlement, and extensively investigated in the last century, have seen little modern study, in particular since the discovery of many new examples by aerial photography. Further large-scale investigation of these structures, in the context of the settlements of which they form part, is required.

It is ironic that much of the cropmark record that we believe we can interpret may originate in this period, but is scarcely investigated. Building a chronological framework for defended, enclosed and unenclosed sites in south and east Scotland is a priority. Investigation should also address the role and nature of boundary structures and entrances. The south-east of Scotland and Strathmore would be particularly rewarding areas for future study.

A number of traditions of burial exist in the Later Bronze Age but excavated sites are rare. Further investigation of the kerb cairn tradition is needed and any discovery of further Later Bronze Age cremation sites should be investigated thoroughly. Burial remains of the Iron Age are even more scarce. Some square barrows may date to this period and the further study of these and other Iron Age burial traditions should be a priority for future study.

Pottery is a rarer find than over much of southern Britain. Addressing the significance and chronology of the tradition of decorated ceramics in the Western and Northern Isles is a priority.

The work of the National Museums of Scotland in examining the context of modern chance finds is of considerable importance. Any future discoveries of significant objects should be studied carefully and related to patterns of settlement and activity.

THE ROMAN OCCUPATION

The Roman occupation falls within proto-history as opposed to prehistory and thus has a framework provided by historical events. The chronological framework was established nearly a century ago and has been refined since. Further refinement of this and of the patterns of occupation is likely to occur through the gradual accretion of knowledge, critical assessment of established frameworks, and by chance (Hanson and Breeze 1991).

The last 25 years have seen significant excavations at forts, fortlets and towers. Survey and aerial photography have expanded our knowledge of the road network. Recent work has suggested that occupation sequences of temporary camps may be more complex than had been expected: the exploration of temporary camps under threat of development remains a priority. While in general we have some understanding of the Antonine Wall military frontier, it retains a capacity to provide unexpected discoveries. Where it is not possible to protect these remains in situ, archaeological projects should address important questions related to the Wall. Our understanding of the earlier Gask frontier is more limited: an important tool here is aerial survey.

In contrast to strictly military remains, other aspects of the Roman occupation are poorly understood. Annexes are largely unexplored and the subject of different interpretations: they are a priority for further investigation. In spite of its acknowledged high priority for 25 years, we have failed to locate and excavate any civil settlement with the exception of Inveresk. The Roman occupation cannot be understood fully without reference to contemporary Iron Age settlement. The assessment of the relationship between the army, its environment and the indigenous population is important. Opportunities should be taken to explore the relationship of Roman military sites to contemporary Iron Age settlements. This must be undertaken within the framework of a broad view of first millennia BC and AD settlement and vegetation studies through which the impact of the Romans can be recognised and understood.

Within this broad approach, specific areas can be seen as having a high priority for study. These include the Esk Valley of Midlothian (Hanson and Breeze 1991) and the Newstead area (Jones 1990). In addition, landscape projects in an area where complex patterns of contemporary Iron Age settlements occur but military remains are rare, for instance the area around Traprain Law (Maxwell 1970), would be useful as a comparison. Another approach will be site-based (i.e. specific fort/annexe/civil settlement/cemetery complexes, e.g. Camelon and Elginhaugh). Further, the significance of the Roman episodes for other periods in providing a dated horizon should not be underestimated.

 Artefacts have been an important part of the study of Roman Scotland. In the absence of other dating evidence, they remain a significant method of dating native sites and for understanding the impact of the army on contemporary Iron Age society. A long-term priority must be further refining of the artefactual database, to improve our dating of sites as well as our analysis of the main social trends.
As a priority we should aim to study the nature and significance of changes in the pattern of behaviour of the indigenous population during the period of Roman contact and control; for example, studies of contrasts and similarities in agricultural operations, diet and material culture. A particular topic of importance is the ways in which local societies re-use Roman sites and Roman materials. The re-use of certain fort sites is relevant (e.g. Cramond), as is the use of material from Roman forts in structures such as souterrains and fort ramparts.

**THE EARLY HISTORIC PERIOD**

Although not as ‘dark’ as it used to be, our knowledge of the activities of the Picts, Dal Riata Scots, Britons andAngles in Scotland in the first millennium AD remains dim. Intellectual developments and advances in, for example, dating methods, have propelled study forward, but there is an urgent need for intensive research and fresh data in all areas. Identifying Early Historic sites remains a problem. Particular attention should therefore be given to Early Historic remains which are encountered accidentally in the course of work on sites of other periods.

Investigation of functional site types and activities, about which we know virtually nothing, such as burial practice, where these have already been identified should be a priority, as should be the investigation of landscapes that have an Early Historic element. In selecting landscapes for research, attention should be focused on areas with known power centres, both secular and ecclesiastical, to investigate the relationship between potentates and clerics, and the population as a whole. Geographically diverse landscapes should be compared, because these are likely to have been the subject of contrasting political developments and cultural stimuli. The investigation of sites which have the potential for the recovery of detailed information, particularly waterlogged sites, could provide basic information about structures, furnishings, the contemporaneous environment, and a refined dating sequence which is currently lacking.

The first important theme for the Early Historic period is the structure and workings of society, including the key issue of ethnic and political identities, the origin, definition, extent, physical manifestation and effectiveness of territories, administrative units and other formal land divisions and the recognition of their constituent parts. In the nature and organisation of settlement, it is a priority to understand the evolution, nature and development of power centres. It is also necessary to understand the nature and evolution of non-elite settlements and secular sites, and their influence on the structure and organisation of society.

In the area of religious beliefs and associated practices, work is needed on a chronological sequence for the range of surviving ecclesiastical structures. This is a necessary element in the better understanding of the nature and chronology of the introduction of Christianity in the context of indigenous pagan beliefs, the structure and physical manifestations of the early church and the evolution of burial practice. Archaeology can also contribute to understanding of the development of insular art, and the dating and origin of Pictish symbols.

The nature and effect of external influence or intrusive presence is a particularly important area of study in this period: in particular, the cultural awareness and cultural contacts of peoples, the nature and impact of ‘migrations’, ‘invasion’, ‘raiding’ and settlement. A very significant subject is the process by which the Gaels took over Pictland and the impact of this on both society and material culture.

Finally, in the area of trade and economy, key themes relating to the Early Historic Period are the nature and organisation of specialised and ‘domestic’ craft activities; their technology; the source of resources; patronage and circulation; palaeoecological and faunal evidence for farming, hunting, fishing and other subsistence strategies. In addition, we need to understand better the nature and development of North Sea trade, links with the empires of the continental mainland and the role of power centres in local and long-distance trade, and the nature of this trade.

**THE NORSE PERIOD**

Archaeological evidence of the Norse period in Scotland (c. AD 800-1200) mainly comprises rural settlements, pagan graves, silver hoards and stray finds. The last three categories have invariably been found by chance and were often recorded inadequately. Relatively few Norse settlements have been excavated and fewer published. Until relatively recently, excavations of Norse settlements tended to concentrate on the interiors of buildings and the retrieval of artefacts. More recent excavations, almost all in Orkney, have been targeted at larger areas and multi-period sites. Linguistic and place-name evidence for the Norse in Scotland is abundant by contrast with the relative paucity of the archaeological evidence. Contemporary documentary sources for the early Viking period in Scotland are entirely lacking. Conversely, Icelandic sagas, notably Orkneyinga Saga, offer rich pickings if used with care.
Runic graffiti on monuments such as Maeshowe offer tantalising glimpses into the later Norse mindset.

Against this background, the following priorities may be suggested:

Systematic interdisciplinary survey (site, landscape and environmental archaeology, artefact studies, place-name and historical studies) of areas of Scandinavian colonisation is a priority in order to begin to redress the existing bias towards the well-known high-status sites in the Northern Isles. Excavation of settlement, grave, or other sites in the south-west, north, or along the eastern seaboard would be a priority, particularly cemeteries adjacent to settlements.

The nature and chronology of early Norse settlement must be addressed, as must ascertaining the origins of the settlers. The impact of the Norse on the indigenous population in Scotland remains largely a matter of conjecture, with contrary hypotheses emerging from excavated sites in the Western Isles and Orkney. The excavation of more sites exhibiting clear pre-Norse and early Norse horizons is needed in both regions. The excavation of Norse sites of any kind in the Western Isles, where the linguistic evidence for the Norse period at present far outweighs the archaeological evidence, is a priority. Examination of regional variations in land-taking, settlement patterns, administration and political control must be undertaken, against the backdrop of the different circumstances pertaining to the Norse period throughout northern and western Scotland.

At the other end of the chronological scale, archaeological re-evaluation of the processes of ‘Scottification’ is a priority, through the examination of medieval type-sites of the 12th to 15th centuries in areas of Scandinavian colonisation (e.g. high- and lower-status farms, potential hallhouses and castles). The examination of less typical Norse sites in Scotland is a priority, for example, farm-mounds, fish-processing stations, seasonal trading posts, burnt mound deposits, early Norse churches and castles, and proto-urban centres.

Examination of the agricultural and economic basis of Norse settlements is a priority, through enhanced programmes of palaeoenvironmental sampling and through the excavation of sites with preserved organic materials, especially timber.

The nature and dynamics of the relationship between paganism and Christianity is an important area of study. The location and systematic excavation of single graves and Norse cemeteries is a priority in all areas where there has been a Scandinavian presence.

**THE MEDIEVAL BURGHS**

Scottish urban archaeology, although richly informative, has occurred unsystematically. Only Perth and Aberdeen have seen any large-scale excavations and any systematic development monitoring before the 1990s. Many towns of undoubted importance in medieval Scotland have seen only limited watching briefs, small-scale excavations, or even no archaeological investigation at all.

The urban research agenda is inadequately informed by previous archaeological work; of necessity, excavation is driven almost entirely by development pressures. Scheduling is rarely appropriate in urban contexts. Against this background, the systematic archaeological monitoring of developments in the cores of historic burghs is a priority. The analysis of historical, cartographic and archaeological data in order to predict the likely nature and extent of areas of archaeological sensitivity in historic burghs is urgently needed. This information must be provided in a user-friendly and accessible form (in particular through the Burgh Surveys).

The results of the last 20 years must now be analysed on a number of levels: burgh by burgh, within their hinterlands, regionally, Scotland-wide, within Britain as a whole and in their European context. The burgh-by-burgh and regional analyses are an immediate priority.

Where sufficient fieldwork has taken place in towns with deeply stratified deposits (only Perth and Aberdeen at present) the production of topographic and three-dimensional models of the surviving archaeological deposits (for both development control and archaeological interpretation) is a priority. Elsewhere, synthesis of the results so far and analysis of their significance is a priority. Analysis of the date and nature of a range of common features of early burghs must be undertaken (e.g. town walls and other defences, castles, fortified houses, ports, markets, harbours). Analysis of the archaeological and historical evidence for urban crafts and industries is needed (textiles and leather industries, metalworking, saltworks, etc). The provision of a dated and sourced framework for Scottish medieval pottery – so plentiful in urban contexts – is a high priority. Analysis of buildings and buildings technology, of the nature and uses of street frontages as opposed to backlands, and of the relationships between buildings and burghal plots, should be undertaken. Comparison between
successful (i.e. surviving) and failed (i.e. deserted) burghs would be useful.

Excavation opportunities will continue to be dictated by development pressures. On all sites, however, the recovery of absolute dating evidence (especially by dendrochronology) for the origins and main features of towns is a priority. Evidence for the changing economic basis of towns and of the relationship between town and country must be obtained through enhanced programmes of palaeoenvironmental and ecofactual sampling and analysis. Evidence for craft industries and trade is also a priority; modern sampling techniques will ensure the retrieval of minute remains and therefore improved interpretation of deposits.

MEDIEVAL OR LATER RURAL SETTLEMENT

For much of the Scottish mainland our understanding of rural medieval settlement is virtually non-existent, largely because of the lack of intensive and invasive fieldwork. As the majority of the medieval population lived in the countryside, this is a serious gap in understanding. A high priority for excavation must be any currently deserted settlement that is known to have been occupied in the medieval period but which never achieved burgh status, and the investigation of any associated agricultural system. Documented examples survive in Glenlednock, Perthshire. Research to locate examples elsewhere is required.

The Scottish medieval burghs were supplied with everyday items from these rural settlements and farms; it is possible that answers to many of the current problems of pottery dating, the operation of the pottery industry and the location of its production centres may come from the investigation of these settlements. The location and investigation of kiln sites is a priority, as is the recovery of information relating to other aspects of the urban supply network.

The countryside also contains important sites related to major monastic centres, few, if any, of which have been excavated; for example, the granges that controlled the collection and storage of crops produced from abbey estates.

Hospitals were important medieval institutions in both town and country. Further investigation of such sites is needed. Although there has been some excavation, further investigation of earthwork and timber castles (e.g. mottes and moated manors) which held an important position in medieval life, is still required. Further archaeological research into the location and operation of deer parks is needed to enhance the documentary record.

Sites and landscapes which are usually interpreted as post-medieval are very common in Scotland and form extensive landscapes across much of the uplands. This is an archaeological resource of very considerable importance because of its extent, complexity and good preservation (Hingley 1993). However, little coherent archaeological work has occurred on post-medieval rural settlements and agricultural systems in Scotland and we have very little detailed knowledge of the dating and significance of the majority of these very varied remains. In the Highlands of Scotland extensive systems of settlement survive. Over much of lowland Scotland substantial remains only survive in pockets within disturbed or improved ground (Foster and Hingley 1994).

There is evidence to indicate regional variation in the pattern of MOLRS. The identification and investigation of regionally representative systems of settlement is a high priority, as is the establishment of regional research frameworks for MOLRS study (e.g. Atkinson 1995). Variations in the tradition of domestic architecture across Scotland through time require to be addressed.

Although many MOLRS sites would appear often to date to the 19th century or later, rectangular and other (e.g. round-ended) buildings have been built in Scotland from the Neolithic period onwards; some MOLRS sites will certainly be of early medieval or medieval date. The investigation of potentially early MOLRS sites and landscapes is a high priority.

The nature of the resources exploited by these settlements requires attention. Very little archaeological work has been undertaken on MOLRS field systems and it is difficult to decide which systems are the most important (Foster and Smout 1994). Multi-disciplinary research on the fields and rough grazing settlements as economic systems is urgently needed.

Work in Skye and Perthshire indicates that shielings may date back well into the medieval period. Therefore, regional and chronological variations in the exploitation of shieling grounds must be examined.

The nature of the use of material culture across settlements and field systems of this date requires study. Many pre-modern settlements in the Highlands appear very poor in terms of portable possessions. Where numerous items
occur (e.g. St Kilda), study of the small find assemblage and the mechanisms that led to their occurrence on sites should be a priority.

While numerous well-preserved landscapes survive in Highland Scotland, we should not forget the potential of the richer lowland settlements and their potentially greater chronological depth. Some of these sites may have been flattened by agriculture or built over but their investigation is a priority.

There is an urgent need to integrate historical documentary accounts into an understanding of field remains and excavated sites. In some cases, through this type of analysis, it is possible to investigate aspects of social and domestic life on recently abandoned settlements. Using this type of approach, it should also be possible in broader terms to study the influence of tenurial traditions on patterns of settlement.

The study of the process and mechanics of agricultural improvement from the medieval period onward is required, as is the investigation of industrial and transport systems associated with settlement, agriculture and industry.

INDUSTRIAL ARCHAEOLOGY

Comparatively little archaeological excavation has taken place on industrial sites in Scotland. Too often, important sites of early industries are still seen as derelict land needing 'restoration'. Little is known of the details of structures and processes used in individual industries, particularly the metallurgical and ceramic industries. It is a priority that industrial sites, particularly of the 17th, 18th, and early 19th centuries, threatened by development should be recorded, both above ground and, where appropriate, through excavation or watching briefs. Preservation and restoration schemes for industrial sites must include full provision for archaeological investigation and recording. Some industries, for example ceramics and mining, do not survive significantly above ground today and excavation can contribute much here. It is important that early industrial features that are little understood and poorly protected (e.g. bloomery mounds and clamp kilns) are investigated, the better to inform our preservation strategies. The importance of the remains of the infrastructure supporting industry should not be forgotten - transport systems (tramways, railways and canals) are little investigated as field monuments - and palaeoenvironmental studies (e.g. in the history of woodland management as affected by iron working) have a part to play.
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COMMENTS

We would welcome comments on any aspect of the paper. These should be sent to Dr David Breeze, Chief Inspector of Ancient Monuments, Historic Scotland, Longmore House, Salisbury Place, Edinburgh, EH9 1SH.


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8 The Neolithic

GORDON J. BARCLAY

THE IDEA OF THE NEOLITHIC

The origins of the concept

The Neolithic is the period of the first farming communities and, as defined by Childe (1925) and more recently by Zvelebil (1992), it comprised a package of traits:

1. the introduction of new food resources (sheep or goat; cereals);
2. new technology (polished stone tools, pottery);
3. new economic practices (agriculture).

Traditionally the Neolithic population, with its different means of subsistence, was seen as almost entirely foreign, having settled the British Isles from the near continent. The role of immigrants in the spread of farming economies and the package of Neolithic traits is now seen as far less important, although it cannot be dismissed entirely (Kinnes 1994).

The spread of farming as a way of life across central Europe was relatively rapid. By 6000 BP (probably around 5000 cal BC) the fertile soils of the major north European river valleys supported farming communities using long timber houses, particular types of pottery, cultivated wheat and barley, and domestic cattle, pigs and sheep. We cannot detect the transplantation of an identical Neolithic culture from one side of the North Sea and the Channel to the other. It was assumed in the past that Mesolithic populations continued to exist alongside incoming Neolithic peoples until such time as their way of life was replaced through the vaguely defined process of acculturation. However, the inception of the Neolithic in Britain in the centuries immediately before 4000 cal BC (Kinnes 1985, 1988) certainly involved far more complex processes than the replacement of one population and way of life by another. Zvelebil and Rowley-Conwy (1986) have suggested that there are three stages in the change:

1. the availability of agriculture to hunter-gatherers;
2. the process of substitution of one economic system by the other; and
3. the consolidation of the change, where a 'return' to hunter-gathering becomes impossible.

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Recent trends in the discussion

A decade ago Kinnes (1985) critically appraised the available evidence for the Neolithic period in Scotland; simultaneously Clarke et al. (1985) produced a compelling summary. Darvill (1987) and Parker Pearson (1993) have since summarized effectively many of the arguments about the nature and origins of the period. Kinnes (1994) has provided a valuable, if condensed, survey. The recent debate on the definition of the Neolithic and the processes involved in the change from Mesolithic to Neolithic, can be characterized at its most uncompromising by the exchanges between Zvelebil (1989b, 1992; Zvelebil and Rowley-Conwy, 1986) and Thomas (1987, 1988, 1991). In these works, the range of possible processes of change is explored, from the movement of people in some numbers, to an indigenous development of agriculture through contact between hunters and people practising some form of farming. Most recently, Zvelebil (1994) has undertaken a valuable Europe-wide survey of Mesolithic plant use and tools that might have been involved in the exploitation of plants. He discusses the varying intensity of plant use, the extent to which the environment was modified to favour appropriate plants, and the ways in which these strategies might merge indistinguishably (although with the introduction of foreign cultivars) into formal agriculture.

Thomas (1991) has since moved further towards Zvelebil’s position, suggesting that the earlier Neolithic population was not living by practising fully developed formal agriculture, particularly arable cultivation. In his model, the early Neolithic may be seen as an elaboration of native Mesolithic culture by the gradual adoption of social structures, ritual practices and economic subsistence strategies. He has dismissed the cultivation (if any) undertaken by these people as ‘transient, hoe-based horticulture’ and ‘rather small-scale, garden horticulture’ (1991, 21).

He has made his disagreement with the traditional model explicit (Thomas 1991, 28):

The population of Neolithic Britain:
[1.] did not live in major timber-framed buildings,
[2.] quite probably did not reside in the same place year-round,
[3.] did not go out to labour in great walled fields of waving corn,
[4.] were not smitten by over-population or soil decline, and
[5.] much of their day-to-day food may have been provided by wild crops.

This statement provides a convenient structure within which to examine the nature of early farming in northern Britain.

Thomas is referring not only to the early Neolithic, as he goes on to say that ‘traces of domestic agriculture are no more common in the later Neolithic’ and that only in the early to mid second millennium cal BC ‘did field systems and permanent domestic structures become the norm in the British Isles’ (Thomas 1991, 28). Barrett (1994) argued for the same pattern, using data mainly from the same part of southwestern Britain. Zvelebil (1992) has criticized Thomas’ approach and interpretation as being regionally restricted (to Orkney and Wessex for the Neolithic) and selective in its use of rather inadequate evidence. However, Zvelebil himself generalizes, mixing data and interpretations from across Europe, apparently seeing the Neolithic...
as a definable constant across time and space, which it clearly is not (Thomas 1991, 11). Neither approach is helpful in understanding the Neolithic of Scotland, nor its regional variations.

**THE NEOLITHIC IN SCOTLAND**

**Problems of the data**

Kinnes (1985) characterized the problems of Neolithic studies in Scotland as ‘a recurrent need to derive innovation from without and then to resort to the parochial for explanation and understanding’, but even explanation and understanding are too easily imported. The interpretation of relatively poorly understood local data by analogy with better (although not always comparable) data from distant areas has often proved too tempting. In Britain, explanations of the Neolithic have generally relied on models erected using data from Wessex (cf. Thomas 1991), or from Yorkshire or Orkney, the three areas where most work on Neolithic sites has been undertaken. This author would argue that the understanding of archaeological material must first be sought in its regional context, through the erection of regionally valid sequences and interpretations, before drawing on sequences and interpretations developed in distant areas. It is also necessary to be wary of believing that there is a unified entity which can be identified as the ‘Scottish Neolithic’ (Kinnes 1985, 16); for example Armit and Finlayson (1992) have argued that in the Western Isles the evidence of a gradual transformation to a farming economy contrasts with the pattern elsewhere. Nor can the later Neolithic of lowland Scotland be interpreted uncritically by using, for example, Skara Brae (Figure 8.1) as a model. Scotland is a country of great diversity in landscape and climate, which must surely have been reflected in the variability of the first farming communities.

Far more data have been collected in the last century on Neolithic burial and ceremonial sites than from settlements, but there are problems even with this apparently well-studied material. For historical reasons it has long been perceived that the Neolithic (and indeed much of the archaeology) of Scotland is represented by stone monuments, especially those in the uplands of the North and West. However, aerial photography in the last 20 years has revealed a dense, hitherto unsuspected, distribution of Neolithic and Early Bronze Age timber, gravel, soil and turf monuments, most now ploughed down, but some remarkably well preserved, in lowland east and south-west Scotland (Barclay 1992). As this brief survey of the Neolithic is concerned more with evidence for settlement and economy, and attempts to deal evenly with upland and lowland material, discussion of the distribution and typology of chambered tombs (Henshall 1963, 1972), the archetypal Neolithic monument, has not been included (Plate 8.1). Ashmore (1996) has provided a useful summary of their typology, Kinnes (1985) has reviewed the value of typological analysis, and Barber (1988, 1996) has cast doubt on the reliability of analyses of the chamber contents.
Plate 8.1 The chambered cairn known at Cairnholly I, Stewartry of Kircudbrightshire. The great interpretive value of chambered cairns, once central to Neolithic studies in Scotland, is perhaps now in doubt. Crown Copyright: Historic Scotland

The survival of evidence

As Thomas (1991) notes, little evidence has been found in southern England for Neolithic houses or arable farming. There is impatience amongst archaeologists working on the period: Bradley (1985), Thomas (1991, 8) and Barrett (1994) have all suggested that it is no longer tenable to suggest that traces of Neolithic settlement will eventually be revealed, discounting Fowler’s (1981) and Bell’s (1983) arguments that the evidence will survive in areas protected from intensive modern land use. The implication is that as no houses or fields have been found, few or none existed (Thomas 1991, 8–9). However, these authors take insufficient account of the evidence for domestic structures that has appeared in other parts of the British Isles and of the difficulties affecting the survival of this kind of material in intensively cultivated areas. Gibson (1992) has recently dealt convincingly with the factors which may have led to the loss of much of the evidence for Neolithic settlement in lowland Britain. The circumstances leading to the survival of the Neolithic settlement site at Lismore Fields, Derbyshire (in a field never ploughed using modern machinery) and its discovery (while searching for traces of a Roman road) amply demonstrate the problems of survival and location of domestic sites in such areas (Garton 1987). Likewise, the cropmark of the enormous earlier Neolithic building at Balbridie, Kincardineshire (Ralston 1982; Fairweather and Ralston 1993) was confidently identified as an early historic structure prior to its excavation.
THE MONUMENTAL NEOLITHIC

Monuments and society

Our understanding of Neolithic society is based largely on interpretations of burial and ceremonial structures and the changes in practices associated with them. Just as some have sought to push the ‘agricultural transformation of the landscape’ into the second millennium (e.g. Barrett 1994, 147), there have been recent challenges (e.g. Bradley 1993) to the assumption that the Neolithic and monument building began simultaneously; monuments traditionally seen as being of a sedentary, farming Neolithic, might have grown out of the needs of a hunter–gatherer, traditionally Mesolithic, population.

The end of the earlier Neolithic (in the centuries around 4300 BP; 3000 cal BC) was marked by significant changes in ceremonial and burial architecture which seem to reflect major changes in society. Suggestions of a contemporary decline in the agricultural economy, with the regeneration of scrub and woodland on previously cleared land, are dealt with below and in Chapter 5.

In most of Scotland by this time, communal mortuary structures associated mainly with long earthen mounds (long barrows; Plate 8.2), long cairns (Scott 1992), and in places, round mounds and cairns (e.g. Coles and Simpson 1965), were no longer built or used for burial. The burials of the later Neolithic (where evidence survives, e.g. Corrimony, Inverness-shire [Piggott 1956]) are more likely to be of
individuals rather than of communal assemblages of, to us, anonymous bone: this has been widely interpreted as reflecting a greater capacity for the representation of individual status in death. Corrimony is a member of the Clava series of monuments, best exemplified by the group of cairns at Balnuaran of Clava, Inverness-shire (Plate 8.3).

The significant foci of ceremonial activity during the later Neolithic are no longer burial sites, but monuments known as henges (Harding 1987; Burl 1991; Plate 8.4 and Figure 8.2). Henges normally comprise a ditch with external bank, the purpose of which may have been to screen the interior from view; there are usually one or two entrances and often there are internal settings of timber or stone uprights. Stonehenge is both the best known and least typical of the class. Enclosures that can be interpreted as being henges or related to the henge tradition vary in diameter from below 10 m to almost 400 m in diameter; the smallest (below 14 m [Harding, 1987] or 30 m in diameter [Wainwright, 1969]) are often called hengiform enclosures. In the map showing the distribution of these sites (Figure 8.2) the dividing line is drawn, perhaps arbitrarily, at 20 m.

The labour input for the construction of a substantial henge is greater than for a burial monument of the earlier Neolithic. Their construction and use might imply a hierarchical society, in which there was a need for large-scale gatherings and which could have organized the large workforce necessary to build them. However, many of the Scottish henges are small, and would have required little more, or even less, effort than the construction of a long mound, and it has been suggested that the largest of the enclosures, in Wessex, may have been built in segments over a prolonged period (Barrett 1994; cf. the Cleaven Dyke, Perthshire, p. 135).
The process of change from burial structures of the earlier Neolithic tradition to later Neolithic ceremonial enclosures may have been detected at two sites in Scotland, at Maes Howe in Orkney and at Balfarg in Fife (4 in Figure 8.5). At the former, the tomb, a local variant of the communal burial tradition, is encircled by a ditch and bank which Sharples (1985) has compared to a henge. At Balfarg, a structure possibly used in the preparation of bodies for communal burial in the earlier Neolithic tradition, was, at the end of its use, covered by a low mound of earth and surrounded by a henge: both mound and ditch contained Grooved Ware pottery (Barclay and Russell-White 1993) and the ditch deposits were dated to c. 4385 BP (3275–2900 cal BC). Grooved Ware, a type of pottery with flat bases and complex decoration, appeared at the same time as (and was particularly associated with) henges and other features of the apparently changed society of the later Neolithic. While Parker Pearson’s statement (1993) that Grooved Ware and henges were ‘invented’ in Orkney cannot be substantiated, it is clear that the radiocarbon dates for both are earlier in Scotland than in England (MacSween 1992).

Two types of monument whose date-range is still unclear are the bank barrows (exaggeratedly long mounds) and the cursus monuments (Figure 8.3 and Plate 8.6). Cursus monuments (which are probably related to long barrows and mortuary enclosures [Loveday and Petchey 1982]) appeared in England prior to henges, and, it has been suggested, in some way may have presaged their development. All Scottish
examples appear as cropmarks, either of ditched cursus monuments, as at Holywood (Dumfriesshire), or a Scottish variation – as parallel lines of pits, as at Balneaves, in Angus. However, there is one exception: the Cleaven Dyke, apparently a hybrid cursus/bank barrow, which runs for over 2 km. A substantial portion (1.75 km long) survives as an upstanding earthwork: a 9 m wide bank, standing 1–2 m high, running midway between two segmented ditches 50 m apart (Pitts and St Joseph 1985; Barclay et al. 1995). The construction of the Dyke has been dated to before c. 3300 BC. This date is comparable with normal earlier Neolithic long barrows. A few other bank barrows and one very long cairn (Plate 8.5) are known in Scotland, but as yet they are undated.

The apparent large scale of the effort necessary in the construction of the cursus monuments may be illusory: the Cleaven Dyke at least may have been built over a prolonged period, in relatively short segments (Barclay et al. 1995).

**Regional variation**

Sharples (1992a) has suggested that although Neolithic colonization (if that was indeed the mechanism of change) must have begun in much the same way in each region, later diversity would have been caused by environmental, social and cultural factors peculiar to those regions. He presents a number of examples of regional diversity: Orkney, the Western Isles, the Clyde and south-west Scotland.
Figure 8.2  Map showing the distribution of certain and possible henges and small hengiform enclosures (less than 20 m in diameter); cursus monuments; Clava cairns (after Henshall 1963) and recumbent stone circles (after Burl 1976)
The situation in north-east Scotland provides perhaps the clearest example of regional diversity, at least in traditions of monument building, for this period. While henges are the typical large public monuments of the later Neolithic, a very different type of site is characteristic of north-eastern Scotland: the recumbent stone circle (Plate 8.7 and Figure 8.2; Burl 1976). There are about 100 of these (and variant sites related to the tradition) in the relatively small area of Aberdeenshire, Banffshire and Kincardineshire, in an area with very few normal henges (e.g. Broomend of Crichie and Wormy Hillock, Aberdeenshire). The recumbent stone circles (now generally accepted as having their origins in the later Neolithic [Shepherd 1987]) seem to be a very different sort of ceremonial monument from the conventional henges found over much of lowland Britain at that time. This impression of regional individuality is further strengthened by the distribution of that unusual class of artefact, carved stone balls (Edmonds 1992), which is also weighted heavily towards the same area. The contrast between this area and the...
Plate 8.6  An aerial view of the Neolithic enclosure at Douglassmuir, Angus. Crown Copyright: Historic Scotland

Plate 8.7  Recumbent stone circle at Loanhead of Daviot, Aberdeenshire. Crown Copyright: Historic Scotland
coastal plain and Tay and Earn valleys to the south, where probable henges abound, may suggest very different developments in ritual practice in the later Neolithic.

Astronomy, geometry and theocracy

In the late 1960s the role of astronomy and geometry in the construction and use of megalithic sites, based on the work of Thom (1967, 1971), became the subject of debate; a radical re-interpretation of the nature of late Neolithic society was proposed (MacKie 1977, 1993). Ritchie (1982, 1990) has provided characteristically thoughtful and balanced views on some of these discussions.

Most archaeologists working in the period would accept that there is clear evidence for the alignment of elements of sites, in a relatively imprecise way, on lunar rising and setting points, particularly the extremes of their ranges, and also some evidence for solar alignments on the winter solstice (Ruggles 1984), e.g. the alignment of the passage of the chambered cairn at Maes Howe, Orkney. There is general agreement in the worlds of archaeology (e.g. Burl 1980; Ritchie 1990) and of science (e.g. Norris 1988) that the interest of prehistoric peoples in the sun and moon was in ritual observation (i.e. low accuracy, within one or two degrees).

Studies of the geometry of stone circles rely on the application of precise methods of analysis upon monuments, which are often incomplete or which were altered during use, and that are constructed of stones, often rough and irregular in shape. There is no necessity to assume that the complex geometries used by proponents of these beliefs to describe the shape of a circle (where the 'best fit' may leave many stones off the geometrical shape) was originally used to set out that circle (Barber 1996); it may be that they have fallen into 'the delusions of accuracy' (Huff 1954; Moroney 1965; MacKie 1977, 13).

In 1977, MacKie, drawing on parallels with Mayan civilization, argued that Britain in the late Neolithic was a theocracy, in which an elite of 'wise men, magicians, astronomers, priests, poets, jurists and engineers with all their families, retainers and attendant craftsmen and technicians' (MacKie 1977, 186) lived in major ceremonial complexes and in other special sites (such as all the known Skara Brae type settlements on Orkney). Fed by the efforts of a peasantry living in primitive conditions, this elite undertook precise astronomical observation and set out complex ceremonial sites using advanced geometry and a standard unit of measurement. He rejected the possibility of a sophisticated and capable Neolithic society without an elite of priests to organize it, in contradistinction to most workers in this field. The arguments used in 1977 can now be seen to be flawed. Two examples must suffice here. First, there is no evidence that the settlements of the Orcadian Neolithic were anything other than normal settlements of the period in that area, containing buildings of complex domestic, and perhaps ceremonial and religious function, constructed and used by a sophisticated society; only MacKie still argues for the Neolithic as a society largely of primitive peasants. Secondly, there is no unequivocal evidence that the timber structures within the Durrington Walls henge in southern England were large roofed buildings, let alone that they were occupied by priests; both assertions are central to MacKie's thesis, but he
largely ignores Musson's clear statement (1971, 363) that there is no evidence to prefer the interpretation that these were roofed structures over any other.

To summarize, there is no evidence for high-precision astronomy and the geometrical arguments are unconvincing; the complex structure of interpretation erected on the astronomical and geometrical arguments is flawed and, furthermore, is unnecessary to explain the data.

RESOURCES, SETTLEMENT AND LANDUSE

The exploitation of resources and the movement of artefacts

During the Neolithic, resources were systematically exploited on a considerable scale for the manufacture of artefacts (Saville 1994a). There are examples in Scotland of the production of both stone axes and flaked stone tools (Sheridan 1992). Four groups of Scottish axehead rock have so far been identified by the petrological analysis of axes (Groups XXII, XXIV, XXXII and XXXIII). Of these only the exact location of Group XXIV has yet been found, at Creag na Caillich in Perthshire (Sheridan 1992). Products of the quarry were widely distributed; one axe has been found as far away as Buckinghamshire. Radiocarbon dating places the early quarrying activity at around 4240 BP (2925–2878 cal BC).

The processes of quarrying and distribution raise many questions about the function, or range of functions, fulfilled by the axes (Bradley and Edmonds 1993). The traditional view of the process of manufacture as quasi-industrial has evolved into an appreciation of its real complexity. For example, both quarries that have been examined in detail (Creag na Caillich and Langdale, Cumbria [Bradley and Edmonds 1988]) are situated in striking locations; it has been observed that the rock is quarried from the least accessible parts of isolated outcrops, suggesting that the choice of quarrying site was not wholly pragmatic. The axes range greatly in size and in quality of finish. Many are too small to have had a function as a cutting or digging implement, or are made of special materials (such as jadeite), are very finely finished and are either unsuitable for actual work or show no signs of having been used. Axe-shaped stones may therefore be understood as both functional and symbolic objects. It is in the latter role that axes may have been distributed over considerable distances, perhaps used in formal exchanges between individuals or groups. Other goods may also have been exchanged – the most striking possibility being the carved stone balls already mentioned (Edmonds 1992). Clear evidence of large-scale late Neolithic flint extraction has been recovered by Saville from the Buchan gravels, at Boddam Den, Aberdeenshire. Here both sides of a small valley had been ravaged by hundreds of intersecting quarry pits (Saville 1994a, b). Radiocarbon dating brackets this activity in one part of the site between c. 4550 BP and 3800 BP (c. 3500–2000 cal BC).

Other stones suitable for flaking – Arran pitchstone, Rhum bloodstone, chert and quartz – were also exploited (Wickham-Jones 1986; Saville 1994a), but the processes of their distribution are even less well understood.
THE NEOLITHIC
LAND USE, CULTIVATION AND ENVIRONMENT

The evidence for the processes by which farming became the main economic system is equivocal. The disagreements about the social aspects of the change have been outlined above, and there is also debate about the meaning of the palaeoenvironmental data. This is unfortunate, as the evidence for the changes wrought by human settlement, certainly in the earliest phases of the Neolithic, is almost exclusively palaeoenvironmental. Kinnes (1988) has been critical of the interpretation of the limited evidence. Pollen analysis may reflect in detail only a relatively small area around the sampling site and it has been suggested that clearings in woodland would not impact sufficiently to be recorded through pollen analysis. There is possible evidence for cereal pollen around 5900 BP (Edwards and Hirons 1984; Edwards 1989a) but the significance of these data is uncertain (Chapters 5 and 7).

The most widely recognized environmental event in this period is the elm decline, i.e. the marked reduction in the amount of elm pollen appearing in pollen diagrams. This was formerly explained as the direct consequence of human intervention (e.g. Pennington 1974) such as the feeding of elm leaves to animals or the felling or pollarding of trees. However, human activity alone cannot account for the vast scale of the decline and it is more likely that the reduction was caused by elm disease or a series of contributory factors which also include soil and climate change (Bell and Walker 1992, 162–163).

In the later Neolithic what has become known as the ‘late Neolithic agricultural recession’ is also in doubt. Whittle described the phenomenon in an influential article (1978), suggesting that there was clear evidence in Ireland and northern and southern England for a regeneration of woodland in the main between 5000 and 4500 BP, with the next advance of clearing not taking place until c. 4000 BP. Subsequently, this interpretation of the pollen data has become accepted as fact. However, there are problems with what these pollen results signify. Edwards, as early as 1979, warned that it was ‘rather dangerous to talk of a general third millennium regeneration . . . unless all sites bore a relative constant and known spatial relationship with the human community or communities causing the inferred impact’ (Edwards 1979a, 283). As it is difficult to determine how much of the vegetation change of the fourth and third millennia cal BC was caused by human activity (as against natural causes), and how such change would impact on the pollen rain, it cannot be argued that the apparent regeneration of woodland indicated a reduction in that activity. For example, it could be proposed that there was only a change in the pattern and size of settlements, rather than a decrease in the area of land under cultivation. Recent pronouncements from palynologists raise the possibility that the expansion of woodland pollen taxa should not necessarily be taken to signify a reduction in agriculture or population (Grannson 1987; Edwards 1993a; Chapter 5).

As noted above, Thomas (1991) rejected a particular model of Neolithic farming (large timber-framed buildings, great stone-walled fields of corn and so on) which has become familiar through the study of later prehistory. Gibson (1992, 42) has critically examined the assumptions made about the nature of Neolithic settlement — ‘a nucleated, self-contained settlement of a type with which the later Bronze Age, Iron Age and Roman-British periods have made us familiar’ — which has perhaps
provided us with an inappropriate pattern. Thomas therefore dismissed a model of settlement organization that is irrelevant to our study, but does not replace it with one more appropriate to the interpretation of small-scale agriculture. He presents us with only two alternatives: either relatively large-scale intensive agriculture, involving the extensive use of the plough within fields of a kind we would recognize today; or a very transient existence, possibly a form of modified hunter-gathering.

Thomas' assertion that hoe and spade cultivation was incapable of supporting a substantial, fully developed Neolithic society is not sustainable. There is clear evidence in the later Neolithic and the Bronze Age for ridged plots or fields which were probably formed by hoe or spade cultivation (cf. Barclay 1989). Fenton (1974, 43; Gailey and Fenton 1970) has noted, of more recent spade cultivation in Scotland: 'Twelve men using cas chrones [= foot spades] could till an acre a day, and a season's work with one from Christmas till late April or mid-May could till enough ground to feed a family of seven or eight with potatoes and meal for a year.' He has also described (1974, 139), in combination with the cas chron, the use of the ristle: 'a kind of knife or coulter mounted in a beam, was used to cut slits in the turf to ease the working of the cas chron'.

The 'ploughmarks' and other marks at Links of Noltland from around 2700 cal BC (associated with a boundary ditch: Clarke and Sharples 1985) might as easily be explained by this method of working the ground as by the use of a plough (as might the later combination of 'ard marks' and 'spade marks' found at Suisgill in Sutherland (Barclay 1985, 165–167) dating from the late second millennium cal BC). It has been suggested that much, or all, ard marking resulted from ground breaking, rather than routine cultivation by ploughing (Fowler 1981).

At North Mains, Romans and Robertson (1983a) suggested that a form of cultivation leaving no plough marks had taken place in soils beneath the henge bank at the beginning of the mid third millennium cal BC. There was also later Neolithic or Bronze Age ridging under the adjacent (Bronze Age) mound. At Pitnacree (Coles and Simpson 1965), indirect evidence of cultivation was noted in the form of a very deep sub-barrow soil and the setting at an angle of potsherds and schist fragments on the surface.

The model of the Neolithic rejected by Thomas also included 'fields'. Again it must be considered whether the assumption of permanent, formally laid out fields is conditioned by modern preconceptions and by a failure to take regional differences into account. It is evident from Scotland and other parts of the British Isles that there were systems of land division, even in the earlier Neolithic. For example, at Shuton Hill, Shetland, a sub-peat dyke suggests that pasturage boundaries may have been in existence soon after 4750 BP (c. 3600 cal BC) (Whittington 1978). Caulfield's researches in the west of Ireland (Caulfield 1978) have shown just how complex systems of land division had become in the later Neolithic (by the early to mid third millennium cal BC), and the work of Whittle et al. (1986) at Scord of Brouster has demonstrated the existence of cleared and divided land in the late fourth and early third millennium cal BC in Shetland.

While the extensive formal division of land on a communal basis may be inferred, there are various ways of dividing land, perhaps annually, which can be almost undetectable archaeologically: for example, plots demarcated by lines of small stones (as at Suisgill, Sutherland in the Bronze Age: Barclay 1985), or plots
delineated by light hurdle fences for relatively short periods and re-established on different lines (in the later Neolithic at Machrie Moor, Arran [Haggarty 1991]).

Sharples (1992a) has discussed changing patterns of land use in Orkney and the Western Isles, suggesting that less easily cultivated soils were exploited in the later Neolithic, following earlier exploitation of more easily cultivated land. He has proposed a direct relationship between the development of Maes Howe type tombs, Grooved Ware and the economic and social innovations (including the development of larger-scale settlements of the Skara Brae type) which allowed the communal effort necessary to exploit more difficult land.

What was being grown in these fields and plots? Direct evidence for cultivated cereals is limited for both the earlier and later Neolithic. Evidence for both barley and wheat was recovered from the settlement at Knap of Howar, Orkney (Ritchie 1983). At Balfarg, a carbonized barley grain was found incorporated within an earlier Neolithic pottery sherd (Barclay and Russell-White 1993); this was radiocarbon dated to around 4830 BP (3750–3520 cal BC). At Boghead, Moray, around 5200 BP (4000 cal BC) naked six-row barley (*Hordeum hexastichum*) made up 88% of the cereal grains, and emmer wheat (*Triticum dicoccum*) 11% (Maclean and Rowley-Conwy 1984). Emmer had declined to 8.4% later in the Neolithic at Skara Brae and the decline continued into the earlier Bronze Age (Maclean and Rowley-Conwy 1984). The actual size of emmer grains decreased at the same time – a sign of poor adaptation to the northern climate. Hulled barley (*Hordeum vulgare*), not represented at Boghead, was found at Skara Brae, and a gradual replacement of the naked form by the hulled has been noted generally (Maclean and Rowley-Conwy 1984). The material from the timber building at Balbridie, broadly contemporary with Boghead, has recently added considerably to our knowledge (Fairweather and Ralston 1993). Emmer wheat made up a large component (almost 80%) of the assemblage, naked barley 18% and bread wheat (*T. aestivum*) 2%. However, in one posthole the proportion of bread wheat was 76%, showing the difficulties inherent in examining limited samples of cleaned crops.

Evidence for managed pasture is preserved under the long barrow at Dalladies, Kincardineshire (Piggott 1972), which was built on long-established grassland. Indeed, 0.75 ha of this pasture was sacrificed in the turf dug to build the mound (Piggott 1972, 45–46).

There is evidence for the use of other non-food plants, e.g. cultivated flax (as at Balbridie [Fairweather and Ralston 1993]). At Balfarg Riding School, Fife, one of the larger Grooved Ware vessels contained a substance based on black henbane (*Hyoscyamus niger*; a member of the hemlock family), perhaps used as an hallucinogen (Moffat in Barclay and Russell-White 1993; Plate 8.8). At Kinloch, Rhum, evidence was found in organic residues on pottery for a cereal-based (possibly alcoholic) drink (Wickham-Jones 1990). It is interesting to note suggestions that some patterns in Neolithic decoration, including perhaps those on Grooved Ware, may originate in patterns seen in states brought on by using hallucinogens (Lewis-Williams and Dowson 1993).

Local evidence for the management of woodland is limited and indirect (e.g. in the use of timber in the construction of monuments). Nowhere as yet is there the quality and quantity of artefactual and environmental evidence found in the Somerset levels (Coles and Coles 1986).
Plate 8.8 A sherd of Grooved Ware with residues of its contents. On analysis these proved to contain black henbane, which causes hallucinations, amongst other symptoms. Crown Copyright: Historic Scotland

Few significant faunal assemblages have been published, and it is only possible to point to the presence/absence of species, and to make generalizations about the proportional representation of different species. The assemblages from individual sites are mentioned below.

There is no direct evidence of transhumance in the Neolithic. Bradley et al. (1993, 278) suggest that their work on the relationship of rock art to the landscapes in which it is found provides evidence of 'an essentially mobile pattern of landuse'. Simpler patterns of carvings are found in lowland areas; more complex patterns are grouped in upland areas, around basins or waterholes, or on isolated hilltops. It is possible that some of the complex patterns are related to and produced during the use of summer grazings.

HOUSES, ENCLOSURES AND ECONOMY: A SUMMARY

There is consistent, but as yet limited, evidence that the people of the earlier Neolithic in Scotland generally lived in small rectangular houses (Figures 8.4 and 8.5) (Barclay 1996). Where the evidence survives, this picture is replicated in Ireland and England. Armit's excavations at Eilean Dhomnuill, North Uist (Figure 5.3; Armit 1988, 1992a), have provided evidence of rectilinear houses measuring 6.5 m × 4 m and 4 m × 3 m internally and probably dating to the earlier fourth millennium BC. They are similar to those found at Knaphowar (1 in Figure 8.4), measuring 7.5 m × 3 m and 10 m × 4.5 m internally (Ritchie 1983), together with
Figure 8.4 Orkney buildings. 1: Knap of Howar, buildings 1 and 2; 2: Rinyo, building A; 3: Rinyo, building G; 4: Skara Brae, building 7; 5: Skara Brae, building 9; 6: Barnhouse, building 2; 7: Barnhouse, building 3; 8: Skara Brae, building 8. The cross-hatched areas are hearths.

evidence of an economy based on arable agriculture in the form of cereal grains and querns and on a wide range of wild resources. Kinnes (1985, 27) has expressed doubts about the relationship between the houses at Knap and the midden material into which they were dug (and to which the radiocarbon dates may relate), but the excavator (A. Ritchie, pers. comm., 1993) argues that these doubts have not been substantiated.
Figure 8.5  Structures on the mainland and the Western Isles. 1: Raigmore, Inverness-shire; 2: Eilean Domhnuill; 3: Balbridie, Kincardineshire; 4: Structure 2 at Balfarg, Fife – this is not a roofed building (the black dots show where one post can be proved to have replaced another). The open and filled spots are post-holes; in Balbridie the defined areas are post-holes and wall-slots and the toned areas are suggested rafter lines.

These structures invite comparison with those at Ballyglass in Ireland (measuring 7.4 m x 6.4 m) (O'Nuallain 1972) and the recently excavated house at Tankardstown in Co Limerick (Gowen 1988), both of which have produced dates around 5200 BP (c. 4000 cal BC). The houses at Lismore Fields (Garton 1987) are of similar dimensions. These recall aspects of the Neolithic timber houses of continental Europe (Ilett 1980).

The massive building at Balbridie (2 in Figure 8.5; Plate 8.9; Ralston 1982; Fairweather and Ralston 1993) has to date no excavated parallel, either for scale
(24 m long and 10 m broad) or construction. Radiocarbon dating puts the building in the early/mid fourth millennium cal BC. Broadly comparable cropmark sites are now known but some are likely to be of later date or different function (e.g. the Balfarg, Fife, timber structure, 4 in Figure 8.5; Barclay and Russell-White 1993). Fairweather and Ralston (1993, 321) comment that ‘the farmers of Balbridie were – in terms of their building and, it would seem, of their strategy with cereals – closer to continental European practice than has normally been identified in the British Isles’.

There is as yet no certain evidence for large-scale Neolithic enclosures to compare with the causewayed enclosures of southern Britain of the period c. 5100–4500 BP (c. 4000–3100 cal BC). The promontory enclosed by a massive palisade at Meldon Bridge, Peeblesshire, may have a domestic aspect but, in the absence of a final report, the precise nature of the site remains unclear (Burgess 1976). There are hints of enclosures at Balloch Hill, Argyll (associated with Neolithic pottery: Peltenburg 1982), and at Carwinning Hill, Ayrshire (Cowie 1979) where causewayed ditches were recorded under later hillforts. The excavation of a probably domestic enclosure at Kinloch Farm, Fife (J. W. Barber 1982a), has suggested there may also be a tradition of enclosed Neolithic settlement in eastern Scotland yet to be explored. In the cropmark record there are possible causewayed sites, such as Leadketty, Perthshire (RCAHMS 1994, 40). Two complex multivallate hilltop enclosures, the Brown Caterthun, Angus, and the earthwork element of the Barmekin of Echt, Aberdeenshire (Feachem 1966, 73–74), traditionally dated to the Iron Age, may be Neolithic in date. The defences of both are pierced by many gaps in both bank and ditch, in contrast with the more normal hillforts of the area, and they bear a close resemblance in plan to the causewayed camps of southern Britain.
Anna Ritchie’s (1983) excavation of the Neolithic settlement at Knap of Howar has provided a useful picture of the nature of settlement and range of resources being exploited in the later fourth millennium cal BC. There is evidence of cereal cultivation, surviving both as grains and as pollen, and of cattle and sheep or goat. There is also evidence for some pig-keeping, limited use of wild animals (deer, seal, whale and otter), and more intensive exploitation of sea birds, fish and shellfish, discussed in more detail in Chapter 6. An even greater use of wild resources is indicated at Northton, Harris, where 14 wild species were found (Simpson 1976) and at Noltland, Orkney, where 15 deer skeletons were recovered (Kinnes 1985, 30). At Knap of Howar there is indirect evidence of the collection of seaweed, perhaps as manure or food (for animals or humans).

A model that might be useful in the interpretation of the available information is crofting, as operated by communities in north and west Scotland in the recent past and, in other forms of broad spectrum, intensive resource use, by peasant agricultural communities elsewhere in Europe. While crofting was a deliberate product of changes in land tenure during the late nineteenth century AD (Hunter 1976) and involved the cultivation of the potato, this model of a small scale, intensive, subsistence economy utilizing a wide range of resources may be more helpful than comparisons with later prehistoric agricultural systems in Wessex.

It might be suggested that the pattern of agricultural economy throughout much of Scotland from the earliest Neolithic differed from that dismissed by Thomas, in the following ways. The population of earlier Neolithic Britain:

1. lived in light timber houses (cf. Lismore Fields) (or, where timber was not the most readily available building material, stone [cf. Knap of Howar]), which should not be dismissed as impermanent; in some places (e.g. Balbridie) larger structures were in use;
2. resided in one area, probably based in permanent settlements, but possibly with some of the population moving seasonally, to summer grazings or fightings;
3. worked for part of the year in productive hoe- and spade-, if not ard-cultivated plots, perhaps of considerable extent; the organization, size and boundary structures of such plots or fields might vary widely, from permanent arrangements to plots defined by shifting hurdles or even slighter demarcations, depending on local practice and land tenure arrangements; pasture was managed and enclosed;
4. used locally-available wild resources intensively for food, manure or oil (from sea birds);
5. managed herds of cattle and sheep or goats (which could be moved to summer grazings) and pigs (which probably could not [Piggott 1981]).

Thomas (1991) suggests that there is little reality in the soil conservation problems often attributed to Neolithic farming; the evidence for this and for a late Neolithic ‘agricultural recession’ in Scotland, involving the abandonment of cleared land (perhaps because of the exhaustion of those soils which had been the first cleared and colonized) and regeneration of woodland on it, is as yet either absent or debatable. This issue is considered more fully by Edwards in Chapter 5.

For the later Neolithic, Orkney provides the best settlement evidence, in particular from the sites at Rinyo (2 and 3 in Figure 8.4; Clarke 1983), Skara Brae
The norm seems to have been relatively large-scale, communally based settlements which were occupied for long periods by people with a rich material culture and who practised an economy that incorporated both mixed agriculture and intensive exploitation of wild resources. The major difference from the earlier Neolithic seems to lie, in some areas, in the more communal organization of settlement and agriculture, reflected for example in the arrangement of the Skara Brae houses, and the shared effort necessary to construct the field systems of Ireland in the later Neolithic. The less-nucleated later Neolithic settlement at Scord of Brouster in Shetland (Whittle et al. 1986) perhaps suggests that the process of nucleation was not constant. However, it might be suggested that in general the differences already visible to archaeologists in the organization of ceremonial and burial monuments can also be detected in the organization of settlement and economy in the later Neolithic. These sites all lie in a limited geographical area – the uplands and the islands. Elsewhere in Britain the accidents of preservation have revealed only limited evidence; for example two wooden buildings under later burial mounds at Trelystan, Powys (Britnell 1982). The ground plans of these buildings are strikingly similar to those at Skara Brae, although the building medium is less substantial. While similar structures may remain to be found in lowland areas, it is probable that they will only survive and be discovered by chance.

It may be suggested that the people of later Neolithic Scotland:

1. were more likely to live in larger-scale communally arranged settlements;
2. may have worked less easily cultivated but more productive soils, in a more communal arrangement of land-holding, such as the field systems of western Ireland. The extent and complexity of the communalization of land use may have varied considerably from area to area;
3. probably continued to exploit locally available wild resources to different degrees of intensity;
4. managed herds of cattle and sheep, although the increase in pig numbers might indicate a reduction in the proportion of stock suitable for transhumance.

Into the Bronze Age

The chapters on the Neolithic and the Bronze Age divide with the appearance of Beaker pottery. However, the traditions of ceremonial and burial activity continued and Beaker pottery appeared on many sites which had already been in use for over 1000 years.
THE CLEAVEN DYKE AND LITTLEOUR MONUMENTS IN THE NEOLITHIC OF TAYSIDE

GORDON J BARCLAY & GORDON S MAXWELL
To Liz and Kathleen,

for putting up with the Cleaven Dyke
THE CLEAVEN DYKE AND LITTLEOUR
MONUMENTS IN THE NEOLITHIC OF TAYSIDE

GORDON J BARCLAY & GORDON S MAXWELL

with
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Location map. (Based on the Ordnance Survey map with the permission of the Controller of Her Majesty's Stationery Office. © Crown Copyright MC/98/172)
INTRODUCTION

'I stand beneath the trees, lost in thought.' Wilhelm Müller, *Winterreise* tr Lois Philips 1979

The Cleaven Dyke is a complex linear earthwork comprising a pair of widely-spaced parallel ditches flanking a central bank, running for around 2km through dense forestry plantation and arable fields, north of the village of Meikleour, near Blairgowrie in Perthshire (illus 1). The Dyke appears to terminate on the NW near the edge of the wood in which it lies, and on the SE on the low hill where the cropmarks of the ditch are last visible (illus 2). For 200 years it was confidently identified as a Roman monument, related to the legionary fortress at Inchthill (Marshall 1776; Richmond 1940). There has never been, however, explicit archaeological evidence for its interpretation as a Roman work, nor for any extension beyond its presently visible terminals (Pitts & St Joseph 1985, 258). One of us (Gordon Maxwell) first challenged the Roman interpretation in 1983 (Maxwell 1983a) and the interpretation of the monument as related to the cursus monuments of the Neolithic period gained currency through the 1980s (Pitts & St Joseph 1985). The Dyke appears to combine a number of features and

illus 2
A view of the south-eastermost portion of the Cleaven Dyke. The ditches have never been recorded beyond the point marked 'X'. The Herald Hill long barrow is at 'Y'. (Crown Copyright: RCAHMS)
characteristics of burial and ceremonial monuments of the Neolithic: a round or oval barrow, a long barrow, a cursus and a bank barrow.

The way in which the investigation of the Cleaven Dyke has been conducted in the past has been conditioned to a great extent by the assumption that the monument was first, a Roman military earthwork, and second, 'perfectly straight' (Abercromby et al 1902). Most previous survey has been at low resolution, incapable of detecting the smaller scale variations in the monument, and excavation has been limited to narrow slots across bank and ditches (Abercromby et al 1902; Richmond 1940; Adamson & Gallagher 1986). This has tended to reinforce the perception of the monument as broadly uniform and regular, although the irregularity of aspects of the layout and construction of the monument has been acknowledged for many years. The newly-undertaken survey shows just how complex and varied the monument is.

As part of the project, the opportunity was also taken to examine a cropmark structure, which we believed might be contemporary—a pit-defined enclosure—discovered nearby at Littleour during the course of aerial survey (RCAHMS 1994a, 28). The Littleour structure (illus 3) is one of a group of apparently similar features located by aerial photography in Perthshire in recent years. It had a superficial resemblance both to probable mortuary structures of the Neolithic (cf Balfarg Riding School in Fife: Barclay & Russell-White 1993) and, in scale, to a roofed building of the same period at Balbridie in Kincardineshire (Fairweather & Ralston 1993). The excavation of the Littleour structure suggests it had ceremonial rather than domestic functions (4, 7.4 and 7.5 below).

Nine years ago, Ian Hodder complained in the pages of Antiquity (1989) about the bland nature of many excavation reports, singling out for censure their 'impersonal, abstract, timeless and [spuriously] objective prose'. Although we may differ from Hodder in identifying the cause of this malaise, as well as its cure, we agree that we should all try to provide a lively and direct, as well as an accurate, account of our own areas of work. We have attempted to find a balance between, on the one hand, over-detailed presentation of evidence, and on the other, interpretation without adequate supporting data. We hope we have succeeded.

A number of interim reports have been published: Barclay & Maxwell 1993; Barclay et al 1995; Barclay & Maxwell 1995; Barclay & Maxwell 1996; Barclay & Maxwell forthcoming. The account published here supersedes all earlier statements.

**CALIBRATION OF RADIOCARBON DETERMINATIONS**

All radiocarbon determinations, other than those for the Loch Rae pollen column, have been obtained using the OxCal program (version 2.18), working on the 1986 calibration curve of Stuiver and Kra. All calibrated ranges are at the 95% level of confidence. For further explanation of the radiocarbon method and the process of
calibration see Ashmore (1996, 15-18). The errors attached to radiocarbon determinations from Glasgow University with a laboratory number lower than GU-1500 have been multiplied by 1.4 and, if then less than 110, have been taken to be 110 (Ashmore 1997); the errors attached to determinations prior to the early 1980s from other laboratories are also likely to be understated, and should be treated with caution (Ashmore, pers comm). Calibrated ranges have been rounded to the nearest five years. As an aid to the discussion sections within the volume, radiocarbon dates for sites mentioned in the text are gathered together here in table 1.

The radiocarbon determinations for the Loch Rae pollen column have been calibrated using the 1993 curve of Steiver et al; however, the way in which the calibrated ranges have been used (to calculate deposition rates for the Loch) make the slight differences between the calibration curves irrelevant. We are grateful throughout to Patrick Ashmore for his advice on radiocarbon dating matters.

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<th>Raw determination, cf Ashmore 1997</th>
<th>Calibrated range (95%)</th>
<th>Reference</th>
</tr>
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<tr>
<td>Balbridie, Aberdeenshire</td>
<td>Carbonised grain from building.</td>
<td>OxA-1768</td>
<td>5010±90BP 4000-3640</td>
<td></td>
<td>Fairweather and Ralston 1993</td>
</tr>
<tr>
<td>Balfarg Henge</td>
<td>Mainly <em>Alnus</em> charcoal incorporated in fill of posthole.</td>
<td>GU-1160</td>
<td>4180±110BP 3050-2450</td>
<td></td>
<td>Mercer 1981</td>
</tr>
<tr>
<td>Balfarg Henge</td>
<td>Mainly <em>Alnus</em> charcoal incorporated in fill of posthole.</td>
<td>GU-1161</td>
<td>4035±110BP 2900-2250</td>
<td></td>
<td>Mercer 1981</td>
</tr>
<tr>
<td>Balfarg Riding School</td>
<td>Heavily charcoal impregnated later in henge ditch, associated with Grooved Ware.</td>
<td>GU-1904</td>
<td>4385±55BP 3310-2900</td>
<td></td>
<td>Barclay and Russell-White 1993</td>
</tr>
<tr>
<td>Balfarg Riding School</td>
<td>Fill of Grooved Ware pit.</td>
<td>GU-1902</td>
<td>4250±85BP 3100-2550</td>
<td></td>
<td>Barclay and Russell-White 1993</td>
</tr>
<tr>
<td>Cleaven Dyke</td>
<td>Charcoal from hearth below bank (predates construction by 200-800 years).</td>
<td>GU-3912</td>
<td>5550±130BP 4750-4000</td>
<td></td>
<td>This volume</td>
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<tr>
<td>Creag na Caillich</td>
<td>Peat formed at time of rapid human induced change.</td>
<td>GU-2975</td>
<td>4770±50BP 3500-3100</td>
<td></td>
<td>Edmonds, Sheridan and Tipping 1992</td>
</tr>
<tr>
<td>Creag na Caillich</td>
<td>Peat at lower debitage layer.</td>
<td>GU-2976</td>
<td>4240±60BP 3030-2610</td>
<td></td>
<td>Edmonds, Sheridan and Tipping 1992</td>
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<tr>
<td>Creag na Caillich</td>
<td>Peat immediately below upper debitage layer.</td>
<td>GU-2977</td>
<td>3820±70BP 2490-2040</td>
<td></td>
<td>Edmonds, Sheridan and Tipping 1992</td>
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<tr>
<td>Douglasmuir, Angus</td>
<td>Charcoal from throughout posthole BDD.</td>
<td>GU-1469</td>
<td>4895±110BP 4000-3350</td>
<td></td>
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<tr>
<td>Inchtuthil, Perthshire</td>
<td>Burnt fence.</td>
<td>GU-2761</td>
<td>5070±50BP 3990-3780</td>
<td></td>
<td>Barclay and Maxwell 1991</td>
</tr>
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<td>North Mains barrow, Perthshire</td>
<td>Old land surface under mound.</td>
<td>GU-1134</td>
<td>3805±140BP 2900-1800</td>
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<td>Barclay 1983</td>
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<td>From primary packing of henge posthole A/7.</td>
<td>GU-1353</td>
<td>4102±110BP 2950-2350</td>
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<td>Barclay 1983</td>
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<td>North Mains henge, Perthshire</td>
<td>From primary packing of henge posthole A/5.</td>
<td>GU-1354</td>
<td>4040±110BP 2900-2300</td>
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<td>Barclay 1983</td>
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<td>North Mains ring ditches</td>
<td>Pit predating ring-ditches, containing EN pottery.</td>
<td>GU-1546</td>
<td>4650±65BP 3650-3100</td>
<td></td>
<td>Barclay 1983</td>
</tr>
</tbody>
</table>

Table 1
Radiocarbon dates quoted in text.
1

SETTING THE SCENE

'By the word "information" we denote all knowledge which we have...; therefore, in fact, the foundation of all our ideas and actions. Let us consider the nature of this foundation, its want of trustworthiness, its changefulness, and we shall soon feel what a dangerous edifice [it is], how easily it may fall to pieces and bury us all in its ruins.' von Clausewitz, On War, 1832, chapter VI (tr JJ Graham, 1908).

1.1 THE NEOLITHIC AND EARLY BRONZE AGE IN TAYSIDE: A BRIEF HISTORY

The projects reported on here were undertaken in Tayside, used here to encompass the area of the now reinstated counties of Perthshire and Angus. The topography is very varied: broad rolling fluvo-glacial gravels, incorporating one of the largest single areas of good agricultural land in Scotland, backed by the foothills of the Grampians, in which sheltered valleys offer different, but also good, opportunities for settlement. It is effectively formed by the catchments of the rivers Tay, Earn and Isla in its western part, the broad valley known as Strathmore—happy hunting ground of Romanists on foot and in the air—the coastal plain to the south and the arable landscape of Angus, mainly the catchment of the South Esk, to the east. This part of eastern Scotland, best seen in the paintings of local artist McIntosh Patrick, is extraordinarily beautiful, far more pleasing to the eye of the lowland Scot than the acclaimed grandeur of the mountainous west. Nineteenth-century painters of the Scottish landscape conformed with, and encouraged, the romantic notions of a Highland Scotland evoked in the novels of Sir Walter Scott and his imitators, depicting a landscape 'entirely populated by sheep, woolly cattle and antlered beasts who stood proud against the snow, rain and fiery sun of this mountainous land... deserted by [the inhabitants] who had finally admitted to their defeat by the elements' (Billcliffe 1987, 8). Much of the traditionally recognised Neolithic of Scotland lies in landscapes not far removed from this sorry 'ideal'. Patrick, in contrast, painted a landscape 'which has offered man an opportunity to co-exist, a countryside which has not spurred his husbandry but which has openly responded to his care' (ibid 1987, 8). Perthshire and Angus seem to have been 'openly responding' for over 5000 years.

BURIAL AND CEREMONIAL MONUMENTS

In the absence of easily identifiable settlement evidence, published consideration of the Neolithic period in Perthshire and Angus, as in every part of Scotland, has concentrated on chambered tombs and the distribution of artefacts. Of paramount importance to the cataloguing of the past in Perthshire, as in the rest of the country, is the work of the former Archaeology Division of the Ordnance Survey, unpublished, yet the foundation of all sites and monuments records. Their work has now been superseded in the substantial parts of Tayside that have since been surveyed in detail by the Royal Commission on the Ancient and Historical Monuments of Scotland (RCAHMS 1990; 1994a; 1994b). In other parts of the area new monuments have been located only by small-scale archaeological fieldwork or by accidental discovery. The capacity for even the densely populated arable lowlands of Perthshire still to provide surprise discoveries is remarkable; for example, two substantial burial mounds of similar proportions to the early Neolithic round barrow at Pitnacree, near Aberfeldy (Coles & Simpson 1965—see below) have recently been located in arable areas of Perthshire, one on the outskirts of the village of Dunning, the other within sight of the Perth to Crieff main road (Barclay 1992a, 73). Between 1954 and 1966 Audrey Henshall undertook the fieldwork on Perthshire chambered cairns that was published in volume 2 (1972) of her magnum opus. Her consideration of the Neolithic beyond the tombs was necessarily limited as little was then known. She listed seven probable chambered cairns in Perthshire: Clach na Tiompan (Clyde group, long); Kindrochat (Clyde group, long); Rottenreoch (?Clyde group, long); Cultoquhey (Clyde group, round?); Derculich (unclassified);
Fortingall (long cairn); Cairnwochel (?long cairn). Three of these had been excavated by the time the volume was published: Kindrochat (Childe 1930); Clach na Tiompan (Henshall & Stewart 1956) and Cultoquhey (Stewart 1959). Since 1966, fieldwork has added further examples (eg the cairn at Edinchip: Davidson, JL & Henshall 1983) and the 350m-long cairn at Auchenaich (Foster & Stevenson forthcoming, and note below). In 1992, the Afforestable Land Survey of RCAHMS located four hitherto unrecorded chambered tombs in the Braes of Doune area (RCAHMS 1994b), effectively filling the gap in the distribution noted by Henshall (1972, 28-9).

Dr Margaret Stewart’s published consideration (1959) of Strathtay in ‘the second millennium’ (in those effectively pre-radiocarbon days, from chambered tombs to Beaker and Food Vessel burials) logged a limited number of known sites. The interpretative structure and the concerns of the paper were very much of their period and as a result it has not dated well. Dr Stewart considered the date and affiliations of the large round earthen mounds of Strathtay and Strathearn and drew the (at that time inevitable) conclusion that they were an early Bronze Age phenomenon belonging to ‘an intrusive culture penetrating inland from the east coast’.

Perhaps as a result of Dr Stewart having drawn attention to the Neolithic remains in the area, the mid 1960s saw a considerable, if brief, upsurge in excavation activity in upper Strathtay, around Aberfeldy. In 1964 John Coles and Derek Simpson undertook a research excavation on one of the round mounds that Stewart had speculated about, at Pitnacree, in Strathtay, demonstrating that that example at least had been constructed in the earlier Neolithic; a sample of charcoal from the old land surface produced a calibrated radiocarbon date (using revised errors—Ashmore 1997) of 4300-2900 cal BC (GaK-601) (Coles & Simpson 1965). The life of the monument was broken down into three phases:

1. Two large (?split-trunk) posts were erected at either end of a mortuary structure of ‘linear zone’ type (Kinnes 1979; Scott 1992).

2. An elongated ring-bank of stone and soil was built, with a formal entrance to the east, associated with cremation burials; the enclosed area contained a rectilinear drystone structure. During the later part of this phase the mound assumed its familiar bowl-shape.

3. A cremation and cist burials were inserted, and a standing stone was erected on top of the mound.

In 1965 the same excavators undertook a brief rescue excavation on a group of pits on a second site, on the opposite side of the Tay at Grantduffy (Simpson & Coles 1990). Two phases of activity were represented: deposition of later Neolithic impressed-ware pottery, and Bronze Age cremation burial.

Also in 1965 Piggott and Simpson undertook excavation at the Croft Moraig stone circle (Piggott & Simpson 1971). They discovered that the monument had three phases:

1. A penannular setting of posts with outliers, and a slight ditch.

2. An oval of free-standing stones on much the same plan as the preceding posts, and an enclosing stony bank.

3. A stone circle lying outside the oval but within the stony bank; the circle has two outliers beyond the bank.

Earlier Neolithic pottery was recovered from the ditch of phase 1, with undiagnostic ‘flat rim ware’. It is characteristic of Scottish prehistoric studies of the period that the timber structure below the Croft Moraig stone circle (Piggott & Simpson 1971) was interpreted as a ‘provincial version’ (our emphasis) of the structures being discovered at Durrington Walls, Wiltshire.

In 1973 Stewart published a further general survey of Perthshire in the 4th to 3rd millennia BC (Stewart 1973). The interpretation of the ‘tomb’ excavated by Stewart at Dull is unresolved; Henshall believes (1972, 479) that it was actually a corn-drying kiln.

During the investigation of the Roman fortress at Inchtuthil (Pitts & St Joseph 1985) Richmond and St Joseph examined a pre-Roman rectilinear enclosure, interpreted at the time of excavation as a Bronze Age domestic structure. Later investigation (Barclay & Maxwell 1991) showed that the irregular, ditched, trapezoidal enclosure, measured 50m in length and between 10.1m and 8.4m wide, and belonged to quite a different period and classification (illus 4). A fence erected in the ditch was burnt; it was radiocarbon-dated to 4000-3780 cal BC (GU-2760 & 2761 combined). The monument has been interpreted as a mortuary structure, because of its close similarities to such sites in other parts of Britain (Kinnes 1992b).

In 1970 and 1971 Coutts published two summaries of the prehistoric monuments and artefacts of Tayside (1970; 1971). The latter volume contains a more rounded presentation of the monuments, taking in a larger area, and reflecting the dating evidence provided by Pitnacree.

THE SIGNIFICANCE OF AERIAL PHOTOGRAPHY

We have described elsewhere the general part played by aerial photography in revolutionising our understanding
of the prehistory of lowland Scotland (Maxwell 1983b; Barclay 1992b). In particular, aerial photography has made a striking impact on our knowledge of Neolithic monuments of the Tayside area. The last 40 years have seen the density of the distribution of Neolithic or potentially Neolithic monuments in Tayside transformed in a way that can hardly be paralleled: from being an area with a very sparse distribution of monuments of the period, it has become one of the most densely populated in eastern Britain.

At least 16 cursus monuments (both ditch- and pit-defined) or enclosures of related type have been discovered in Tayside from the air (Brophy below), as well as many sites that can be interpreted as henges or hengiform enclosures (eg Barclay 1997a).

**RECENT EXCAVATIONS**

From the mid 1970s the effects of the expansion of the state-funded rescue archaeology programme began to be felt in Tayside, as in the rest of Scotland (Barclay 1997b). In the early days there were two false starts in adding to our knowledge of the Neolithic of the area. In 1977 the supposed cursus at Huntingtower on the outskirts of Perth proved to be a post-medieval road (Barclay 1982) and in 1978 a second Perthshire round mound, at North Mains, Strathallan (Barclay 1983), proved on excavation to date from later than Pitnacree, the radiocarbon date from the old land surface being 2900-1800 cal BC (the 1σ calibrated range is 2470-2040 cal BC; GU-1134), firmly in the earlier Bronze Age (although if revised, higher, errors are built into the calibration process, the calibrated ranges for Pitnacree and North Mains at 2σ now abut). The adjacent henge at North Mains, excavated in 1979, was radiocarbon dated to 2900-2300 cal BC (GU-1354) and 2950-2350 cal BC (GU-1353) (Barclay, 1983, 133), in its main phase of use. A pit containing earlier Neolithic pottery was located nearby, adjacent to later ring-ditches and cut by one of them. The pit was radiocarbon dated to 3650-3100 cal BC (GU-1546) (ibid, 243).

The rescue excavation of a pit-defined site at Douglasmuir in Angus undertaken in 1979 and 1980 (Kendrick 1995) revealed it to be a complex palisaded enclosure associated with the cursus tradition (6 Brophy below) (illus 5) radiocarbon dated to 3950-3350 cal BC (GU-1210), 4000-3350 cal BC (GU-1469 and GU-1470). In pits close by, an assemblage of early Neolithic pottery
was discovered. The excavation in 1989 of a burial mound at Beech Hill House, in Coupar Angus, close to the Cleaven Dyke, recovered Grooved Ware from a land surface buried beneath an early Bronze Age burial mound (Stevenson 1995).

This excavated material has been put in context, and our knowledge and understanding of the archaeology of eastern Perthshire transformed, by the publication of the RCAHMS surveys of north-east and south-east Perthshire respectively (RCAHMS 1990, 1994a), the Cleaven Dyke lying in the latter area. The discovery of four hitherto unknown chambered cairns, to the west in the Braes of Doune, has already been mentioned (RCAHMS 1994b).

More recently, there have been two further Historic Scotland-supported excavations on round mounds in Angus, at Fordhouse (Peterson & Proudfoot 1997) and Maryton Law (Dalland 1997); interestingly, both had been the victims of hitherto unrecorded 18th-century antiquarian trenching. The former site has produced evidence of a complex history, from Neolithic beginnings (burnt timber structures, a circular stone chamber set into the subsoil (unparalleled in the area) and a low earthen mound) a Bronze Age ring-bank, later filled in to form a mound, which was then coated with stone (cf North Mains), and secondary burials (Peterson pers comm).

Research excavation has continued to play a significant part in broadening our understanding of the period in the area. The main authors of this volume conducted an excavation on a possible Neolithic long mortuary enclosure within the Roman fortress at Inchture (this chapter, below; Barclay & Maxwell 1991). The National Museums of Scotland project of survey and excavation at the stone quarry site at Creag na Caillich (Edmonds et al 1992) has provided valuable information on the processes and organisation of stone extraction for axe-head manufacture. Radiocarbon dating suggests the activity spanned the period 3030-2610 cal BC (GU-2976) to 2490-2040 (GU-2977). In addition, a radiocarbon date of 3500-3100 cal BC (GU-2975) was obtained for peat which formed on the site at a period of rapid (human-induced?) change—the latter suggested accelerated soil erosion, decline of elm and birch and increased evidence of fire. Trevor Cowie's recent survey of Neolithic pottery (1993) has provided a valuable and up-to-date review of material from Perthshire and Angus, as well as Fife and parts of Stirlingshire and West Lothian. As Cowie notes, Callander (1929) could point to only one assemblage in this area: now there are 30, although admittedly of considerably varying size. The paper also cites the only occurrence of earlier Neolithic pottery close to the Cleaven Dyke, at the fortress of Inchture (Abercromby et al 1902; Cowie 1993, 32). The excavated sites already mentioned, Pitnacree and Croft Moraig, produced contemporary assemblages from further up the Tay. Cowie also discussed the date range associated with this material; the calibrated dates from the Cleaven Dyke and the nearby site at Littleour fall within the range of the currency of these styles.

In 1994 Richard Bradley carried out survey in upper Strathtay (Bradley 1994). Extensive arable fieldwalking, combined with survey of rock art in the area, recovered evidence of a quartz industry. The results provided a measure of support for interpretations of prehistoric rock art based on its siting in the landscape, but they also suggest that the more complex carvings may have followed, or even marked, the outer limits of the settled land.
THE ARCHAEOLOGY OF THE INCHTUTHIL PLATEAU

Although not specifically part of this project, the excavation of the long mortuary enclosure at nearby Inchtuthil in 1989 (Barclay & Maxwell 1991) must be considered here (illus 4), not least because it marked the origin of our joint interest in the Neolithic of east Perthshire. The passage of nine years has also served to enhance our appreciation of the context and significance of both the excavated structure and its setting.

The long mortuary enclosure occupies the summit of a low ridge situated near the centre of the Inchtuthil plateau, an isolated table of fluvo-glacial sands and gravels similar to, but less than half as extensive as, the ground traversed by the Cleaven Dyke. It is most unlikely that Neolithic use of such a desirable topographic niche, on well-drained soils beside the River Tay, would have been restricted to the construction of a single funerary structure, but the report on the extensive exploration of the 20ha Roman fortress which overlay the enclosure could point (Pitts & St Joseph 1985) to only two cinerary urns and a bronze axe as further evidence of pre-Iron Age activity on the site, although a single sherd of Neolithic pottery was found during Abercromby’s work (Cowie 1993). Consideration of the cropmark evidence (Barclay & Maxwell 1991, illus 5; RCAHMS 1994a, 28-9) pinpointed two circles of pits near the SW corner of the fortress as possibly yet more indications of funerary or ritual practices in the Neolithic period, and indeed the case is additionally strengthened by the fact that pit-circles and Neolithic structures are known to be near neighbours at other sites in Perthshire (eg Leadketty in Strathearn, and Carsie Mains, a short distance to the north of Littleour; see below). Without excavation, such structures cannot be indubitably assigned to this early period, but the wide spacing and massive scale of the post-pits in the larger (16m diameter) pit-circle at Inchtuthil make the identification very attractive.

Moreover, detailed scrutiny of the accruing mass of aerial photographic material suggests that further candidates for consideration are not lacking - in addition, that is, to the random scatters of pits, the presence of which on a Roman legionary or Neolithic ritual/mortuary site would be equally appropriate. The first, already noted in the fortress report (Pitts & St Joseph 1985, 261), but ascribed to the Iron Age, is an oblong enclosure measuring 32m by 16m and apparently defined by a narrow post-trench; aligned roughly E-W, it lies within the Roman labour camp to the west of the fortress, and its intermittent outline may be the result of disturbance occasioned by the Roman works. Attached to its southern side is a curvilinear annexe, which gives the composite structure a lobed appearance. Only a handful of such ‘lobate’ enclosures has so far been identified in the course of aerial survey in Scotland, and, as with other rectilinear ditched enclosures, it is not easy to decide whether they belong to the 3rd or 4th millennium BC or to the Early Historic period. Nevertheless, as well as certain structural affinities with known Neolithic monuments (for instance, dimensions, shape, and proportions), their tendency to display an E-W alignment makes it clear that the earlier context is perhaps more appropriate.

There are, however, at least two other elongated subrectangular structures at Inchtuthil that merit closer inspection. The first, lying barely 15m SE of the larger pit-circle, is represented by intermittent cropmark traces (on CUCAP prints CDB59-60), showing an enclosure measuring 18m by 6m within a post-trench and aligned NE-SW. The second, lying c 100m NW of the SW angle of the fortress, is more faintly delineated (on CUCAP prints CDC13-14); it comprises two straight parallel ditches, set c 6m apart and extending for at least 15m on an E-W alignment; the west end appears to coincide with two large pits. Neither structure has been previously identified or discussed in print, but in the context of other features at Inchtuthil for which a Neolithic date has been proposed they deserve more than a passing mention. If of Neolithic origin, they may mark the sites of accompanying mortuary enclosures or even burial mounds of the same general class as those discussed in section 7.5 below, their presence amplifying the already impressive evidence for the area-grouping of such monuments by the Neolithic communities of the middle Tay.

1.2 THE PALAEOENVIRONMENTAL BACKGROUND: POLLEN STUDIES AT RAE LOCH

Kevin J Edwards & Graeme Whittington

Today the Strathmore area of Perthshire is a highly cultivated landscape. That part of the strath which lies between the southern edge of the Grampian hill mass and the River Isla, for which the town of Blairgowrie-Rattray provides a focus, is no exception. The area is floored by strata of Old Red Sandstone (ORS) age overlain for the most part by alluvium and gravels. Distributed to the west, south and east of Blairgowrie is a string of lochs and mires. Relatively little is known of the progress of the landscape of the area from its condition at the end of the last ice age to its current state. This means that the important prehistoric and historic exploitation of this area lacks any contemporary environmental context.
The existence of the lochs and mires does provide the potential to remedy this situation. Care has to be exercised as to the choice of site for any palaeoenvironmental investigation due to the disturbances of the sediments in the larger lochs resulting from the trawling for marl in the 18th century (Brodie 1796). One major palynological record is available for the area, based on a marshy area adjacent to Stormont Loch (Caseldine 1980).

**METHODS**

Rae Loch (NGR NO159464) measures 300m by 200m in size and is located 1.5km west of Blairgowrie at an altitude of 61m (illus 1). A core, 6m in length, was obtained with a Russian corer from the open waters of the loch. Water depth at the point of sampling was 1.8m. The sediment was visually unvarying detrital lake mud (gyttja) apart from the basal 0.11m which consisted of silty gyttja.

Unfortunately, there are no radiocarbon dates associated with that investigation. Dated sites in the wider area are those of North Mains, Strathallan (Hulme & Shiriffs 1985) and Carn Dubh, near Pitlochry (Tipping 1995), but they are too distant to be of practical use. Thus a new site was needed; Rae Loch, 4km north of the Cleaven Dyke, was chosen because of its small size, lack of marl-trawling and restricted catchment area.

The sediments were sampled at every 40mm for assessment of organic carbon content (by loss-on-ignition [LOI], illus 6) and pre-treatment for pollen analysis. The latter was undertaken with NaOH, HF, HCl and acetylation (Faegri & Iversen 1989). Samples were mounted unstained in silicone oil of viscosity 12,500 cSt.

Pollen and spore counts were undertaken to a minimum counting sum of 500 total land pollen (TLP). Over 100 pollen and spore taxa were
Exaggeration curves x7

Illus 7
Selected percentage pollen and spore data from Rae Loch (y-axis=depth).
recorded from the site, indicating its rich potential for reconstructing vegetational and environmental history. Pollen type and plant nomenclatures follow Bennett (1994) and Stace (1991) respectively. Microscopic charcoal was present in trace amounts only. The pollen diagrams presented here (illus 7 and 8) show selected taxa only. The diagrams are divided into seven local pollen assemblage zones (RAE-1–7, two of which are subzoned further). Computations and diagram construction were achieved using the computer programs TILIA and TILIAGRAPH (Grimm 1991).

<table>
<thead>
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<th>Depth below water surface (cm)</th>
<th>(^{14}\text{C} \text{(yr BP)})</th>
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<tr>
<td>GU-4770</td>
<td>205-215</td>
<td>1680±110</td>
</tr>
<tr>
<td>GU-4769</td>
<td>265-275</td>
<td>1350±70</td>
</tr>
<tr>
<td>GU-4768</td>
<td>305-315</td>
<td>1750±110</td>
</tr>
<tr>
<td>GU-4767</td>
<td>370-380</td>
<td>2000±80</td>
</tr>
<tr>
<td>GU-4766</td>
<td>410-420</td>
<td>3190±90</td>
</tr>
<tr>
<td>GU-4765</td>
<td>445-455</td>
<td>3600±70</td>
</tr>
<tr>
<td>GU-4764</td>
<td>545-555</td>
<td>4160±60</td>
</tr>
<tr>
<td>GU-4763</td>
<td>660-670</td>
<td>4530±70</td>
</tr>
<tr>
<td>GU-4762</td>
<td>725-735</td>
<td>7970±100</td>
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<td>GU-4761</td>
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<td>9260±100</td>
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<tr>
<td>GU-4760</td>
<td>759-769</td>
<td>Insufficient carbon</td>
</tr>
</tbody>
</table>

Table 2
Radiocarbon dates for the Rae Loch deposits.

Ten radiocarbon \(^{14}\text{C}\) dates were obtained (table 2) which allowed the dating of critical events by means of the construction of a time-depth curve (illus 9). The uppermost date (1680±110 BP uncal) is 'reversed', a well-known phenomenon in loch sediments which have received erosional inputs containing old carbon from catchment soils (eg Edwards & Rowntree 1980). This date was ignored in constructing the time-depth curve and a date of AD 1700 is employed at that point in the profile (0.214m) where palynological evidence for agricultural improvements occurred. A date of 10,000 BP was assumed for the silty gyttja/gyttja interface, taken to be the Late-/Post-glacial boundary on bio- and litho-stratigraphic grounds. Estimated dates, based on straight-line extrapolation between \(^{14}\text{C}\) dates, are presented in units of radiocarbon years before present (BP; where present = AD 1950), followed, for dates younger than 10,000 BP, by t dendrochronologically calibrated dates (after Stuiver & Reimer 1993) in parentheses, expressed as calibrated years BC/AD. All dates are quoted to the nearest 10 years. A pollen diagram constructed with time as its vertical axis (illus 8, see illus 6) overcomes the compression imposed by slow sediment accumulation rates where depth is used for the y-axis (illus 7). This provides an alternative perspective on events, though temporal fidelity in illustration 8 is achieved at the expense of clarity in the upper part of the pollen profile, which now becomes compressed as a function of the increased sedimentation over the last 5000 radiocarbon years. Deposition time (\(^{14}\text{C}\) years per cm of deposit) is depicted in illustration 6; this is a reciprocal of deposition rate (cm of deposit per \(^{14}\text{C}\) year).

VEGETATIONAL HISTORY
LATE-GLACIAL VEGETATION
Prior to an estimated date of 10,000 BP, the pollen spectra of zone RAE-1 are indicative of Late-glacial (Lobch Lomond stadial) conditions. The dominance by willow (Salix), dock family (Rumex spp), sedges (Cyperaceae) and grasses (Poaceae), and the presence of Koenigia islandica, indicate the final climatic stage before the strong rise in temperature which occurred at the start of the Holocene (Post-glacial). At this time the landscape would have presented an open vista with probably no woodland presence, as the birch, shown in zone RAE-1, was probably of the dwarf variety (Betula nana). The basal silty gyttja has an organic content of about 5%; the soils around Rae Loch were clearly low in carbon content, bearing a strong signature of their glacial origin.

THE EARLY HOLOCENE IMMIGRATION AND SUBSEQUENT ESTABLISHMENT OF TREES AND SHRUBS (10,000-5220 BP)

The organic content of the sediments dating from an estimated 10,000 BP rose to 90% by 7750 BP (6520 cal BC). This reflection of soil development within the catchment was a natural consequence of the sudden climatic amelioration from the start of the Holocene, with temperatures at least as warm as those today within several decades of final deglaciation (Whittington & Edwards 1997). Increased summer temperatures enabled the immigration of warmth-loving trees and shrubs from further south (cf Birks 1989).

Thus, zone RAE-2 sees the arrival of birch (Betula) in the area. It is unlikely that the birch provided a completely closed canopy as zone RAE-2 also reveals strong representation of the shade-intolerant juniper (Juniperus communis), grasses (Poaceae) and the fern Deppeopteris filix-mas-type. The Rae Loch site also conforms to the early Holocene vegetation history of Scotland in that this zone witnessed the eclipse of the dominant position held by birch in the pollen diagram due to the rapid rise of Corylus avellana-type (generally taken to have originated from hazel) from 6300 BP (8950 cal BC). It is noticeable that, by the end of the zone, that taxon had obtained a level of 65% TLP. A further feature of note is the poor representation of Scots Pine (Pinus sylvestris) pollen, a situation which continued until very recent times. Zone RAE-1 showed a paucity of herbaceous taxa and, indeed, those already present, like grasses and docks, went into decline in RAE-2. This resulted from the closing of the canopy and the establishment of a more stable soil cover following upon the in-migration of Corylus avellana-type.

During zone RAE-3, hazel began to decrease in its representation as other tree species colonised the area. The greater warmth-demanding and slowly-migrating oak (Quercus) and elm (Ulmus) became established at 9260 BP (8310 cal BC) to be followed by 7760 BP (6540 cal BC) by alder (Alnus glutinosa). By this date the Bluff (lowerware) area and the Isla floodplain would have presented a fully forested appearance, though the sporadic occurrences of ash (Fraxinus excelsior) indicate that some natural openings in woodland were
available for ash to colonise. This situation continued during zone RAE-4. Over the period of this zone, birch and Corylus avellana-type had declined, the former reaching a stable condition, while the latter presented a more oscillatory pattern. In contrast, oak continued to expand and elm and alder remained steady.

The end of zone RAE-4 is dated to 5220 BP (4010 cal BC), thus almost 5000 radiocarbon years had elapsed since the first arbolescent colony of any significance. A remarkable feature of this period is that less than 1 m of sediment accumulated in the loch basin, giving an average rate of deposition of 0.019 cm per 1000 years. This suggests that environmental disturbance in the area was minimal. It might be suggested, therefore, that, if there was a Mesolithic presence in the area, it was very subdued. The oscillations in the Corylus avellana-type curve might be construed as showing the effects of human exploitation of that taxon, but if this was so, it clearly had very little effect upon soil disturbance and thus sedimentation rates. This supposition is supported by the lack of microscopic charcoal throughout the Rae Loch profile. Burning, whether for clearance, browse-creation, or domestic purposes, is frequently linked to possible Mesolithic activities (cf Edwards 1996; Simmons 1996; Edwards & Whittington 1997). Additionally, the herbaceous component, which pollen zones RAE-2 and 3 is poor. This is demonstrated by the dominance of trees and shrubs in the summary pollen curves (illus 6; 7; 8; 10); the pollen of grasses and sedges manages only a meagre showing.

Furthermore, there is no positive support for woodland management in the form of coppicing or leaf-foddering (Göransson 1986; Edwards 1993), nor is there any indication of possible pioneer farming as may be intimated by pre-elm decline cereal-type pollen (Edwards & Hironis 1984; Edwards & Whittington 1997). Such inferences may be thwarted by the cloaking effect of a strong woodland pollen component which could prevent herbaceous pollen and microscopic charcoal from reaching the sampling site. The probability also exists, however, that dense woodland would have been unfavourable to human activity.

**WOODLAND REDUCTION, REGENERATION AND EQUILIBRIUM IN NEOLITHIC AND BRONZE AGE (c 2920–2920 BP)**

It was in this period that the Cleaven Dyke was built. The start of zone RAE-5 marked a significant change to the landscape within Rae Loch's pollen catchment area. At 5220 BP (4010 cal BC) is recorded one of the most notable features of Scottish (and European) woodland history - a major and sudden collapse in the representation of elm pollen. This decline in elm at Rae Loch is also closely coincident with those for oak, hazel, pine and, a little later, alder and birch. While the fall in elm is, to all intents and purposes, a permanent phenomenon (it barely rises above 2% TLP for the next five millennia), the fortunes of the other woodland taxa recover and then experience further decreases through the remainder of zone RAE-5.

The widespread elm decline of c. 5100 BP (3830 cal BC) has been ascribed to a variety of causes, singly or in combination, including disease, climate change, soil change and clearance for agriculture and leaf-foddering (Ten Hove 1968; Whittington et al 1991c; Tipping 1994a). There is no obvious indication that arable agriculture began c. 5220 BP around Rae Loch, but the pollen of grasses, ribwort plantain (Plantago lanceolata), common sorrel (Rumex acetosa), cf buttercup (Ranunculus acris-type), heather (Calluna vulgaris) and the spores of bracken (Pteridium aquilinum) begin to expand from the start of subzone RAE-5a. This pattern strongly suggests that Neolithic pastoral activity was taking place in the vicinity of Rae Loch, but that woodland, bereft of elm, continued to dominate the landscape. The demise of elm and the slight expansion in heather may suggest that the sandy soils of the area were becoming podsolised. Could grazing on soils with more surface horizons, exposing mineral horizons to erosion from a combination of animals and sheetwash (LOI values exhibit a fall from this point on) Sedimentation rates through most of subzone 5a increase to c. 0.346 cm per 1000 years. If animals were also being fed elm leaves and twigs, and if some arable activity was occurring in the catchment area, this may have provided conditions suitable for pathogenic attack brought by the elm bark beetle (cf Goring & Greig 1985). Whatever the cause, once elm had been reduced, the features of高清扫描amined were podsolised substrates could have prevented its regeneration (cf Sturludottir & Turner 1985). The similar, though more muted, decline in pine might suggest that, if it was local, it had been growing on the sandy soils now being given over to grazing.

Cereal-type pollen appears first at an estimated date of 4420 BP (3040 cal BC). The low and local dispersal of cereal pollen means that its initial presence in the pollen diagram need not be a certain indication of the date of adoption of arable activity. Indeed, many herbaceous taxa frequently found as weed flora in arable and pastoral habitats become consistently present within zone RAE-5a. These include mugwort (Artemisia-type), goosefoot family (Chenopodiaceae), cabbage family (Brassicaceae), carrot family (Apiaceae) and the dandelion group (Cichorium intybus-type), as well as the previously noted pollen of such taxa as grasses and plantain, and the spores of bracken.

A pattern of woodland dominance, accompanied by a consistent representation of taxa indicating the existence of some open land, continues into subzone RAE-5b. The drop in the percentage of tree pollen from about 80% to 67% TLP near the 5a/b boundary, c. 4050 BP (2510 cal BC), suggests that an extension of the cleared land was continuing. It may be the case that subzone 5b is largely reflecting landscape impacts of early and middle Bronze Age peoples-first feature in Scottish pollen records (Edwards & Whittington 1997).

Throughout the period to 2920 BP (1120 cal BC), there are few sporadic recordings of cereal pollen and the ribwort plantain profile shows varying but rather low percentages. These features might lead us to question whether the area around Rae Loch was only farmed at low intensity up to 2920 BP (the end of subzone 5b) or, at least, to wonder about the extent to which the farming was of an arable nature. The sedimentation rate in the loch indicates that a period of major soil disturbance was occurring and LOI values continue to fall. The strong presence of trees, along with an apparent paucity of evidence for a well-developed arable, and indeed pastoral, farming system and a high sedimentation rate, cannot be construed as a lack of human activity over this long time-span. Until there are special pollen dispersal considerations which might be thought to have been occurring at Rae Loch, the pollen evidence might be reflecting a pervasive, though 'hidden' practice of forest farming, in which openings in the woodland are cultivated and then used for pastoral activity (Edwards 1993; Göransson 1986). The generally steady percentage values for the other taxa may indicate that they have reached an equilibrium within a managed system, untroubled by natural competitive pressures. The demise and lack of recovery in the elm pollen record could also be in accord with this development, as the use of elm foliage as cattle fodder is a well-established feature of European agriculture--did this stop the flowering of elm, or did elm simply not flourish on the increasingly poor sandy soils?

**WOODLAND REDUCTION AND THE EXPANSION OF FARMING IN LATE BRONZE AGE, IRON AGE AND ROMAN TIMES (c 2920-1740 BP)**

The boundary area between zones RAE-5b and 6 exhibits a decline in sedimentation, a rise in LOI values and an apparent expansion in oak woodland. There may well have been a temporary lull in human activities which enabled the landscape to 'recover'. Most of subzone 6a sees a renewed fall in arboreal pollen taxa which spans the late Bronze Age, Iron Age and early Roman periods (2920-1740 BP [1120 cal BC-cal AD 280]). This does not accord with the increased erosion that occurs until 2000 BP (cal AD 10), or sometime thereafter. After that time, the organic content of the loch deposits falls once again, which could be a function of further impoverishment of the cariespoor soils. Subzone 6b sees a fall in grasses, plantain, sorrel and bracken, with cereal-type not much in evidence until the closing stages. On the available evidence, it seems that an extension in pastoral activity could be occurring and this may have
reduced soil erosion until the recommencement of mixed farming during the Roman/Early Historic period, c 1990 BP (cal AD 20), when cereal pollen is again present. It would be necessary to conclude from this that the Rae Loch area, or at least the area beyond its immediate environs, did not witness the upsurge in arable agriculture that most other areas in Scotland experienced during the Iron Age. That seems unlikely and is perhaps due to the very local, and still heavily extant wooded picture associated with the Rae Loch site.

It would seem, however, that enhanced soil erosion was a feature of the loch’s catchment area once arable cultivation again became part of the farming regime from around 1990 BP (covering at least the period 90 cal BC–cal AD 130 at one standard deviation if a precision of 100 ¹⁴C years is assumed). This could embrace either the end of the late Iron Age or the start of the Roman period. That this area was one of intense Roman activity is borne out by the legionary fortress at Inchtuthil, the major monument of the Flavian period (c AD 84-7) and located only 5.5km to the SW of Rae Loch. It provides an early example of large-scale, timber-intensive construction of military works, the introduction of which might conceivably have contributed to the continuing decline in the oak tree component of the woodland, well-marked in subzone RAE-6a. The decline in the woodland cover of the area continued until c 1740 BP (cal AD 280).

POST 1740 BP

The largely unvaried nature of the pollen record until the close of the period c 1740-250 BP suggests that population pressure in this part of Strathmore for most of the centuries AD was never excessive and could well have been at a lower level than during the late Iron Age and Roman periods.

Although the site provided environmental evidence up to the present day, it was not felt appropriate to discuss it in any detail here.
DISCUSSION AND CONCLUSIONS

The palynological record at Rae Loch provides a detailed statement on vegetational development for the complete period of the Holocene. The timing of the arrival of the major woodland components in the area can be established, providing an important corrective to the isopollen maps developed by Huntley and Birks (1983) (the construction of which was severely hampered by the lack of dated pollen diagrams at that time for the central and eastern lowlands of Scotland). According to the maps, hazel arrived at c 9000 BP (8030 cal BC), yet it is clear that hazel was established at Rae Loch by 9650 BP (8950 cal BC). The maps indicated that oak and elm had only achieved values of 2-5% TLP in the west of Strathmore by around 8000 BP (6840 cal BC), but the Rae Loch record shows that both taxa were established by 8620 BP (7580 cal BC). Throughout Britain, the establishment of alder is a very varied chronological event. For example, two sites in Fife, Black Loch and Pickletilllem, lying about 50km apart, have dates for this event of 7300 BP (6090 cal BC) and 6605 BP (5520 cal BC) (Whittington et al 1991a, 1991b). The date of 7650 BP (6460 cal BC) for Rae Loch not only adds to these variations but also establishes a very early record compared to one of c 6500 BP (5440 cal BC) predicted by the isopollen maps. The sheltered, inland situation of western Strathmore and its sandy substrates lead to rapid soil warming in the spring and the maintenance of high levels of accumulated temperature conducive to the growth of trees which prefer higher temperatures.

That human activities have had a recognisable effect on the vegetation of the Blairgowrie area was indicated by the investigations at Stormor Loch (Caseldine 1980), and the Rae Loch study has not only confirmed this but also put them into a chronological framework. There is little or no sign of any Mesolithic activity in the area. At the time of the major elm decline, after c 5220 BP at Rae Loch, not only are other tree types reduced, but pastoral activity seems to be indicated and an inference of podsolisation is also made. It is not until 800 14C years later that cereal-type pollen appears in the fossil record. We should not place too much reliance, however, on the sparse incidence of such pollen grains; open land indicators were already frequent and soil erosion was evident from increased sedimentation at, or after, a date of 4530±70 BP (3360-3090 cal BC). Such soil instability could have resulted from the grazing on and damage to thin sandy soils. The lack of elm regeneration could have been due to soil impoverishment, as could the fall in representation of pine pollen.

Evidence to be cited by the excavators (3.1 below) suggests that one area of the bank of the Cleaven Dyke in the area of burnt context F5 was possibly constructed between the late 5th to mid/late 4th millennium cal BC. This might be taken to approximate the period 5350-4500 radiocarbon years BP, which would correspond to the shaded area in pollen diagram illustration 10. As we have seen, the pollen record for this interval around Rae Loch is indicative of woodland reduction, possible incipient soil podsolisation, and woodland regeneration. Even in a record rendered mute by the dominance of arboreal taxa in the pollen profile, it is apparent that clearance could have been occurring in the Rae Loch area. It may be noted that the soil pollen record from beneath the Cleaven Dyke (2.5 below) brought forward the suggestion from us that the bank was constructed in post-elm decline times, that birch and hazel formed a regenerated woodland community in the area, and that some podsolisation with a heather cover was evident. Pine pollen was also insignificant in the soil pollen spectra. All of this exhibits a similarity to early to mid Neolithic events at Rae Loch; the only marked difference is that oak was clearly an important taxon around the loch, whereas its pollen was absent in the palaeosols at Cleaven Dyke.

The Rae Loch pollen profile suggests that prehistoric activity was undertaken in an environment which continued to be heavily wooded right up to c 2920 BP (1120 cal BC), but that the late Iron Age and Roman periods witnessed considerable farming activity, including that of an arable nature.
THE SURVEY AND EXCAVATION OF THE CLEAVEN DYKE

"Great part of the information obtained ... is contradictory, a still greater part false, and by far the greatest part is of a doubtful character." von Clausewitz, On War, 1832, chapter vi (tr JJ Graham 1908).

2.1 THE HISTORY OF THE INVESTIGATION OF THE CLEAVEN DYKE

The Cleaven Dyke lies on a plateau (illus 1) which is part of an extensive deposit of fluvio-glacial sands and gravels covering much of the area between Blairgowrie and Cupar Angus, in the broad valley known as Strathmore. The gravels are cut by the rivers Tay and Isla and the Lunan Burn, which define the western, southern and eastern edges of the plateau; the northern boundary is formed by the steep valley of an unnamed burn, running westwards to the Tay. The upstanding portion of the Cleaven Dyke runs from NO 1566 4086 to NO 1725 4000.

THE MONUMENT: AN INTRODUCTORY VIEW

The history of the study of the Dyke will make more sense to the reader if the information available from recent fieldwork is presented in summary now, so that previous observations can be considered in context.

The Cleaven Dyke comprises, first, a pair of ditches between 38m and 50m apart (consistently broader near the NW end). The breadth of the ditches is difficult to assess accurately; in many places tracks (of vehicles and possibly cattle) have been formed within them, causing damage and distortion. Where excavated, the width was between 1.5m and 5m. Roughly centrally between the ditches lies a bank (illus 11), varying between 7m and 15m across, and up to c.1.7m high (these dimensions excluding the swollen NW terminal). The bank of the Dyke survives as an upstanding earthwork for almost exactly 1800m, mainly in woodland, now partly cleared. The modern contour survey suggests that it terminates at the NW a few metres beyond the boundary fence of the wood; it is argued below that the NW terminal is formed by an oval mound with an E-W axis, to which are attached, first, a long barrow, and then the long bank of the Dyke.

The northern ditch survives in woodland for 20m more than the southern ditch, at the SE end of the wood. To the SE of the upstanding portion of the Dyke the ditches have been detected on aerial photographs in arable fields for a
further c 380m. A c 240m length of the bank was visible in the arable field at the time of the first-edition Ordnance Survey map (surveyed 1864, published 1867); a similar length is now visible as both a cropmark and a soil mark. The ditches are visible for rather longer, rising to the low hill on which we believe the Dyke ends. There is no evidence that the monument continued further to the SE. It has been suggested that the Dyke continued beyond both known terminals, and some evidence has been advanced for the extension to the NW; however, it is argued below that the Dyke does not continue further, at either end.

There are now four breaks in the line of the bank, all of which seem to be original, at the points marked W, X, Y and Z on illustration 23. There is evidence that the ditches are causewayed at W, X and Y, as well as at other points. For the whole period for which map information is available, the greater part of the length of the Cleaven Dyke is shown as lying within woodland.

THE CLEAVEN DYKE'S MORE RECENT PAST

18TH- AND 19TH-CENTURY REFERENCES

References are given in order of date of publication.

1772

Pennant, who has sometimes rather unfairly been credited with the first mention of the Dyke, in his Tour of Scotland 1772 (Pennant 1776), provided the vehicle for an account of the Dyke by a local man, Thomas Marshall, which influenced every interpretation until Abercromby (Marshall 1776, 452). The account, like many since, is short on description and long on interpretation:

"The Romans profited of the commodious accident of the two rivers, the Tay and the Illa [Isla], which unite at a certain distance below. These formed two secure fences: the Romans made a third wall of great thickness, defended again by a ditch both on the inside and the outside. These extend three miles in a line from the Tay to the Illa, leaving within a vast space, in form of a delta ... I must note that the wall is styled the Cleaving wall."
1783

Stobie's relatively small-scale depiction of the Dyke in his map seems surprisingly familiar (Stobie 1783). The size of the wood within which it was preserved 200 years ago has changed little, except at the NW end of the Dyke. The map, however, at too small a scale for the Dyke to be shown other than as very stylised; in general the representation is similar to McOmie's larger scale mapping.

1784

McOmie's plan of 'the Roman Wall and Camp at Mickleour' (illus 12) (McOmie 1783) is the first reasonably large-scale representation of the Dyke, but even so, it is marked as a ruler-straight feature, connected to the supposedly Roman 'Redoubt' (now interpreted as a burial mound of the Early Historic period (RCAHMS 1994a)). The plan, which is the first to attempt a portrayal of the ditches as well as the bank, should be considered only as a stylised depiction rather than a source of trustworthy archaeological evidence.

1797

The description in the Old Statistical Account of Scotland adds little to that provided by Marshall, apart from some rough dimensions: 'Here the Romans raised a wall of earth, about 24 feet thick, (for it is difficult to ascertain the exact measurement,) defended by a ditch on each side, 60 feet distant from the wall.'

1831

Knox provided a description of the Dyke, taking it, as had Marshall before him, to be one rampart of a vast Roman fortification utilising the Tay and Isla as natural barriers (Knox 1831, 63-4). He suggested that because of the relationship between the Isla and the Tay '... it was only necessary to throw up an intrenchment in front, or on the north side of the camp: accordingly a rampart ... extends from the Isla to the old course of the Tay'. The map is once again at a very small scale and the representation of the Dyke owes much to Stobie and/or McOmie.

1864

The first edition Ordnance Survey 1:10,560 map and 1:2500 plan were surveyed in 1864 by Lt Col Bayly, and published in 1867. Within the woodland the Dyke is once again depicted, at both scales, as a largely rectilinear monument, although minor variations of bulk and alignment are detectable at the larger scale. The Dyke is shown as terminating in the NW at the boundary of the wood, more or less as it does today; the northern ditch is, however, shown as carrying on to the fence, which is not what modern survey indicates (fold-out illus 98). At the SE end, both maps contain important information, surprisingly not referred to by any writer before now (fold-out illus 99). In 1864 the bank survived as a surveyable feature for 240m beyond the end of the wood, into what is now arable land, reflecting almost exactly the evidence provided by modern aerial photography and confirming the minor change of alignment (and possibly a swelling of the bank) in the last 100m. Nor is this the only respect in which the survey materially enhances the interpretation of modern aerial photography; on the south side of the Mickleour to Coupar Angus road, which runs across the low hill where the Dyke probably terminates, an active gravel quarry is depicted. The irregular scar of this feature (which has disappeared by the time of the second edition map) appears as a vegetation mark on modern oblique aerial photographs, and has previously been interpreted as a geological feature (Sharpe 1996) or as a Dyke-related feature. The quarry would effectively have removed any continuation of the Dyke on the south side of the summit of the hill. However, as has been mentioned already, no trace of the monument has been found beyond this hill, despite very intense aerial survey in recent decades (Pitts & St Joseph 1985).

The second edition of the 1:2500 plan (1901) contains less information. On the southern of the two map sheets the northern ditch and bank are not depicted at all, although this is probably the result of a transcription error. The bank extending into the arable field is no longer shown, the boundary of the wood where the Dyke leaves it has changed (to its modern line), new field boundaries have been inserted, and the site of the gravel quarry has been filled in and its site is under the plough.

20TH-CENTURY ACCOUNTS

The first recorded excavations on the Dyke were undertaken by Abercromby during the work, sponsored by the Society of Antiquaries of Scotland, on the Roman fortress at Inchtuthil in 1901 (Abercromby et al 1902). His description betrays an assumption that the monument is of Roman date: 'the rampart and ditches run in a perfectly straight line and parallel to each other through the whole length of the Dyke'. Abercromby was the first to note, to the east of the Blairgowrie road, 'the remains of a circular rampart with a ditch outside, about 90 yards in diameter over all' which 'intersects the northern ditch of the Cleven [sic] Dyke'. He also noted the presence here of a deliberately constructed break in the bank of the Dyke (that marked at Y on illustration 23). Three cross-sections were cut, at least one (and possibly two) in Section A and another probably in Section C or D. All told the same structural tale: the central bank was composed mainly of sand and gravel revetted externally with a clayey material. Unfortunately, no excavation archive has survived, but although only featureless profiles were published, they are sufficiently clear to indicate that the excavators had recognised the bank's
Photograph showing the location of Richmond's two cross-section and single axial trenches (1939) at the SE end of Section B of the bank of the Cleaven Dyke, looking across the main Perth to Blairgowrie road. (Crown Copyright: RCAHMS; Ian Richmond Collection)

The idealised cross-section drawing of the Cleaven Dyke published by Richmond (1940).

A view of one of the cross-sections through the Cleaven Dyke cut by Richmond. The pattern of deposits closely resembles that recorded in the 1993 cross-section. (Crown Copyright: RCAHMS; Ian Richmond Collection)
varying breadth and profile: in particular the predominant slightness of the SE portion (shown as 7m, compared with at least 10m in the middle portion), and the patently asymmetrical profile in the NW cutting.

Richmond undertook excavations on the Dyke in 1939 (Richmond 1940), once again with the financial support of the Society of Antiquaries of Scotland. He too cut three cross-sections through the bank of the Dyke but provided a written account of the location of only one of them, an axial section cut at the butt of the bank on the west side of the gap at the Perth-Blairgowrie road. The section proved that the turf-toeing of the bank, first noticed by Abercromby, continued round the butt-end, implying the break was deliberately constructed, rather than merely truncated by the building of the road. Unpublished photographs in the National Monuments Record of Scotland (NMRS) show details and general views of this and the other two trenches. From these photographs (particularly PT/6345; illus 13) it can be seen that these two cross-sections of the bank were cut through the bank immediately to the west of the main Perth to Blairgowrie road, just to the west of the axial trench. The approximate locations of the trenches, taken in part from recent observations on the Dyke, are marked on the fold-out plan (illus 99). There is no evidence that any ditch sections were cut. No detailed section drawings were published and no field drawings have been located. Only an idealised interpretation was published (Richmond 1940, fig 2), reproduced here for comparison (illus 14), rather than a record of the stratigraphy recorded in photograph PT/6344 of trench 2, in the NMRS collection (illus 15).

Illus 16
The hypothetical original course and extent of the Cleaven Dyke, as proposed by Richmond (1940).
Although he had explored the possibility of an origin in later or earlier periods, Richmond vigorously promoted the Roman interpretation of the Dyke in his paper, suggesting that it was a *limes* or political boundary related to the fortress at Inchtuthil, running some 14.5km from the Isla to the foothills of the Grampian mountains (Richmond 1940, fig 3; illus 16). The basis of evidence upon which the complex argument rested was, however, mainly circumstantial, depending on an assumed similarity between the Dyke and the Vallum of Hadrian's Wall, and an unsubstantiated claim about its original extent. Crawford (1949, 74-5) accepted the identification, but doubted that it had originally extended much beyond its current limits; for decades the Dyke continued to be seen in this light, Richmond even surmising in a later appreciation (Collingwood & Richmond 1969, 73) that its purpose might have been 'to mark the *prata legionis* or legionary grazing grounds'. This possibility was accepted as late as 1986 (Keppie 1986, 163). Nevertheless, the accumulating weight of aerial photographic material was now making it difficult to persevere with this categorisation, and already Maxwell (1983a), in a review of the results of aerial survey in Scotland, had drawn attention to the irregularity of the Dyke's ditches as they appeared in cropmark form at the SE end; such an appearance, contrasting sharply with the general clear-cut rectilinearity of Roman military ditches, found its clearest analogue in the segmentary alignments and perimeters of Neolithic structures. This view was shared by Pitts and St Joseph; their report on the excavations undertaken between 1952 and 1965 by Richmond and St Joseph on the Roman legionary complex at Inchtuthil (Pitts & St Joseph 1985) included the Cleaven Dyke in their discussion of the context of the Roman fortress. They concluded that the monument was unlikely to be of Roman date, refuting in detail the argument advanced by Richmond; the reasons given for this reinterpretation were: 1) the Dyke did not close the gap between the Isla and the hills (as Richmond - and earlier authors - had asserted); 2) a unit as powerful as the garrison of Inchtuthil would have had nothing to gain from the construction of such a line of demarcation; 3) the ditches of the Dyke are irregular in line, and shallow and flat-bottomed with gently sloping sides, unlike Roman military ditches; and 4) the use of turf in the construction need not imply a Roman date. They drew parallels instead with cursus monuments.

In 1986 there appeared the final report on a limited excavation undertaken in 1975 by Helen Adamson for

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**Illus 17**

Adamson's section through the Cleaven Dyke, redrawn from the site archive. The soil descriptions, expressed using our conventions, are approximations, based on the authors' own experience on the Dyke.
Historic Scotland's predecessor department. Adamson's work was limited to a long narrow trench cutting NE-SW across the projected line of the Dyke, 3m beyond the boundary fence of the wood at the NW terminal of the Dyke.

She found that the gravel core of the bank was 13.5m across (illus 17). The turf revetment of the gravel had a footprint 2.7m wide on the north side and 2.4m wide on the south side. Adamson also detected to the north of the bank a shallow ditch some 2.5m wide and a maximum of 0.25m deep. Immediately to the south of the bank she recorded a very shallow feature 0.25m deep.

The bank was 18.9m wide in total and survived to a maximum height of 0.5m. What was almost certainly a buried old land surface survived below the bank: it was c 9.5m wide, and Adamson suggested that this had approximated to the original width of the bank at this point; the broadening of the bank within the arable field was interpreted as spread. However, both turf revetments appear to be in their original relationship to the gravel core. We would suggest therefore that the width of the gravel core is relatively unchanged and that the turf revetments may have spread only a little. Adamson interpreted the broadening of the bank within the wood, immediately to the west, as possibly being the result of dumping material during a hypothetical flattening of the mound in the arable field.

Unfortunately, in the illustrations for the final publication, the location of the trench (together with the features it contained) was accidentally transposed c 8.5m to the north, and the width of the trench was given as 3m, rather than 1m (its true dimension over most of its length); the final text seems to have been written with this plan in mind, which had a significant effect on the final published interpretation of the NW terminal of the Dyke. In particular, important (and accurate) observations and interpretations put forward in an interim report (Adamson 1979) were omitted from the final text. Illustrations 18 and 19 are, respectively, figure 3 in Adamson's report, and a plan showing the accurate location of the trench in relation to the recently completed contour plan. The revised trench location is confirmed by the published plan in the interim report, a 1:2500 plan in the site archive and an annotated diagram in the site notebook (NMRS MS/858/6).

In illustration 18 the bank is shown as continuing on the same line as in the adjacent wood. The result is that the northern ditch that Adamson detected appears to be 10m north of the upstanding adjacent bank, and the southern ditch lies immediately to its south. However, the relocation of the trench and the features it contained to their correct location makes the relationship clear: in the interim report Adamson specifically noted that the mound she detected was not on the line of the adjacent upstanding bank, as is shown, erroneously, in illustration 18.

Illus 18
The plan of the Cleaven Dyke published as figure 3 by Adamson & Gallagher (1986). The trench is mislocated c 8.5m to the north and is shown as 3m wide, rather than 1m.
Illustration 18 also makes it appear that the northern ditch of the Cleaven Dyke proper continued beyond the point where it is last visible, and then veered towards the bank, to appear as the ditch located in Adamson’s excavation; the recent detailed ground survey contradicts this. On illustration 19 it can be seen that the northern and southern ditches detected by Adamson, instead of being respectively distant and close to the projected line of the Dyke in the wood, are in reality equidistant from the projected line of the bank (3-4m away). In the interim report Adamson noted that the southern ditch cut the turf revetment of the bank (Adamson 1979). In the final report it is noted only that the ditch lay immediately to the south of the turf; we would suggest that the former is the likelier interpretation. Adamson noted that the northern ditch terminated in an extension to the NW of her main trench.

Bradley’s observation (pers comm) that the NW terminal of the bank might comprise a round or oval mound is supported by the contour survey. We must consider what it was that Adamson excavated at this point in the field (Adamson & Gallagher 1986). We would suggest that, taking account of the straightening effect of the modern fences at NW and SW, the survey, together with Adamson’s evidence, indicates that the NW terminal of the Dyke is formed by an oval mound c 28m E-W by 22m, and now c 2m high at its highest point, falling to c 0.5m where excavated, extending c 10m into the arable field. Adamson’s trench seems to have cut across the NW corner of this mound. We would argue that a long mound was attached to the east end of this oval mound; this long mound is not accompanied with the cursus-type ditches of the Dyke, which only start some 60m to the SE, but may be a long barrow. The two ditches located by Adamson seem to parallel the main body of the long mound in the woodland, and we would suggest that, as the southern ditch cuts the revetment of the possible oval mound in Adamson’s trench, the ditches she located were the NW ends of the defining ditches of this long mound.

The case for the Dyke being Neolithic was judged ‘not proven’ by Adamson, who suggested that Richmond’s comparison of the Dyke with the Hadrianic vallum was strengthened by the fact that cross-dimensions of the Dyke and its structural elements corresponded closely to fractions of a Roman actus unit of measurement.

Adamson also noted the existence of three lines showing as cropmarks to the NW of the existing
terminal (illus 20). These marks had also been noted by
the Ordnance Survey, who used them to suggest an
extension to the line of the Dyke on recent 1:2500 and
1:10,000 maps. We would argue that these marks have
nothing to do with the Dyke. First, the marks are those
of three ‘ditches’, not two ditches and a bank. Second,
they are more closely-spaced than the ditches and bank
of the Dyke. Finally, the marks are not on a flat field (the
impression given by Adamson’s uncountoured fig 2):
they run over the edge of the steep drop from the plateau
on which the Dyke sits, to the valley of the unnamed
burn to the north. It seems more likely, as the character
of their cropmark traces indeed suggests, that they are
hollow-ways - tracks worn into the edge of the terrace,
precursors of the existing metalled but unnumbered
road immediately to the west, which is itself a
hollow-way, cutting deeply into the scarp (illus 21).
There is a local tradition that the Dyke was part of a
cattle-droving route, although Haldane does not note it
as a major route in his survey of the subject (Haldane
1973); if this was so, then the origin of the hollow-ways
is clear: the frequent passage of cattle and other traffic
up and down a slope.

In summary, the 1975 excavation revealed more about
the Dyke than was appreciated at the time, but it is only
in the context of the wider project reported on here, and
with the correction of the locational error in the
published report, that that significance has, finally,
become clear.
PREVIOUS SURVEYS OF THE CLEAVEN DYKE

In the past the survey, recording, description and interpretation of the Dyke have been approached as though it was a Roman military earthwork and therefore ‘perfectly straight’ (Abercromby et al 1902) and broadly uniform in dimensions. Some major variations in alignment appear to have been noted by Richmond (although which he means in his description of the monument is impossible to determine, as there is considerable confusion—eg over east and west—in the text) but the many more minor variations were not. Inevitably the survey scale and methodology chosen for a monument perceived as having only gross variations would be capable only of recording gross variations. Until 1996 the only complete surveys of the Dyke were those prepared for various editions of the Ordnance Survey 1:2500 plan. The last published paper edition of the map records only the major changes in direction and some of the more obvious changes in the width of the bank. The current, electronic, version, however, has added a line for the approximate edge of the bank (illus 55). In the early 1990s Historic Scotland asked RCAHMS, as part of its fieldwork in south-east Perthshire, to undertake a survey of part of the Dyke that was about to be clear-felled, as a precaution against possible damage and loss of information during forestry operations. A traditional hachure survey of a length of c 300m at the SE end of Section A recorded that the bank was segmented, the boundaries of the segments being marked by dips in the height of the crest (RCAHMS 1994a, 27; illus 22 this volume). In the limited area surveyed the segments appeared to be between 25m and 53m long, some adjacent segments being on slightly different alignments and of different width.

Field observation showed that the features noted in the surveyed area were evident elsewhere in the monument. It was difficult, however, to gain an idea of the overall pattern of variation in the height and alignment of the Dyke, because of the heavy tree-cover over much of its length.

As it appeared that the Dyke displayed both small- and large-scale variation, and was structurally more complex than had been believed, we decided that a complete survey of its upstanding remains was needed to ease definitive observation and interpretation. Consideration of the results of the RCAHMS survey led us to believe that our aims would be better met by a contour survey, rather than traditional hachure drawing, a decision that has proved justified by the results. The contour survey, a daunting task in the dense woodland, was undertaken between 1994 and 1996 by Christopher Burgess (5.1 below) with a range of assistants, as funding and surveyors’ time became available. No comparable survey had been done in Scotland to give any realistic idea of the time or funding needed; in the event, our initial estimates of both were woefully inadequate. The felling of the trees at the NW terminal in 1995, and the likelihood of further forestry work in the near future, forced the pace, and the last c 40% of the survey was funded by Historic Scotland.

We should note, before moving on, the other important observations made by the RCAHMS surveyors: between the bank and the southern ditch two phases of later agricultural rigging were noted. In the earlier phase the rig runs almost at right angles to the bank. The later phase of rigging runs parallel with the Dyke.

ARCHAEOLOGY IN THE IMMEDIATE AREA

Apart from the Littleour structure (4 below), the immediate vicinity of the Dyke is surprisingly poor in archaeological remains that can be assigned confidently to the Neolithic. The cropmark record includes the sites possibly related to Littleour, the ‘long mortuary enclosure’ and pit-circles at Inchtuthil, and the Milton of Rattray cursus monument, all described below. Two substantial flint scatters have been found in the vicinity: one at Nether Pittendreich, close to the NW terminal of the Dyke (NGR NO 158 411), and the other on the opposite bank of the River Isla from the Herald Hill long barrow (NGR NO 189 393 to 189 393). Elements of the Pittendreich scatter were collected from 1977 to 1983 (Lye 1977, 1983, 1984; Reid 1985), and reports prepared by James Kenworthy were deposited in Perth Museum. The assemblage of 17 pieces included trimming flakes, core preparation flakes, six scrapers and two plano-convex type knives, and was identified by Kenworthy as late Neolithic/early Bronze Age.

Alan Saville has kindly surveyed the material from the banks of the Isla, opposite the Herald Hill.

LITHIC SURFACE FINDS FROM BESIDE THE RIVER ISLA

Alan Saville

A small collection of 46 struck lithic pieces was recovered as a dispersed scatter of surface finds from fields close to the River Isla, near its confluence with the Tay. The main location, from which derive all the implements specified below, is on the eastern bank of the Isla, opposite Herald Hill, approximately centred on
Illus 22
The plan prepared by RCAHMS of the area between segment-boundary A10 and close to the SE end of Section A of the Dyke. (Crown Copyright: RCAHMS)
grid reference NO 189 391. The pieces are of flint of various types and colours, apart from two pieces of flaked opal/agate. From those flints with surviving cortex it is clear that both beach/gravel pebble flint and flint with non-waterworn cortex are involved, and the colours include, red, brown, and yellow as well as various shades of grey.

The classifiable implements among the collection comprise an arrowhead, two knives, three scrapers, and two probable gunflints. The arrowhead is a very large (50mm x 42mm) example of a Late Neolithic chisel type (Green 1984), which can be compared to the larger of the examples from Airhouse, Berwickshire (Callander 1928, fig.7). One of the knives is a classic Late Neolithic/Early Bronze Age plano-convex type (Clark 1932), and the other is a variant of the same type, with bilateral scale-flaking on a blade of triangular cross-section. The latter example is noteworthy for having edge gloss inversely on parts of both lateral edges. The scrapers include one example on a core, but none is a diagnostic example in terms of date. Neither of the two possible gunflints are standard types and no specific date for them can be suggested. A large unretouched blade of grey flint is so substantial (L:71mm x B:36mm x Th:10mm; weight: 24g) that it might also be connected with gunflint manufacture rather than being a prehistoric artefact.

Only one piece, a thick plunging flake from the face of a small bladelet core, is at all suggestive of a Mesolithic date, though it cannot be regarded as wholly diagnostic. Otherwise a blade element among the flakes may suggest some Early to Middle Neolithic activity, but, as far as the prehistoric element is concerned, the only truly diagnostic component is Late Neolithic/Early Bronze Age. The fact that such a small collection should include an exceptional arrowhead and two fine knives is clearly unusual; all sorts of factors could bear on this, but the nearby presence of a site or sites of this period, perhaps of a funerary nature, is probably indicated.

A stone axehead was also found at this location (NO 1894 3960) in 1997. It is a small, squat example (L: 89mm x B: 48mm x Th: 22mm; weight: 172g), polished over the whole surface. The colour is basically light grey-green, with distinctive darker green and brown banding, emphasised by differential weathering. The rock type has not been identified but, superficially, it resembles that of other axeheads made from the hornfels from Creag na Caillich, Killin (Edmonds et al 1992). If this were the case, then a later Neolithic date would be appropriate.

The axehead was declared Treasure Trove and allocated to Perth Museum and Art Gallery, which also houses the other lithic finds reported upon here.

2.2 THE 1993-1997 SURVEYS

In the preceding section covering the history and early survey of the Dyke, its general appearance and composition will have become familiar to the reader. In this section the detailed analysis of the form of the monument made possible by the 1993-1997 surveys is described.

GENERAL OBSERVATIONS

As already described, the Cleaven Dyke comprises a pair of ditches and a central bank. The bank of the Dyke survives for almost exactly 1800m as an upstanding earthwork, mainly in woodland. The most sensible way to examine the Dyke seems to us to be to ‘walk’ the reader along it, using the detailed contour plan as a substitute for the monument itself. Tilley (1994) describes the Dorset cursus in relation to its surrounding landscape, natural features incorporated within the monument, the features of the cursus (where visible) and artificial features (eg long barrows) in and around it. For the Cleaven Dyke the approach must be different. On the one hand, its excellent state of preservation means that we can describe the structure of the monument in greater detail. On the other hand, the heavy tree-cover immediately around the monument restricts direct observation of the surrounding landscape. Tilley founded his approach to the Dorset cursus on the normal assumption that cursus monuments were built in one or two construction events and were designed primarily to operate as unitary monuments in their final state. This is perhaps arguable at the Cleaven Dyke and some other sites (eg Maxey, Pryor 1985). The survey of the Dyke, undertaken by Chris Burgess, is presented below in four parts on the fold-out (illus 98/99). The relationship between the individual plans is shown on the index map, illustration 23. Where the formally identified ‘Sections’ of the monument are referred to, a capital ‘S’ is used throughout the report to distinguish them from the archaeologically cut sections.

Illus 23
Map showing the main subdivisions of the Cleaven Dyke (the breaks W, X, Y and Z divide the Dyke into five Sections—A, B, C, D and E). (Based on the Ordinance Survey 1:10,000 map with the permission of the Controller of Her Majesty’s Stationery Office, © Crown Copyright MC98/172.)
Illus 24
Cleaven Dyke: diagram showing the height of the bank and the ditch bottoms in relation to Ordnance datum, in 0.75m bands.
(Christopher Burgess and Peter McKeague)
Some general observations can be made on the form of the monument. There are four breaks in the bank of the Dyke, W, X, Y and Z, which are, or appear to be, original and are set at significant intervals. These break the monument into (from the NW) five main Sections: A, B, C, D and E. In Sections A and B, the north face of the bank is consistently steeper than the south face. Where the ditch changes angle the changes are not sharp, but are complex (eg that north of segment-boundary A3).

The limited evidence from excavation confirms the impression gained from field-observation that the monument was built from NW to SE, and we describe its elements in that order. Within the Sections clear segments can be identified which can be characterised as relatively broad or narrow, the width changing abruptly at segment boundaries. The segments are further marked by:

- variations (occasionally abrupt) in the height of the bank;
- slight changes in the alignment of bank and ditches;
- changes in the width of the ditch or the platform between bank and ditch on each side;
- variations in the cross-section of the bank.

Some of the segment boundaries appear to be more significant than others: they are marked by a combination of narrowing/broadening of the bank, significant angle-changes in bank or ditch, perturbations in the line of the ditches, or causeways in the ditch. We have observed that where the ditch changes angle, the change is not usually sharp, but complex, and where there is a complex change, it more often takes effect in the northern ditch first, the southern changing later (eg the change north of segment-boundary A3 in the northern ditch is matched 25m to 60m east of A3 in the southern ditch; see fold-out illus 98). Within each segment of the bank it is occasionally possible to identify individual construction dumps.

A diagram (illus 24) representing the height of the bank at intervals in 0.75m bands (above Ordnance Datum) shows the rise and fall of the monument over its upstanding length. It shows clearly that the highest points lie within the same 0.75m band: they are the NW terminal, the SE end of Section A, the SE end and terminal of Section B, the NW and SE terminals of Section D, and the NW and SE terminals of Section E. Although it cannot be checked while the tree-cover remains over most of the monument, it seems likely that the only place that someone travelling along the Cleaven Dyke would lose sight of the whole of the earthwork, would be in the distinct dip within Section C (discussed further below).

Illus 25
View along the NW part of the bank of the Dyke, looking towards the terminal, in 1997, after the clearing of trees. (Crown Copyright: Historic Scotland)
DESCRIPTION AND DETAILED ANALYSIS

SECTION A

The visible remains of the monument begin just to the NW of the boundary fence of the wood. Just inside the wood the bank is at its highest and broadest (illus 23; 25; fold-out 98). As it is argued above (2.1), a long mound apparently abuts a pre-existing oval mound; it seems to be some 80m long (ending c 99m from the fence), but may be bipartite, since at one point some 38m from the edge of the oval mound (c 56m from the fence) it displays a slight change of alignment and profile, there is a pronounced bulge on its north side, and there is a perceptible drop in height. No quarry-ditches of the kind that would be expected beside a long barrow are visible within the plantation, but Adamson located, in the arable field, what appear to be the NW ends of two very shallow ditches that lay 3-4m from the base of the long mound on either side; she observed that the southern ditch cut the revetment of the oval mound. As these ditches were no more than 0.25m deep, and seem to act more to define the monument than as quarries, it is hardly surprising that they are not visible in the wood. However, the geophysical survey profiles taken across the arable field to the south of the bank may indicate the possible course of the southern ditch.

Towards the end of the long mound (c 99m from the fence), the top of the bank falls in height at a fairly even rate; at that point it dips in the first of the identifiable segment boundaries (A1). Beyond here, the line of the Dyke 'wobbles' considerably and returns to the alignment of the western part of the long mound. Some 14m back from segment-boundary A1, the northern ditch begins. There is no evidence of the ditch having existed further to the NW; the contour survey shows what may be a further extension to the NW, but on the ground this may be interpreted as a reflection of the local topography. The geophysical survey profiles in the arable field south of the bank seem to indicate that the ditch extends as far as profile 'b' in a straight line from where it was last visible in the wood; that is, to a point corresponding broadly to the terminal of the northern ditch. From that point the geophysical anomaly, the southern edge of which lay outside the area surveyed, begins to veer slightly to the south. The indeterminate end of both the northern and southern ditches may have a prosaic explanation; we know that the Dyke is supposed to have been used as a customary route for cattle droving. If cattle were driven along the ditches, then the ends of the ditches, where the cattle left them to move towards the hollow-waves to the NW, might have been eroded by traffic, subsequently filled with humus, and obscured.

To sum up, therefore, the first c 90m of the monument (the appearance of which may be considered atypical) seems not to be flanked by ditches as widely separated or as deeply cut as the normal Cleaven Dyke ditches; as has been noted above, the ditches located by Adamson appear to be associated with a possibly multi-phase structure resembling a long barrow that incorporated a free-standing oval mound as its NW terminal. How far they extended cannot yet be determined, the significance of aerial photographic and geophysical evidence on this point is still uncertain, both sources hinting at anomalies of one kind or another in the arable field to the south. Our reading of the totality of the evidence, however, is as follows: only at segment-boundary A1, at the end of what may be interpreted as a normal long barrow, does the cursus/bank barrow proper of the Cleaven Dyke begin. From here the rest of the Section is c 840m long and is relatively straight and regular.

The first segment of the Dyke proper, between A1 and A2, is 57m long and may be characterised as 'normal'. The south side of the bank and a portion of the southern ditch are overlain and obscured by an L-shaped bank of relatively recent date, while segment-boundary A2 has been largely occupied by a modern forestry track, which also crosses the northern and southern ditches.

The next segment-boundary, A3 (190m from the fence at the terminal), is marked, not by a dip in the bank's height, but by an appreciable increase in its breadth, accompanied by a very significant change of alignment - some 3.5° to the south. The northern ditch undergoes a complex angle-change over a length of c 60m to either side of the same point. The southern ditch executes a similar change a little further to the E.

The segment between A3 and A4 measures c 88m. The bank is straight and can be characterised as broad. Between 25m and 60m from segment-boundary A3, the southern ditch undergoes a complex change of direction. Some 35m short of A4, it is crossed diagonally by a modern track and disappears from view for a length of 10m. At segment-boundary A4, the northern ditch undergoes a complex change of direction, which is mirrored in the bank, the terminals of the adjoining segments inclining slightly north to the junction point. This deviation has an additional significance: where it terminates, some 20m beyond A4, the bank adopts an altogether new consistency of alignment, pointing directly at the hill where the Dyke terminates, another c 1850m to the SE.

The segment from A4 to A5 measures c 107m in length. It is of even height and straight, apart from the western portion just described. A few metres to the east of A5, the southern ditch exhibits an undoubted causeway, c 3m wide, east of which it again undergoes one of its complex changes of direction. The northern ditch appears to narrow slightly at a corresponding point.

The segment from A5 to A6 is c 28m long and can be characterised as narrow, the decrease in girth being marked, as elsewhere in the Dyke, by a northward re-alignment of the bank's southern edge.

At A6 the bank once again broadens markedly, maintaining its broad character throughout the c 83m length of the segment, and attaining a maximum just before A7.

East of A7 the bank once again becomes narrow and remains thus throughout the next two segments, each relatively short at 40m and 49m respectively. From A7 to A9 the course of the Dyke appears to be slightly curved, an appearance which is mirrored by the complex-angled re-alignment of the southern ditch in this Section.

At A9 the bank again becomes broad and straight, the segment between A9 and A10 measuring c 73m. A10 is a particularly well-defined boundary: both the height and width of the bank decrease sharply. This is the segment-boundary chosen for excavation in 1995, the westernmost then unencumbered by trees. Two of the shortest segments occur together just after segment-boundary A10.

A single geophysical cross-profile of the mound and northern ditch (near the SE end of segment A9/A10) indicated in this area some sort of anomaly to the north of the bank, a depth of up to 1.5m to 2m being indicated; no feature in a comparable location was found at the immediately adjacent excavation site and no pit or ditch can be detected on the surface (unlike the shallow cursus ditch, which is still visible after over 5000 years). It is suggested therefore that the resistivity-detected feature was of natural origin.

The next segment is only 25m long and is narrow. The northern ditch is interrupted for the first time a few metres west of A11, the southern a metre or two to the east. Immediately to the west of the southern causeway, the ditch undergoes a slight change in angle, while to the east, opposite bank-segment A11-A12, which is narrow and short (30m), the ditch inclines a little to the S.

The segment between A12 and A13 is c 102m long and once again narrow. Both ditches 'wander' a little towards the east end of the segment, near which both ditches are broken by narrow causeways - the northern just before, the southern directly opposite, the segment-boundary.

From the area around the causeway up to the point where a modern bank crosses the monument from the east (terminating on the crest of the bank), the northern ditch diverges considerably from the straight alignment. The segment-boundary A13 appears to be significant: to the east the bank broadens, while the ditches not only undergo unusual perturbations of course but also narrow.
The last segment of Section A (A14 to Section boundary W) measures c. 50m long. It rises higher than the previous segment and, particularly at the end, has a more massive appearance, while the ditch on both sides is unusually slight.

SECTION BOUNDARY W

The Section-break marking the boundary between Sections A and B is now some 10m wide, but it seems likely that this represents a widening of the original gap by its accommodation of the old road leading north from Meikleour village and, in modern times, of a forestry track. However, it is only on the eastern edge of the Section-break that road-formation has caused serious damage, for, on the west, the but-end of the northern ditch of Section A can still be seen, and the massive terminal of the bank on that side appears to have been only slightly trimmed. How wide the break was originally cannot now be determined.

SECTION B

Section B is c. 365m long (illus. 23; fold-out 98/99). The segment between Section boundary W and the first section-boundary of Section B (B1) is narrower than the last of Section A (and is in absolute terms a narrow segment as well as being on a slightly different alignment). At B1 the alignment of the bank changes slightly to the south and the gauge changes again from narrow to broad. Segment B1-B2, which is c. 68m long, incorporates a complex change of alignment c. 25m from its east end; significantly, this manifests itself most clearly in the north edge of the bank: a departure from the norm observed in Section A. Equally significant is the sharply increased width of the ditches in these sectors, compared with the adjacent portions of A. It is also worth noting that from break W to B3, the berm between the northern ditch and the bank is c. 2-3m wider than that on the south; for most of Section A the berms are roughly equal.

Segment B2-B3 is c. 80m long and is characterised as broad. At B2 the alignment of the bank once again changes, this time a little to the north, and this is matched by the northern ditch. Segment-boundary B3 has been identified as a significant boundary; the character of the bank changes: it thickens in a pronounced way on the north side, and both ditches are causewayed at this point, the northern ditch just beyond B3, the southern ditch, just before it. Although B3 has been used to accommodate a track at some time in the past, it and the causeways are certainly original, the ditches to either side of the latter confirming this by complex, though slight, angle-changes.

The segment B3-B4 is once again short, only c. 31m, the bank beginning to encroach on the northern berm.

At segment-boundary B4, the bank again broadens considerably, bulging out to both north and south. Alongside it the northern ditch undergoes a complex angle-change.

At segment-boundary B5 the bank changes alignment abruptly to the south, as does the southern ditch, which now moves onto an alignment parallel to the northern ditch, which had already changed alignment. The southern ditch stops c. 8m short of the end of Section B, at break X. The northern ditch stops opposite the terminal of the bank, just short of which the bank reaches a height of just over 2m.

SECTION BOUNDARY X

This break in the Dyke (fold-out illus 99) was investigated in 1939 by Richmond (1940), who cut two cross-sections and one axial section at the terminal of the bank. In the cross-sections he noted, as had Abercromby before him (Abercromby et al. 1902), that there was a 'toe' of turf at both sides of the bank, apparently holding the gravel of the bank in place. In the axial section at the tip of the bank he noted that this 'toeing' was carried round the end of the section, showing that the end of the segment had been finished off neatly, and therefore that the break had been constructed deliberately. It seems likely that the modern A93 has removed the matching bank-terminal of Section C, for, as it reappears on the SE side of the road, the bank appears to have been truncated. The width of break X therefore cannot be determined with accuracy, but was probably similar to the gap of c. 10m in the southern ditch.

It may be significant that at the breaks X and Y the northern ditch stops slightly further to the SE than in the matching gap in the southern ditch: at X the difference is c. 7m; at Y the difference appears to be less. The effect in both cases seems to have been to preclude an access across the monument that was perpendicular to its axis.

SECTION C

This Section lies almost entirely to the east of the A93. The point at which the northern ditch remains has been lost beneath the road. However, the terminal of the southern ditch, on the SE side of the Section boundary survives c. 14m to the west of the road. The southern ditch then undergoes a complex angle-change just to the east of the A93 and the bank starts the Section on an alignment considerably different from the last part of Section B.

When it resumes in Section C the bank follows a different alignment and is not only of narrow character, but is also of almost symmetrical cross-section. This is furthermore the most variable Section of the monument. About 35m from the NW end of the Section, the angle of the bank changes significantly again, to the south (at C1). This change is paralleled by a change in the angle of the northern ditch; the southern ditch undergoes a similar change c. 20m later, to the east. The bank then runs on its new alignment for c. 40m before making a further angle-change (at C2), with a complex angle-change in the northern ditch just to the east. At this point the land on which the monument is constructed begins to slope slightly downwards from NE to SW, as the Dyke leaves behind the area of negligible contour variation of Sections A and B.

The segment from C2 to C3 is c. 65m long and fairly straight, disrupted only by a track crossing both ditches and the bank. It is constructed for the most part on still falling ground but, at the east end, on the flat. The height of the bank falls evenly from the beginning of Section C all the way to segment-boundary C3. All three segments are narrow and continue to be of symmetrical cross-section.

At C3 the angle of the bank changes towards the north. The northern ditch had already made the angle-change at the point where the modern track crossed, c. 10m to the west. The southern ditch undergoes a similar angle-change.

The next segment (C3-C4) is relatively short, 35m in length, and is, in contrast to the elements to the west, narrow. It is built on the flat at the bottom of a local depression. The southern ditch is still undergoing its complex angle-change and the northern ditch also changes its angle again.

The next segment, from C4 to the end of the Section, is the most unusual part of the monument apart from the NW terminal. From the flat ground of segment C3-C4, it rises, with a slight change of alignment, up a slight slope, the top of which provides to the walker a false horizon. As the ground also slopes up to the bank from the south, the effect of the terrain is also to make the central bank look distinctly higher on the south side than on the north. The bank rises rapidly, at a rate greater than the slope it is climbing and broadens considerably towards its end, which lies over the false horizon. This last segment of Section C is c. 88m long. At its eastern terminal the segment rises to a height of 1.75m above the ground on the south side and broadens into an oval mound measuring c. 14m in breadth and at least 23m long. The end of this Section thus seems almost to mirror the NW terminal of the monument, with its swollen bank and oval terminal mound.

SECTION BOUNDARY Y

This is the only boundary break not to have been occupied by a more recent roadway. The space between the bank terminals is c. 15m across.
About the corresponding gaps in the ditches it is less easy to be sure: that on the north is obscured by a later circular earthwork; the southern gap is quite poorly defined, but is probably c 13m across. The northern ditch continues beyond the end of the segment, by a metre or two, as does the southern. The southern ditch, however, undergoes the most sudden change at any point in its length; c 15m from its end it appears to 'dog-leg' c 5m to the north. It is possible that this unique feature reflects the incorporation of a pre-existing ditch related to the oval terminal mound.

SECTION D

The NW terminal of the bank of Section D is offset sharply to the north and built on a scale only a little less massive than the opposing terminal of C. After 15m, however, it resumes the main alignment (once more with asymmetrical profile).

At segment-boundary D1 the bank narrows dramatically, once again the loss in width being achieved by the southern edge of the bank moving north. The segment from D1 to D2 is c 70m long and is narrow. It is very badly disturbed by more recent banks, but the individual dumps of which it is composed can be distinguished clearly.

The segment from D2 to the end of Section D is short, only c 28m long, and is broad, although its wedge-shaped plan gives it the appearance of a single dump.

SECTION BOUNDARY Z

The boundary between Sections D and E is, as are three of the four original breaks, colonised by more recent roads—in this case the 18th-century route serving Muiralhouse. From field examination it seems likely that the SE terminal of Section D has been disturbed only a little, and that, as at breaks W and X, it is the east side of the gap that has been slighted to accommodate the road.

SECTION E

In the wood to the north, 25m of the northern ditch of Section E survives. The NW terminal of the ditch is preserved, just to the SE of the track. The remainder of this final Section traverses arable land, now appearing either as a cropmark (both bank and ditches) or a soil mark for the bank alone. Geophysical survey just into the field appears to have located the expected features of the bank and ditches. We are fortunate to have the map of the surviving bank by the Ordnance Survey in 1867, but the character and course of the monument are less easy to assess beyond the wood. The Dyke in Section E appears to be on a slightly different alignment from Section D. There is no evidence of any further major break in the bank, so far as it survives or is visible, and no gap was recorded by the Ordnance Survey. However, aerial survey does reveal what appears to be an original break in the northern ditch not far into the field. There also seems to be an angle-change in the ditches at a point about half way from the corner of the wood to the terminal, and c 50m further on the soil mark of the bank abruptly ceases. The end of the soil mark seems to correspond with the end of the earthwork recorded by the Ordnance Survey, and there is no evidence that the bank continued beyond this point. The ditches continue, fading out of sight as they rise on to the summit of the low hill to the SE (an observation confirmed by excavation in 1993).

Excavation was undertaken in the field on a 15m length of the southern ditch and in a number of narrow trenches on the hilltop (2.3 below).

There is no evidence of the Dyke ever having gone beyond this point. A feature visible to the SE of the Dunkeld to Coupar Angus road, occasionally put forward as evidence of a continuation, seems to represent a gravel quarry depicted on the first Ordnance Survey mapping.

Illus 26
Cleaven Dyke: plan and sections of the ditch in excavation area I/I. The 'crossing' marks on the plan at top left are modern subsoiling tracks.
2.3 EXCAVATIONS ON THE CLEAVEN DYKE: 1993 AND 1995

STRATEGY

The first season's excavation in 1993 had three aims: 1) to examine a length of the ditch in the arable area to check the evidence of aerial photographs, which suggested that the ditch was irregular in line, and possibly segmented; 2) to try to locate the SE terminal and 3) to excavate a cross-section of the bank, the berm and one ditch of the Dyke within the wood, where best preserved, to provide a reliable and well-recorded section, and to look for features below the bank and on the berm.

The second season's excavation in 1995 had two objectives: 1) to investigate the boundary of two of the segments of the bank, particularly to determine the sequence, if any, of their construction and 2) to look for further features below the bank.

Excavation was undertaken in two Sections of the Dyke: in Section E, Area I was excavated across the ditch in the arable field and at the SE terminal; in Section A within the wood, Area III, the cross-section, and Area IV, the axial section were cut. The location of each trench is shown on the fold-out illustration 98/99.

AREA I - THE MAIN TRENCH IN THE ARABLE FIELD

In Area I, two 2m x 10m trial trenches were hand-dug prior to machining of a 9m x 30m trench over the southern ditch of the Dyke at the point shown on fold-out illustration 99; the southern trench lay within the area subsequently machined. Three 'segments' of the ditch were taken down in plan (providing axial and transverse sections) within the machined trench (1/1). The surviving hand-dug cutting (1/2) provided a section of the ditch-fill and ploughsoil. The excavated sections showed sand/gravel inwash of limited depth, the rest of the ditch being filled by silty black loam (probably water-deposited) (illus 26; 27). In the machined trench parts of three ditch segments were investigated, one completely, the others only being exposed. The completely exposed segment was separated by a causeway at the SE end and by a distinct shallowing of the ditch at the NW (illus 28). The ditch was nowhere deeper than 0.35m; in places subsoiling had disturbed the edges and fills of the ditch to a depth of 0.25m. The ditch was a maximum of 2.5m wide.

Illus 27
Cleaven Dyke: sections of the ditch in excavation area 1/2.
The bank is composed of redeposited turf, topsoil and subsoil, apparently the spoil of the flanking ditches; at this point it measures c. 8.6m in width over the footing banks of turf which demarcate and partly revet the bank on either side, and it survives to a height of c.1.5m above the old ground surface. Interpretation of the section suggests that the bank was probably built in the following sequence:

1. Turf stripped from the site of the northern ditch was placed to form a low bank; a little to the north of the axis of the final bank. Apparently at much the same time a low bank of turf was built along what would become the northern edge of the bank, forming the toeing already mentioned.

2. Various tips of the lower ditch fill—mixed soils and subsoil—were then deposited over the turf and topsoil dump, and against the turf toeing. Care seems to have been taken not to overlap the toeing.

3. The south face of the bank produced so far in the process was then covered on its southern flank, first by turf, probably cut from the top of the southern ditch, and then by mixed soil and subsoil dug from that ditch, this being finally held in place by another toeing of turf, which, however, laps over the edge of the material of the bank.

4. Finally, a root- and animal-disturbed layer can be seen to cover the whole bank, presumably resulting from a combination of turbation of the layers already described and deposition of leaf litter and other organic material. The disturbed area to the left of the area affected by rabbit burrowing appears to be related to the growth of a tree.

This sequence has produced the markedly asymmetrical profile of the bank over much of its length— with a markedly steeper face on the NE side (illus 30). These observations confirm and amplify the results of Richmond's trenches (1940), as illustrated in his unpublished photographs in the NMRS (although not in his published section drawing, which shows little detail, an almost symmetrical cross-section and confuses the turf toeing with the dark humic mixed layer mentioned in (4) above).

There were various features below the bank (illus 31). A small shallow depression in the topsoil buried beneath the bank (F5) had been the site of one or more fires, sufficient to affect the soil structure; it contained quantities of oak charcoal. The soil micromorphology report below casts light on the relationship between the burning and the construction of the bank.

A substantial pit, probably a posthole (F1), was found below the bank near its northern edge (illus 31); it is not clear whether the post was in situ when the bank was built round it, or had rotted before construction. However, it was not visible on the cleaned old land surface (OLS); it only became visible after the old land surface was removed. It appears likely, therefore, that the post pre-dated the bank.

As no further postholes were found in an equivalent position in the 1995 excavation trench, and no cropmark traces of such features have been observed in Section E, it seems likely that this was an isolated post. The remaining features, F2, F3 and F4, seemed to be of human origin, but their interpretation is unclear. F4 was the only feature visible on the cleaned OLS, where it appeared as a very clear 'dimple', which had filled with the overlying bank material. The published section drawing does not include the OLS.

The trench was continued to and over the northern ditch, which was revealed to have a very shallow profile and to be c. 5m wide and 1m deep below the modern topsoil surface. Its fill is interpreted as the result of natural silting.

Calculation of the volume of the ditches and the bank suggest that the material of the bank could be accounted for completely by the contents of the ditches; it is not necessary to suggest the importation of turf from the berm, as has been proposed in the past, to account for a supposition (inaccurate as it turns out) that the bank had a greater bulk than the sum of its two ditches (Richmond 1940, 41).
Illus 29
Drawn section of the bank and northern ditch of the Cleaven Dyke in excavation area III.
Illus 30
Cleaven Dyke: view of the NW face of the cross-section trench in excavation area III.

Illus 31
Plan of features below the bank of the Cleaven Dyke in the cross-section cut in excavation area III.

Illus 32
View from the NE of the axial section cut along the length of the bank of the Cleaven Dyke in excavation area IV. The NE side of the bank was removed.
Illus 34
Drawn section of the bank of the Cleaven Dyke revealed by the axial section in excavation area IV.
AREA IV - THE AXIAL SECTION CUT IN 1995

The 1995 excavation lay immediately to the SE of the 1993 cross-section, within a rectangular trench 9.5m by 6m, cutting axially along the NE half of the bank and crossing segment-boundary A10 (illus 32). The pattern of soils within the trench was recorded in plan at five levels: twice during the removal of the bank; at the old land surface (OLS); at a level within the buried topsoil under the OLS; and on the cleaned subsoil surface.

Perhaps Richmond's most significant observation during his excavation was that, at the constructed terminal of the central bank, next to the modern A93 road, the 'toeing' of turf on the sides of the mound, holding the gravel bank in place, continued round the end of the bank, bringing it to a neatly finished stop. In the excavation segment-boundary A10, the NW bank-segment (A9/A10) was found to have a similar 'rounding off' or completion marked by deposited turf at its SE end; the bank-segment to the SE (A10/A11) did not; its toeing ran parallel to the bank edge, up against the NW segment. This implied—and the axial section subsequently demonstrated—that the NW bank-segment was built first and finished off with the toeing of turf, before the next segment to the SE was added (illus 33). This is particularly evident in illustration 34, which shows the trench looking from the NW along the axis of the bank, prior to the removal of the lowest layers of bank material; the lateral turf 'toeing' at the northern edge of the bank shows clearly as a dark line along the left-hand side of the bank; the arc of 'toeing' terminating the segment on which the photographer is standing is also clearly visible, curving round from left to right.

Beneath the bank 11 features were noted on the cleaned old land surface. Of the four which could not be dismissed as of natural origin, two (F6 and F7) were certainly the result of human activity, and the others (F8 and F9) possibly so (illus 35).

F8 and F9 were small shallow features with uniform fills resembling the OLS. It is possible that they represent the remains of two shallow postholes or stakeholes.

Illus 34
View from the NW towards the SE along the bank of the Cleaven Dyke during the excavation of the axial section at segment-boundary A10 (excavation area IV). The upper part of the bank has been removed, showing clearly the turf 'toeing' of segment A9-A10 closing off that segment before the construction of segment A10-A11 began.

Illus 35
Plan of excavated features below the bank of the Cleaven Dyke in excavation area IV.
F6 and F7 appeared to be the quarry and bank respectively for an unusual feature: during planning of the OLS a small mound of gravel was noted and planned. It was thought to be a rise in the natural subsoil, but on excavation it was shown to be a pile of gravel apparently dumped on the OLS and gradually absorbed (presumably by the accretion of organic matter) into it. F6 appeared on cleaning. The profile of the two features matched exactly—F6 was deeper at the west, and F7 was higher at the same end. We have interpreted this shallow pit and the upcast from it as in some way associated with the construction of the Dyke, perhaps a crude marker for the line on which the Dyke was to be built.

Two areas of charcoal-stained OLS were identified (F10 and F11). On excavation neither proved to be the top of a deeper feature—only darker areas of old land surface. Fragments of charcoal were found in F10. Fragments of charcoal were also recovered from the old land surface to the NW. The soil micromorphology report cast light on their origins.

2.4 PALAEOSOLS OF THE CLEAVEN DYKE

Ian A Simpson & Donald A Davidson

The 1993 and 1995 excavations of the Cleaven Dyke identified an underlying fossil surface soil and other buried surface soils within the monument, while excavation of the ditches established the occurrence of inwashed soil materials. These are 'palaeosols'—literally ancient soils. Soils are dynamic, natural bodies the properties of which reflect the environmental conditions under which they have been formed (Jenny 1980) and so the palaeosols associated with the Cleaven Dyke provide an opportunity to assist in reconstructing the environment immediately preceding and during the formation of the monument. In this study the technique of soil thin section micromorphology is used to describe the natural and human-influenced properties of the Cleaven Dyke palaeosols. From the descriptions simple categories are presented and interpreted within the context of soil formation chronology. These different strands are then synthesised to provide an indication of the environmental conditions associated with construction of the Cleaven Dyke.

ILLUS 36
Cleaven Dyke: location of micromorphology thin section and soil pollen samples in excavation area III.

METHODS
Twenty-two undisturbed samples from excavated profile faces of the monument were collected in 75mm x 55mm x 45mm Kubiens tins in 1993 (11 samples from the bank, Illus 36; two from the ditch) and 1995 (nine samples; Illus 37). Sampling was designed to ensure the maximum range of soil types within and beneath the monument. Thin sections were prepared at the Micromorphology Laboratory, University of Stirling, following the procedures of Murphy (1986). Interpretation of the observed features rests upon the accumulated data of a number of workers, notably Courty et al (1989) and Fitzpatrick (1993).

RESULTS AND DISCUSSION: SOIL TYPES
In all the thin sections described, basic mineral materials are broadly similar in both terrigenous type and relative frequency. Descriptions indicate a high proportion of coarse angular and subangular quartz with a range of other, less frequent, minerals resulting in a freely-drained soil (Tables 3-6). Rock fragments are usually metamorphic in origin but there are also a very few siltstones present. The mineral and rock fragment suite is typical for this area of Scotland where glacial outwash sediments from the Highlands form the soil parent material. These observations also serve to indicate that the materials used in the formation of the monument were local to the area, as was the material infilling the ditches. No erratics introduced by human occupation were observed.

Despite the similarities in parent material, pedogenic differences are discernible with microstructure, birefringence fabric (the fabric of the fine mass observed between cross polarizers and described by the nature, orientation and distribution of the patterns of interference colours) and related distribution characteristics permitting classification of the thin sections into four types. Type I soils are characterised by intergrain microaggregate structures together with
stipple speckled birefringence fabrics and enaulic related distributions (enaulic distribution patterns refer to a skeleton of larger fabric units with aggregates of smaller units in the interstitial spaces). Such soils represent the land surface buried by the bank, some areas of which have been subject to some scale anthropogenic disturbance, and the turf lines and dumps within the bank. Type 2 soils have a fine granular microstructure with isotropic birefringence fabrics predominating and enaulic related distributions, and are found on the edge of the bank. Type 3 soils have a range of different microstructures which includes intergrain microaggregate, granular and subangular blocky, together with stipple speckled birefringence fabrics and enaulic to porphyric related distributions. These soils are found infilling the ditches of the monument. Type 4 soils are single grain microstructures with enaulic related distributions and represent the sands and gravels forming the largest proportion of the bank (micron distribution patterns refer to fabric units of only one size group). These soils are sampled with other soil classes (the upper part of samples M5 and M10) and are not discussed further, as they provide no evidence with which to interpret the palaeoenvironment of the monument, other than that bank is comprised of local sands and gravels (table 6).

**TYPE 1 SOILS**

Of the Type 1 soils (tables 3 and 4), samples M8, M10, the lower part of M11, M12 and M13 represent the minimally disturbed buried land surface (illus 36; 37). These soils have brown to dark brown organo-mineral fine material with dotted limpidity (limpidity expresses the transparency of the fine mass and is associated with the presence or absence of micro-coated particles). A range of fine organic materials is evident, together with excremental pedofeatures, but, with the exception of very few fungal spores and rare fine organic coatings, coarse organic material and other types of pedofeatures are absent. These characteristics suggest a high degree of biological activity with rapid turnover of organic material and limited loss of nutrients from the soil. Such characteristics and their associated pedogenic processes are indicative of the surface horizons of a brown forest soil that would have supported a deciduous woodland vegetation cover. However, the occurrence of occasional phytoliths suggests that grassland was a significant component of the vegetation cover immediately prior to the formation of the bank, and in the absence of infilled tree root channels within the stratigraphy it is entirely feasible that major woodland cover may have been cleared from at least the line of the monument at some earlier period. Limited evidence of small-scale disturbance is found in these samples, with traces of small stones that are bright orange in oblique incident light and fine charcoal, suggesting a light burning of this early land surface. Dusty clay coatings up to 30µm in thickness are also evident in M14 indicating small-scale anthropogenic disturbance to the soil horizon, but there is no horizon disruption to suggest major woodland clearance activity immediately prior to the formation of the bank.

A greater degree of anthropogenic disturbance is evident in samples M19 and M20, representative of the small areas of charcoal-stained old land surface evident beneath the monument (illus 37). These areas are not part of a deeper feature and are characterised in thin section by very few to few charcoals (not strongly lignified tissue, with which it can easily be confused), the increased frequency of fine organic debris remains, the occurrence of very few heated stones, and the occurrence of a bone fragment in sample M19. Such observations serve to highlight the occurrence of human activity in the pathway of the monument prior to construction, and it may be suggested that this area represents small patches where light burn vegetation cleared from the pathway of the monument was gathered for burning. However, sufficient time must have passed for the main products of these fires to have dispersed before construction of the monument.

Further anthropogenic disturbance is evident in sample M7 beneath the bank (illus 36). Here there is a greater proportion of small burnt stones together with small areas of clay coatings up to 50µm in thickness and light brown fine mineral material, confirming the excavator's observation of a small hearth site at this point in the land surface. The extent of biological activity and microstructure of the hearth site is of the same order as that identified in the other buried land surface soils although red brown organo-mineral fine material remains evident. This means that this locality was regrading back towards a brown forest soil after disruption, although this process was not complete, and implies a limited impact of the hearth on local pedogenesis. The length of time for an A1 horizon to form and reach equilibrium is generally estimated to be between 600 and 1500 years (Douechafour 1982) but in view of the limited disturbance to the soil by the hearth and incomplete regrading, it is evident that the hearth site pre-dates the formation of the monument by a relatively short period of time. This period is likely to be in the order of a few decades to a few centuries.

Samples M5, M6, M9, M14, M15, M16, M17 and M18 represent turf lines and dumps within the bank. They are very similar in their micromorphological characteristics to the soils beneath the bank discussed above, suggesting that the turves were part of a mature brown forest soil surface horizon. One sample, M14, immediately above sample M13 from the old land surface does however contain evidence of rare depletion pedofeatures, and thin (100µm thick) linear accumulations of iron suggest that incipient podsolisation may have commenced immediately prior to the construction, at least in some parts of the landscape in the area around the monument. Because of their mature, rather than skeletal, nature, the position of these turf lines in the bank can be explained as having been stripped from local areas and transported to the bank, rather than having formed in situ on top of the deposited sand and gravels. Use of stripped turves in this manner would have provided a ready-made vegetation surface and provided stability to the evolving bank structure.
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Frequency class refers to the appropriate area of section (Bullock et al. 1985)

- Trace
- Very few
- Few
- Frequent / Common
- Dominant / Very Dominant

Frequency class for textural pedofeatures (Bullock et al. 1985)

- Rare
- Occasional
- Many

Table 3
Cleaven Dyke Type 1 soils, buried land surface.
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<td>STIPPLE SPECKLED</td>
<td>ENAULIC</td>
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<td>STIPPLE SPECKLED</td>
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</tbody>
</table>

Frequency class refers to the appropriate area of section (Bullock et al 1985)

- Trace
- Very few
- Few
- Frequent / Common
- Dominant / Very Dominant

Frequency class for textural pedofeatures (Bullock et al 1985)

- Rare
- Occasional
- Many

Table 4
Cleaven Dyke Type 1 soils, turf lines and dumps.
### Table 5

Cleaven Dyke Type 2 soils, podsolised soils.
<table>
<thead>
<tr>
<th>SECTION</th>
<th>MICROSTRUCTURE</th>
<th>COARSE MATERIAL ARRANGEMENT</th>
<th>GROUNDMASS FABRIC</th>
<th>RELATED DISTRIBUTION</th>
<th>COARSE MINERAL MATERIAL (&gt;10 μm)</th>
<th>FINE MINERAL MATERIAL (&lt;10 μm)</th>
<th>COARSE ORGANIC MATERIAL (&gt;50 cells)</th>
<th>FINE ORGANIC MATERIAL (&lt;5 cells)</th>
<th>PEDOFEATURES</th>
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</thead>
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<td>RANDOM</td>
<td>STIPPLE SPECKLED</td>
<td>ENAULIC</td>
<td>ORGANIC MINERAL, BROWN, SPECKLED LIMPIDITY</td>
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<td></td>
<td></td>
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<tr>
<td>LEFT</td>
<td>SUBANGULAR BLOCKY AND GRANULAR</td>
<td>RANDOM</td>
<td>STIPPLE SPECKLED</td>
<td>ENAULIC TO PORPHYRIC</td>
<td>ORGANIC MINERAL, LIGHT BROWN, SPECKLED LIMPIDITY</td>
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<td>M22</td>
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<td>RANDOM</td>
<td>STIPPLE SPECKLED</td>
<td>ENAULIC TO PORPHYRIC</td>
<td>ORGANIC MINERAL, BROWN, SPECKLED LIMPIDITY</td>
<td></td>
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</tbody>
</table>

Frequency class refers to the appropriate area of section (Bullock et al. 1985)
- Very few
- Few
- Frequent / Common
- Dominant / Very Dominant

<table>
<thead>
<tr>
<th>SECTION</th>
<th>MICROSTRUCTURE</th>
<th>COARSE MATERIAL ARRANGEMENT</th>
<th>GROUNDMASS FABRIC</th>
<th>RELATED DISTRIBUTION</th>
<th>COARSE MINERAL MATERIAL (&gt;10 μm)</th>
<th>FINE MINERAL MATERIAL (&lt;10 μm)</th>
<th>COARSE ORGANIC MATERIAL (&gt;50 cells)</th>
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<th>PEDOFEATURES</th>
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<td>-</td>
<td>MONOC</td>
<td>ORGANIC MINERAL, BROWN, SPECKLED LIMPIDITY</td>
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</tr>
<tr>
<td>M5</td>
<td>SINGLE GRAIN</td>
<td>RANDOM</td>
<td>-</td>
<td>MONOC</td>
<td>ORGANIC MINERAL, BROWN, SPECKLED LIMPIDITY</td>
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</tbody>
</table>

Table 6
Cleaven Dyke Type 3 and 4 soils, ditch-fill and sands/gravels.
TYPE 2 SOILS

Type 2 soils (table 5) are evident flanking the SW and NE edges of the bank (samples M1, M2, M3, M4 and the upper part of M11). Compared to Type 1 soil thin sections, there is less coarse mineral material and more fine isotropic organic material organised in a granular structure, although this latter feature becomes less with depth in the bank, where soils also show characteristics of the brown forest soils discussed above. Other features which characterise these soils are the absence of fine mineral material in parts of the thin sections, and the occurrence of iron depletion and accumulation pedofeatures in the lower samples. Silt cappings are also evident in the lower of these samples (M1), located on the upper surface of coarse mineral material and up to 20μm in thickness, but absent from samples higher in the bank. Taken together, these features are indicative of the surface horizon of podsol soils where there has been a reduced rate of organic matter decomposition, acidification of the soil profile and associated depletion of soil nutrients. Formation of such soils can arise as a result of ongoing pedogenesis in freely-drained parent materials, and as a result of wetter and cooler climatic conditions with freeze-thaw processes, and heathland vegetation cover.

The juxtaposition of brown forest soil and podsol features lower in the stratigraphy (M1, M2, and the upper part of M11) suggests that podsolisation was superimposed upon existing brown forest soils, demonstrating the direction of pedogenesis from brown forest soil to podsol. More marked podsolisation is evident in samples from higher in the bank (M3 and M4) with isotropic granular organo-mineral material indicative of the upper horizon of a well-established peaty podsol. In both contexts the most plausible interpretation of these features is that podsolisation was an in situ process, developing after the construction of the monument.

TYPE 3 SOILS

The two samples from the ditch-fill are sufficient to demonstrate that there have been different episodes of deposition in the ditch that are predominantly the result of alluvial processes (table 6). In sample M21 the greater proportion of fine material suggests a slower rate of deposition in a low energy environment, while the coarser deposits suggest an environment of higher flow energy. Sample M22 is also characterised by coarser deposits but has a greater proportion of organic material. This suggests a period when there was no deposition in the ditch allowing vegetation to develop. Further work is required to correlate depositional phases in the ditch to the soils evidence found in the bank.

CONCLUSIONS

Description and interpretation of palaeosol micromorphological features associated with the Cleaven Dyke has identified a range of environmental conditions and anthropogenic disturbances. Brown forest soil environments were prevalent at the time of monument construction although not necessarily associated with a woodland vegetation cover, at least on the line of the monument. Similar freely-drained brown forest soils beneath Neolithic earthworks in east central Scotland have been identified at Dalladies and North Mains by Romans and his co-workers (Romans et al 1973; Romans & Robertson 1975; 1983; Macphail et al 1987). Although these excavations are few, and a considerable range of dates is represented by these studies, the similarities are sufficient to support the view that the Type 1 soils of Cleaven Dyke represent a Neolithic fossil landscape. The radiocarbon dates from the hearth confirm this interpretation. The Cleaven Dyke, however, does contain evidence to suggest that localised and incipient podsolisation had commenced at the time of monument construction, with subsequent full-scale podsolisation processes during wetter and/or cooler conditions modifying the brown forest soils on the edges of the constructed bank.

A feature of the palaeosols of this monument is the lack of morphological indicators of major anthropogenic activities such as cultivation, intensive burning and substantial woodland vegetation clearance in the immediate area of the excavated sections of the Dyke. It is apparent that construction of the monument did not require or attract major ground preparation, such as the removal of large timber or ploughing. The absence of substantially disturbed soils and lack of infilled tree root channels supports the view that all that was required was the removal of a light brush vegetation from the line of the construction. It is also apparent that settlement activity prior to the construction of the monument was genuinely at a low level although not entirely absent. These observations are in contrast with the only other excavated earthwork of this date in eastern Scotland at Dalladies where there is associated burning of vegetation and cultivation (Piggott 1971; Romans & Robertson 1983), but are similar to the Dorset cursus, which Bradley (1986) suggests may also have initially lain in an area marginal to contemporary settlement.

2.5 SOIL POLLEN BENEATH THE CLEAVEN DYKE

Kevin J Edwards & Graeme Whittington

In an effort to reconstruct the vegetation history of the area prior to the building of the Dyke, a programme of soil pollen sampling, to be related also to soil micromorphology, was instigated. Such a history is vital in providing an understanding of the landscape in which the Neolithic peoples worked—was it wooded or cleared?

If it was the former, what were the floristic components of the woodland? If the latter, were there signs of agriculture or burning? Soil pollen analysis, despite its difficulties, can provide an intimate view of the immediate vegetation which peat or loch deposits rarely allow.
METHODS

Soil monoliths were collected in 75mm x 55mm x 40mm Kubiena tins. Duplicates were obtained for pollen and soil micromorphological analyses. Results from samples from three contexts (illus 37) are considered here: P1 and P3 are from the old land surface (OLS), P3 being from an area of charcoal-stained OLS (F11), possibly a heath site. P2 comes from the turf "toeing" on the north side of the bank and from immediately above the OLS. The sandy soils did not preserve old surface organic horizons; the palynostratigraphic surfaces were marked by a very thin silver-coloured, silty horizon. The stratigraphy for each site is ~70% sand (fine, medium and coarse in roughly equal measures) with the remainder being silt. The organic content was about 4.5%.

The monoliths were sub-sampled at contiguous intervals of 5mm and pre-treatment was undertaken with NaOH, HF, HCl and acetolysis (Faegri & Iversen 1989). Volumetric preparations with the addition of Lycopodium 'exotics' enabled estimations of palynomorph concentrations. Samples were mounted unstained in silicone oil of viscosity 12 500 cSt.

Pollen type and plant nomenclatures follow Bennett (1994) and Stace (1991) respectively. A pollen count of 300 TLP was attempted at each level. Microscopic charcoal was quantified using the point count estimation method (Clark, RL 1982).

Pollen and spores counts are presented as percentages of TLP in illustrations 38-40. Only taxa found in more than two sample levels in each profile are included. Curves for total pollen concentration closely parallel those for total palynomorph concentration; only the former are included here. Charcoal concentrations and charcoal to pollen ratios are also displayed on the pollen diagrams. Computations and diagram construction were achieved using the computer programs TILIA and TILIA-GRAPH (Grimm 1991).

Pollen diagrams based on lake and peat deposits are typically zoned into 'local pollen assemblage zones' which demarcate areas of the diagram within which there is a recognisable homogeneity. Palynomorphs from within soil profiles experience movement as a result of processes such as leaching, water-table fluctuations and animal activity; consequently the microfossils do not necessarily possess the same stratigraphic integrity as those recovered from mires and lakes. Nevertheless, areas of soil pollen profiles displaying similarities between spectra are often evident and their demarcation can be important for explanations of site history. In the present account, 'phases', analogous to traditional pollen 'zones' have been indicated on the pollen diagrams (cf Keith-Lucas 1986)—these facilitate both discussion and interpretation. The phases of profile P2 are numbered in 'reverse' order from top to bottom, the reasoning for which is discussed below.

THE POLLEN DIAGRAMS

All pollen and spore diagrams have a good representation for the following taxa: birch (Betula), alder (Alnus glutinosa), hazel (cf Corylus avellana-type), heather (Calluna vulgaris), grass (Poaceae), ribwort plantain (Plantago lanceolata), devil's-bit scabious (Succisa pratensis), moonwort (Botrychium lunaria), polyophy (Polypodium) and undifferentiated ferns (Pteridaceae (monolete) indet). Each diagram, however, displays important variations and these are described briefly below.

P1

The pollen and spore taxa maintain fluctuating but fairly constant values throughout the profile (illus 38) except for the uppermost three levels where birch falls, ribwort plantain rises and there is a small expansion of heather. The diagram is dominated by birch, hazel and grass pollen. Total pollen concentrations fall from 35,000 grains cm\(^{-3}\) at the top of the profile to 17,000 grains at 32.5mm, before expanding at 42.5mm and declining to 17,000 grains at the base.
Illus 39
Selected pollen and spore data from Cleaven Dyke soil pollen profile P2 (• indicates <2% TLP; x10 exaggeration curves on charcoal samples; note the 'reversed' order of the phases).

Illus 40
Selected pollen and spore data from Cleaven Dyke soil pollen profile P3 (• indicates <2% TLP).
Alder, hazel and grass pollen values are relatively constant (illus 39). The top part of the profile (phases P2-1 and 2) has a markedly higher representation for birch, moonwort and ferns. The basal section of the profile is dominated by heather (phases P2-3 and 4) and plantain is increased in P2-4. Total pollen concentrations show a continuous increase down-profile with a pronounced bulge in values (maximum 184,000 grains cm$^{-3}$) in phase P2-3.

Hazel pollen values are fairly constant throughout the profile (illus 40). Birch and the fern taxa are most in evidence in the basal two-thirds of the diagram (phase P3-1). Heather rises in the top three spectra, having been preceded by a rise in grass pollen. Total pollen concentrations fall sharply from 28,000 grains cm$^{-3}$ at the top of the profile, to 4000 grains at 22.5mm; beneath this, values fluctuate at around 7000 grains cm$^{-3}$.

**INTERPRETATION**

The three pollen profiles provide both (i) an interpretable general vegetational history of the area covering an undetermined period prior to the construction of the Dyke, and (ii) a statement as to the nature of the vegetation in the landscape at the time of Dyke construction. Profiles P1 and P3, being from the old land surface beneath the bank, make it possible to draw inferences concerning contemporaneous site history. Their differing pollen content is a reflection of the flora of the area and this suggests that a vegetational mosaic existed.

The pre-Dyke vegetation exhibited a wooded aspect in which birch-hazel communities were dominant. Alder was growing in damper areas—presumably along the course of the Lunan Burn as well as more locally. The woodland cover was not complete; the pollen of grasses, daisy/thistle family (Asteroidae/Cardueae), pink family (Caryophyllaceae), devil’s-bit scabious, ribwort plantain, greater/hoary plantain (Plantago major/media) and buttercup (Ranunculus acris-type), and the spores of moonwort, are indicative of open areas. The polypody and other ferns could well have been represented in both the open land and woodland floras.

By the time that the Dyke was built, this vegetation had undergone a change. Profile P3 in particular shows that the birch was reduced (phase P3-2, and probably contemporaneous with phase P1-3), whereas the hazel presence was maintained, perhaps due to its value as a food resource. The continued presence of birch in P3-2 could reflect the recruitment of birch pollen from the site of profile P1, as the two sites are only 7m apart, and it is conceivable that the pollen did not come from P1, but from a birch stand in close proximity to it. The expansion in grass pollen values in P3-2 and P1-3, ribwort plantain in P1-3 especially, and the decline in ferns in P3-2, argue for possible grazing. It is impossible to say whether this would have occurred in deliberately cleared areas or in those where a birch woodland cycle had ended. Within phases P3-2 and P1-4, there are expansions in heather pollen—that at P3 is stronger, suggesting an earlier establishment of heather there. This type of pollen change is frequently taken to indicate increasing soil acidity (Simmons 1996) and a decrease in the value of the pasture. The low abundances of charcoal in P1 (0.5cm$^2$/cm$^3$ at the surface and with charcoal to pollen ratios decreasing in the upper part of the profile) suggests that burning of the ground flora did not take place there, either as a natural or as an anthropogenic process. The situation at P3 is very different, with quite high surface values for microscopic charcoal of 4.8cm$^2$/cm$^3$, though with declining charcoal to pollen ratios in the uppermost five samples. It might be argued that burning of the vegetation had contributed to podsolisation in P3, with the resulting expansion in heather on impoverished soils. The situation is confused, however, in that P3 is located on the charcoal-stained old land surface of feature F11, the site of a fire or fires. It might be noted that a profile maximum for microscopic charcoal in P3 is found at 57.5mm, where charcoal attains a value of 12.7cm$^2$/cm$^3$. The section diagram (illus 33) shows that microscopic charcoal permeates much of feature F11, and it would therefore seem prudent to argue for fire-related vegetational change on the basis of either the microscopic or macroscopic charcoal records.

The remaining pollen profile, P2, is part of the bank component of the Dyke. It is most probable that the ‘toeing’ on the north side of the bank was constructed from turves taken from the area of the ditch to the north. Profile P2 shows marked similarities to the other two profiles, with the important difference that it appears to be inverted. The suggestion can be made, therefore, that in this instance the turf had been placed with its vegetated surface facing downwards (it is in recognition of this fact that the phases are numbered in ‘reverse’ order, that is, from the top to the base). With the inverted nature of the profile in mind, it becomes apparent that it bears a very close resemblance to that of P3. Signs of a decline in birch are intimated in P2-1, and continue, with sporadic expansions (possibly due to off-site inputs) in P2-2. Once again the hazel component remains fairly constant. In P3 the birch decline was accompanied by a rise in the values for heather pollen and that is an even stronger feature at the beginning of P2-3. There is a slight reduction in grass values in phases P2-3, moonwort declines to <2% TLP in P2-3 and ribwort plantain is also much reduced. Thus, an unambiguous ‘grazing’ phase is not discernible in P2-3 (that is, before heather pollen expands). Indeed, if most
of the birch pollen in the profile had originated from beyond this site, it is conceivable that the other components of the pollen spectra in P2-1 and 2 could reflect a grazed habitat. Phase P2-4 witnesses the continued abundance of heather pollen (>30% TLP); it is noticeable that ribwort plantain and moonwort also increase slightly. It is possible that the boundary between P2-3 and P2-4 marks the junction of two turves with adjacent upper surfaces (note the divergence in the pollen concentrations), but this is not explored further here. Nowhere in the profile does microscopic charcoal attain values greater than 1.9cm³/cm⁻³ and charcoal to pollen ratios are lower than for profile P1.

The pollen assemblages from the three profiles permit the inference that the vegetation of the pre-Dyke land surface was characterised by a dynamic mosaic structure. Areas of woodland and areas of open land coexisted, with the former also giving way to the latter. The open areas also saw a change from grassland to heath. A possible constant in the vegetation was the existence, and perhaps exploitation, of hazel.

CONCLUSIONS

The vegetational landscape which confronted the builders of Cleaven Dyke would have consisted of an intermixture of light birch-hazel woodland, perhaps of a secondary nature, heath and grassland. At face value, this seems to have been achieved through the simple progression from birch-hazel woodland to heath, as might be expected to result from human interference with woodland for pastoral purposes in an area of sandy soils (Dimbleby 1962).

Given the extremely complex nature of soil pollen assemblages, however, the history of vegetation prior to the construction of the Dyke may have been more complicated than suggested above. The pollen obtained from P1, P2 and P3 could have been derived from at least two sources - from plants growing on the site and from those whose pollen has been transported there by the wind. Upon incorporation into the soil, the pollen and spores would have undergone movement within the profiles, such that the final deposition levels of contemporaneous palynomorphs are likely to be mixed with those of other ages, leading to 'blurred' assemblages. Thus, in the case of the Cleaven Dyke pollen profiles, it is feasible that the woodland to heath progression may conceal recurrent instances of such progressions (cf Edwards 1979).

The conjunction of the pollen data and the radiocarbon evidence from oak charcoal in the nearby heath is of interest. It has been suggested that the pollen indicates possible woodland regeneration. Elm pollen is present in very small amounts (<0.7% TLP in P1 and P3), while oak is absent-a contrast to the situation found in pollen profiles from the nearby lake sites of Stormont Loch (Caseldine 1980) and Rae Loch (1.2 above). The pollen in the Cleaven Dyke profiles could therefore be of post-elm decline age-a time by which much of the primary elm-oak woodland would have been cleared for agriculture. Any abandonment or reduction in intensity of use of cleared areas would permit colonisation by birch and hazel. This process would be consistent with a date younger than c 5100 BP (3800 cal BC) for the soil pollen assemblages and thus also consistent with the suggestion that the Dyke in this area was possibly constructed within the period of the late 5th to mid/late 4th millennium cal BC (3.1 below).
THE CLEAVEN DYKE - CONSTRUCTION AND DESIGN

"Not all human constructions are directed at posterity" (Bradley 1993, 98).

3.1 DATING THE CONSTRUCTION OF THE CLEAVEN DYKE

Two samples of wood charcoal from within the small area of burning beneath the Cleaven Dyke excavated in 1993 (F5) were identified by TG Holden and A Duffy. They noted that both samples were 100% oak (Quercus sp), the poor state of preservation of the charcoal implying that the wood was rotten before being charred.

The samples were submitted to the Glasgow University radiocarbon dating laboratory at the Scottish Universities Research and Reactor Centre. The determinations were 5500±120 BP (GU-3911) and 5550±130 BP (GU-3912). The calibrated ranges produced are, respectively, 4700-4000 cal BC and 4750-4000 cal BC.

The radiocarbon dates provide only a broad terminus post quem for the construction of the bank: can we tie down the date of construction more closely? There are two variables: the oak wood used for dating was already rotten when turned to charcoal, and some time passed between the fire and the construction of the bank. For the first variable, old oak heartwood, perhaps collected for use as a form of tinder, might have ceased to exchange carbon with the atmosphere (the event the radiocarbon method would age) some very considerable time before it was burned—perhaps up to 400 years (the limit normal for unpollarded English oak) or even more (up to 800 years in modern pollarded oaks) (Rackham 1990, 10-16; Ashmore pers comm). This assessment supersedes that published in the interim account (Barclay et al 1995). For the second variable, Simpson and Davidson took and examined a soil micromorphological sample (sample M7, 2.4 above); they suggest that the fire pre-dates the formation of the monument by a few decades to a few centuries. This assessment supersedes the published interim statement that the period was 'c 60-150 years' (Barclay et al 1995). Therefore, it would be reasonable to suggest that the event dated by the radiocarbon method probably occurred somewhere between 200 and 800 years before the bank of the Cleaven Dyke was built at this point. The date range quoted in the interim publication was probably therefore too sanguine. We would be wiser perhaps to suggest a date range tied down no more closely than late 5th to mid/late 4th millennium cal BC. If the Dyke was built in segments over a prolonged period, then the dated bank-segment might also be considerably later than the segments some distance to the NW.

3.2 MENSURATION AND DESIGN

As already observed, for a monument which displays such marked variation of structural detail, the Cleaven Dyke adheres overall to a single alignment with considerable tenacity. This latter characteristic is doubtless what persuaded scholars in the past to believe that its originators could have been none other than the legions of Rome. The 2085m-long line that can be drawn between the Dyke's SE terminal and the point at which it springs from the tail of the original composite long barrow passes very close to the mid-points of each of the breaks that separate the five main Sections of the central bank. Between those breaks, however, the course of the bank and flanking ditches may deviate by as much as 10° from the overall alignment, while the cross-dimension of each structural element may vary by as much as 50%. Clearly, to take account of so much local variation, the builders of the Dyke must surely have had a reliable means of setting out and adhering to a long-term strategy of construction.

Accordingly, any occurrence of a regular dimensional pattern in the surviving remains requires to be investigated carefully, not only as possible evidence of the original design or construction process, but also as an indication of the Dyke's purpose and function.
The most obvious pattern, evident throughout, is the dimensional relationship between the central bank, the ditches, and the intervening berms—a pattern which is modified only by the increasing degree of irregularity in the SE Sections. In general, however, and taking Section A as a model, the originally planned width of the bank appears to have been around half that of either berm and twice that of each ditch. Comparable proportional relationships may be seen among early Neolithic structures elsewhere in Britain; for example, the long barrows with widely-spaced ditches in southern England, where the excavated sites of Nutbane, Wayland’s Smithy (Atkinson 1965), and West Kennet (Piggott 1962) command particular attention, since they display a maximum between-ditch width close to that of the Cleaven Dyke (45-8m).

With evidence of this kind relating to its cross-section, it would not be unreasonable to expect that a similar care had been taken in the design of the Dyke’s longitudinal construction. However, despite our certainty that the monument was built in Sections and segments from NW to SE, the variation in the spacing of segment-boundaries tentatively identified in the upstanding remains of the central bank might lead one to believe that the accumulative growth-pattern was irregular. On the other hand, the spatial relationship between the five major Sections A-E displays a clear pattern. Measured between the estimated terminals of the ditched portions of the monument (the Dyke proper), the lengths of the five Sections are: A=848.5m; B=375m; C=289.5m; D=187.5m; E=c 375m (shown divided into segment lengths in table 7).

The measurement of Section E is to the last visible appearance of the southern ditch, and is necessarily an approximation. The most immediately obvious elements in the pattern are that B and E may be the same length, and B is, and E may be, twice as long as D; but it is also true that the combined lengths of B, C and D, and C, D and E, amount to 852m—very close the length of Section A. Given the room for error in lineal measurement (in modern as well as ancient times), the close agreement of these fractions and combinations seems significant. While the mathematical relationships of these figures indicate a highest common factor of 94.3, which in structural terms could be taken to imply a design module of around 94m, this does not sit easily with the measured lengths of identified segments.

Scarcity of comparative material makes it difficult to determine if the dimensional patterns which may be observed in the lengths of the Dyke’s major Sections are exceptional. However, there is some evidence that analogous structures—specifically pit-defined cursus monuments (see Brophy 6.1 below)—may also occasionally exhibit regular internal subdivision. At Milton of Guthrie, Angus, for example, a total length of c 580m is broken by septal pit-lines into two adjacent pairs of sections, the first each of c 110m, and the second of c 180m; on a much smaller scale, the pit-defined Neolithic enclosure of Dougalsmuir is divided by a similar septal line into two equal lengths of c 32m.

Although it is possible that, within each Section of the Dyke, similar regular subdivision may exist, in general the evidence for this is not sufficiently explicit. The exceptions are nevertheless worth noting: for example, segment-boundary A8, very close to the mid-point of Section A, marks the place at which the north face of the central bank becomes more rectilinear, conspicuously distinguishing it from the more variably-aligned NW portion. Similarly, segment-boundary B3, situated half way between Section-breaks W and X, marks the point at which the overall character of Section B is significantly changed, not only in the degree of irregularity of the

### Table 7

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<th>Segment</th>
<th>Length</th>
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<tr>
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</tr>
<tr>
<td>A2-A3</td>
<td>25 m</td>
<td>Narrow</td>
</tr>
<tr>
<td>A3-A4</td>
<td>88 m</td>
<td>Broad</td>
</tr>
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<td>A4-A5</td>
<td>107 m</td>
<td>Narrow</td>
</tr>
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<td>Narrow</td>
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<tr>
<td>Gap W-B1</td>
<td>45 m+</td>
<td>Narrow</td>
</tr>
<tr>
<td>B1-B2</td>
<td>68 m</td>
<td>Broad</td>
</tr>
<tr>
<td>B2-B3</td>
<td>80 m</td>
<td>Broad</td>
</tr>
<tr>
<td>B3-B4</td>
<td>31 m</td>
<td>Narrow</td>
</tr>
<tr>
<td>B4-B5</td>
<td>94 m</td>
<td>Broad</td>
</tr>
<tr>
<td>B5-Gap X</td>
<td>45 m</td>
<td>Broad</td>
</tr>
<tr>
<td>Gap X-C1</td>
<td>40 m</td>
<td>Narrow</td>
</tr>
<tr>
<td>C1-C2</td>
<td>42 m</td>
<td>Narrow</td>
</tr>
<tr>
<td>C2-C3</td>
<td>72 m</td>
<td>Narrow</td>
</tr>
<tr>
<td>C3-C4</td>
<td>27 m</td>
<td>Narrow</td>
</tr>
<tr>
<td>C4-Gap Y</td>
<td>88 m</td>
<td>Narrow with Broad terminal</td>
</tr>
<tr>
<td>Gap Y-D1</td>
<td>77 m</td>
<td>Broad</td>
</tr>
<tr>
<td>D1-D2</td>
<td>70 m</td>
<td>Narrow</td>
</tr>
<tr>
<td>D2-Gap Z</td>
<td>28 m</td>
<td>Narrow</td>
</tr>
</tbody>
</table>

**Table 7**

Lengths of Sections and segments of the Cleaven Dyke
bank-line, but also, and more obviously, in the width of the space between the ditches: to the NW the latter measures 43m to 46m, while to the SE it varies between 42m and 43m. That this indicates a significant structural boundary cannot be doubted; coincidentally, B3 also lies very close to what must be reckoned the mid-point of the Dyke proper.

At this point we should remind ourselves that the average between-ditch width of the Dyke varies from Section to Section. It is at a maximum in Section A, where it ranges from 46m to 48m; in the two halves of B, as we have just noted, the respective measurements are 2m and 4m less; and in Sections C and D, where a much greater irregularity prevails, the measurement is a uniform minimum of 40-42m. The eroded state of the monument in Section E makes assessment difficult, but the width here is unlikely to be much, if at all, greater than that in D. It will be observed that the consistent decrease in width as one proceeds eastwards along the Dyke accords well with the evidence that different, perhaps less rigorous, standards of construction were being applied to the project in the SE portion.

**QUESTIONS OF ALIGNMENT**

It remains to discuss two further design features, the first of which appears to be closely associated with segmental or sectional construction: the occurrence of changes in alignment of the bank at or near structural boundaries. The most obvious example, already described, is provided by the long barrow element of the composite barrow at the NW terminal of the Dyke, which manifests within its structure a perceptible and complex alteration of axis; this, we suggest, is of the nature of architectural features and quite distinct from the adjacent re-alignments of the Dyke as a whole at A1 and A3. The re-alignment of the terminals of Sections B and C on either side of Section-break X, however, invites a different interpretation; the situation, where the two terminals re-align on each other by means of a diversion of the central bank to the south, is replicated at the rear of the Dyke proper: the smaller re-alignment which we have described and quite distinct from the adjacent re-alignments of the Dyke as a whole at A1 and A3. The re-alignment of the terminals of Sections B and C on either side of Section-break X, however, invites a different interpretation; the situation, where the two terminals re-align on each other by means of a divergence of the central bank to the south, is replicated in miniature at segment-boundary A4, although the diversion in that case is to the north. At Section-break Y, the feature is evident only in the terminal of D, which bends sharply north on the SE side of the gap.

Such re-alignments, whether single or paired, might be explained (as in other complex angle-changes of Dyke elements) as local adjustments to accommodate slight differences in alignment between segments being constructed simultaneously; however, the evidence of the single excavated segment-boundary (A10: see 2.3 above) is that one segment was finished off neatly before the next was added onto it. Additionally, the frequent coincidence of this feature with various types of terminal suggests that this might have been a deliberate feature of the design. Changes in alignment at the proximal or distal ends of long cairns or barrows are sufficiently well-attested (see Brophy 6.2 below) to allow us to reject the suggestion that they are the result of either slipshod construction or widely separated phases of building. On the Dyke such terminal re-alignments seem to assume the status of structural colophons—localised devices to indicate the end (or beginning) of a building sector. The comparable angle-change at the terminals of certain Scottish bank barrows is commented on below (Brophy 6.2). It may be that the oblique angle of the terminal of some ditch- and pit-defined cursus monuments (Loveday’s (1985) terminal types Bii and Biii; Brophy 6.1 below) may represent a comparable feature; this arrangement can be seen in three of the pit-defined structures in the same area (Balneaves, Inchbare 2, and Milton of Guthrie) and a similar feature is visible at the SE and SW ends respectively of the ditch cursus sites at Powis and Blairhall. This seems to reflect the familiar Neolithic preoccupation with the proximal or distal ends of long funerary monuments, often involving the construction of façades, portals, and approach-works.

The final design element with which we are concerned is the Dyke’s orientation, that is, its overall alignment. The localised divergences, particularly in the long barrow to the NW of A1, before the cursus form was established, seem to us less open to explanation than that of the long, main alignment. We note below that, in terms of local topography, the Dyke aligns on the rounded summit of the unnamed hill (labelled ‘Hill of Lethendy’ in Pitts and St Joseph’s (1985) excavation report on Inchtuthil) forming the skyline above Gourdie on the NW, and to terminate in the SE on the crest of a sinuous hill rising only a few metres above the level of the Meikleour plateau; this orientation maximises the area of the plateau’s level ground available for the construction of a linear monument. The same bearing (c 120° south of true North) if prolonged across the wide valley of Strathmore to the distant skyline, would bisect the cloven summit of Northballo Hill. Given that neither the Hill of Lethendy nor Northballo Hill are prominent on their respective horizons, neither alignment seems likely to be significant. We know (Ruggles 3.3 below) that there is no astronomical significance in the alignment.
POSSIBLE BARROWS WITHIN THE BANK

The Dorset cursus, as is well-known, incorporates two long barrows within its fabric (Tilley 1994, 172). At first sight it is possible to suggest that three burial mounds, or features intended to mimic them, may have been built into the Dyke: firstly the oval mound (1) at the NW terminal, and secondly the long mound (2) extending SE from (1) for a length of c. 83m. In support of this arrangement of features it can be noted that no cursus-type ditch can be seen to accompany the oval mound or most of the length of the long mound. It could be argued that the two founding monuments were classic examples of their kind—a typical Perthshire Neolithic round/oval barrow (cf Pitnacre; Coles & Simpson 1965), with a long barrow attached, the defining ditches probably having lain parallel to the bank at each side (see 2.1 above). In this interpretation, the cursus/bank barrow proper, with its distant flanking ditches, does not commence until the end of the long mound at segment boundary A1. It must be noted that the defining ditches detected by Adamson are not deep enough to have provided all the material necessary for the construction of the long mound, which is unusually massive at the NW terminal.

The third possible barrow incorporated into the Dyke is the SE 88m of Section C, which may have been intended to mimic the NW terminal, and may in itself be bipartite, with an ‘original’ oval mound as its SE terminal. Such an interpretation raises the possibility of the feature also having been, in some form, free-standing, which might explain the mismatch of alignment at segment-boundary C4. The matter is further examined below (7.1), but the same degree of separate existence might account for the 18m terminal ‘dog-leg’ of the southern ditch, which structurally parallels the defining ditches of the long barrow at the NW end.

3.3 THE POSSIBLE ASTRONOMICAL ALIGNMENT OF THE CLEAVEN DYKE

Clive Ruggles

On 21 August, 1997 the Cleaven Dyke was examined in the light of the following hypothesis, which had been supplied by Gordon Maxwell:

‘If the Dyke was aligned (to the SE) on the rising sun, Northballo Hill would approximate to the sun’s azimuth and altitude in 3500 BC at dawn on either 27 November or 25 May. The former would approximate to the Neolithic equivalent of the quarter day more recently known as All Hallows (1 November). The implications of such a date, with its association for Celtic peoples, if not their predecessors, with the Festival of the Dead and the beginning of the New Year, could be of considerable importance in our attempts to uncover the original purpose of the monument.’

Estimates of horizon azimuths and altitudes were obtained by a combination of two methods: survey using prismatic compass and clinometer (cf Ruggles forthcoming a, Appendix I); and calculation from large-scale maps and plans. [Note: the term ‘elevation’ is used here to mean the height of a location above sea level, while ‘altitude’ is used to mean the vertical angle between a viewed point and the horizontal plane through the observer.] The former method is prone to error for determining azimuths because of uncertainties in the magnetic correction; the latter is prone to error for determining altitudes where the elevations of certain locations cannot be determined with sufficient precision. However, comparisons between compass readings and calculations from map data indicate that compass readings consistently gave magnetic North between 5°.5 and 6°.5 to the west of true North, while map estimations of altitudes were always within 0°.2 of the measured reading. Hence it is considered that the quoted azimuths and declinations should certainly be accurate to the nearest degree, and altitudes to the nearest 0°.2. Declinations are quoted, and should be reliable, to the nearest half-degree.

Although partly obscured by local vegetation, direct observations of the horizon to the SE were possible from the presumed SE terminal and from points to the NW towards Section boundary Z; while the NW horizon was generally visible from points in Section A of the monument. Part of the latter was also visible from points c. 200m to the SE of the SE terminal, in line with the monument. Otherwise, these horizons were completely obscured by the woodland in which the central part of the Dyke is located.

In order to demonstrate the range of possibilities, four key points on the Dyke were considered: the junction of the oval and long mounds at the NW terminal;
It is evident upon visiting the monument that the Cleaven Dyke is roughly aligned with hilltops in both directions. To the NW is a low rounded hill, c 3km from the NW terminal. It is in line with the SE part of segment A at an azimuth of roughly 300°, although the part to the NW of segment-boundary A3 is aligned some 3°.5 further to the left. To the SE is Northballo Hill, a rather more distinctive hill, 9km from the SE terminal, as mentioned above. In aligning upon hills, the Cleaven Dyke is similar to many cursus monuments around Britain, including a number in the Upper Thames Valley (Ruggles forthcoming b), and it does not seem unreasonable to suggest that such alignments may have had a symbolic significance (cf Ruggles & Burl 1985, 45-50; Tilley 1996, 169), or, alternatively, hills may simply have been used as sighting devices in laying out the monuments.

The question of symbolic astronomy is important because alignments upon the regular motions of heavenly bodies such as the sun and moon may reflect efforts to 'ally [the monuments] with the workings of nature itself' in an attempt, perhaps, to place their operation beyond challenge (Bradley 1993, 62; Bradley & Chambers 1988, 274). It may even reveal something of world-view (Ruggles forthcoming a, ch. 9). The astronomical potential of, say, a point on the horizon, is determined by combining its azimuth and altitude with the latitude of the observer to obtain the declination (latitude on the celestial sphere), from which it is possible to deduce the heavenly bodies that would have risen or set there at a particular time.

As can be seen from table 9, the declination of the summit of Northballo Hill is about −13°.5 as viewed from the SE end of the monument, decreasing to about −14°.5 when

<table>
<thead>
<tr>
<th>Location</th>
<th>NGE</th>
<th>NGN</th>
<th>Elev. (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Benachally (summit)</td>
<td>30622</td>
<td>74916</td>
<td>487</td>
</tr>
<tr>
<td>Hill to NW (summit)</td>
<td>31305</td>
<td>74247</td>
<td>153</td>
</tr>
<tr>
<td>Segment boundary A0 (oval mound/long mound)</td>
<td>31567</td>
<td>74087</td>
<td>45 – 50</td>
</tr>
<tr>
<td>Segment boundary A3 (marked change in direction)</td>
<td>31582</td>
<td>74079</td>
<td>45 – 50</td>
</tr>
<tr>
<td>Gap Z, by end of extant bank</td>
<td>31722</td>
<td>73998</td>
<td>49</td>
</tr>
<tr>
<td>SE end*</td>
<td>31756</td>
<td>73978</td>
<td>50 – 55</td>
</tr>
<tr>
<td>Northballo Hill (summit)</td>
<td>3254</td>
<td>7354</td>
<td>314</td>
</tr>
</tbody>
</table>

*This position on the ground was determined with the aid of G J Barclay and G S Maxwell

Table 8
Location data for the astronomical analysis. National Grid eastings and northings are given in all-figure form.
(Segment boundary AO = NW terminal; Gap Z = Section boundary Z.)

to suggest

above.

segment-boundary A3, c 80m to the SE, where there is a pronounced change in direction of c 3°.5; Section boundary Z, c 300m from the SE end; and the SE end itself. The relevant location data are presented in table 8 and the relevant alignment data are presented in table 9.

An 'M' in the final column indicates that the data given were deduced from map data (figures given in table 1) only. In all other cases, survey and map data were cross-checked and combined.

Table 9
Alignment data for the astronomical analysis. Azimuths are quoted to 0.5°, altitudes to 0.2°, and declinations to 0.5°.
(AO = NW terminal; Gap Z = Section boundary Z.)
viewed from the further, NW, end. The latter corresponded, in Neolithic times, to sunrise on about 30 October or 10 February in the Gregorian calendar, and the former to sunrise on about 27 October or 13 February (Ruggles forthcoming a, Box Ast 5), so that the centre of the sun would rise behind the summit of the hill on about these days. To the right, Northballo Hill falls steeply away to a junction with another hill; a more distant peak is visible in the gap, forming a prominent double notch. This yields declinations about 1° lower, so that as viewed from the SE end, the sun would have risen in this gap on 1 November.

While the autumn dates are close to 1 November, it is extrapolating far beyond the available evidence to conclude that the monument was deliberately aligned upon the rising sun on a Neolithic precursor to All Hallows. First, around half of the horizon corresponds to sunrise or sunset on some day of the year. Furthermore, there is very little evidence to support the idea that a calendar involving eight-fold divisions of the year was in use during the Neolithic and Bronze Age, mimicking (or perhaps even being a direct precursor of) a later Celtic calendar (Ruggles forthcoming a, Chap 8).

Similarly, the summit of the hill to the NW at 3° 131 '425 yields a declination of +17°.5 from the nearer end of the cursus and +16°.5 from the farther (SE) end, corresponding to sunset on the Gregorian dates of 5 August/10 May and 8 August/7 May respectively.

It is of some relevance to note that from the vicinity of its NW end a prominent hill is clearly visible a mere 10° to the right of the low rounded hill upon which the cursus is apparently aligned. This is Benachally, at a distance of c 12.5km. Interestingly, the summit of Benachally yields a declination of +22°.5 from this terminus (see table 9), a value not far short of the solstitial limit of around +24°, indicating that the sun would have set behind the right-hand slopes of this hill for some three weeks on either side of the solstice. If astronomical orientation really was important it is hard to conceive that such an obvious alignment, with solstitial sunset coinciding with a prominent hill, would have been shunned. Indeed, while the orientation seems to have been constrained by topographic factors (dry gullies within 100m to the NE and SW at different points restrict the width of the plateau on which the Dyke is built), it would certainly have been possible to construct the monument with an orientation a mere 10° different from that used, and keep it on flat ground.

Our conclusion, then, must be that at this cursus at least, there is no obvious astronomical orientation and the possibility of combining a solstitial orientation with an alignment upon a prominent hill was passed over. This perhaps seems curious in view of the arguments—now increasingly commonplace—that those who constructed these monuments did so with regard to their orientation upon specific astronomical events, and in particular sunrise and sunset at the solstices and equinoxes (Ruggles forthcoming a, Chap 8). On the face of it, such arguments seem to be weakened by the wider evidence. Certainly, other factors seem to have been operating at the Cleaven Dyke.

3.4 ESTIMATING THE LABOUR REQUIRED TO BUILD THE CLEAVEN DYKE

Bill Startin

The calculation of labour input is by no means an exact science; the following provides an order of magnitude for the input, no more. The methodology used is that set out for the Neolithic enclosure at Abingdon (Startin 1982).

The bank section has an approximate cross-sectional area of 9m². The excavated ditch section, making allowance for the original contour of the ground, has a cross-sectional area of just over 4m² (an estimate of 4.14m² has been used for the calculations below). Allowing for an expansion factor of 13/12 for excavated material, and for two ditches of roughly the same size, the bank and the ditches appear roughly to match, implying that there is no need to account for material brought in from elsewhere.

Given the distance over which the material has to be carried (a little less than 25m), two people excavating at 0.7m³ per hour could be served by one basket-carrier. The labour per linear metre would therefore be (4.14 x 2 x 1) / 0.7; multiply by 3 to estimate person-hours = 35.5 person-hours (3 people working for just under 12 hours). The length of segment A10-A11 is about 25m, thus 887 person-hours. Segment A12-A13 is c 103m long, thus 3655 person-hours (i.e. the equivalent of 4 teams of 3 for 30 days at around 10 hours a day). These figures do not take account of dealing with turf, nor of the variation in the cross-section of the bank of the Cleaven Dyke, but they do give an impression of the scale of the undertaking. Accepting that any figure for the whole of the Dyke can be no more than a gross estimate derived from the calculations of the labour required for individual segments, we can suggest that a monument 2000m long would have taken in the region of 60,000 to 80,000 person-hours to build.
4

EXCAVATION AT LITTLEOUR

4.1 BACKGROUND

The Littleour site was located some 250m to the NE of the Cleaven Dyke at its nearest point (roughly Section boundary Z), located on a bench of fluvio-glacial material at the same height as the Dyke, but separated from it by a shallow dry valley.

The feature at Littleour, as recorded by RCAHMS aerial photography (RCAHMS 1994a), appeared before excavation to be a structure comprising two slightly diverging lines of pits, with its east end closed off by two further pits, giving the impression of a curved end (illus 3). Six pairs of posts forming the sides of the structure are visible on the aerial photograph. One axial pit was noted just to the west of the second pair from the east end. We believed we could see on some aerial photographs a possible matching axial pit and matching curved end faintly represented at the west end, and the preliminary results of geophysical survey provided some support for this observation.

Illus 41
A 'Hi-spy' photograph of the Littleour structure close to the end of the excavation in 1996.
(Crown Copyright: RCAHMS)
The excavation of the site at Littleour (NO 1734 4024) was undertaken in the hope that it might reflect aspects of domestic life broadly contemporary with the construction and use of the Dyke. Specifically, it was hoped that the cropmark might be of a roofed building on the same scale as that at Balbridie, Kincardineshire (Fairweather & Ralston 1993).

In 1995 we undertook a reconnaissance excavation of the cropmark feature at Littleour, exposing the east end of the structure: eight of the boundary postholes and the massive axial pit (L9). At the end of the season we believed we might indeed be dealing with a massive ridged building (Barclay & Maxwell 1995). In 1996 the whole area of the structure was exposed, revealing the shape of the enclosure and that there was no second axial posthole. To distinguish the Littleour excavation from the Cleaven Dyke in the record its features are distinguished below by the prefix ‘L’.

4.2 RESULTS OF EXCAVATION

THE MAIN STRUCTURE

The structure as finally revealed consisted of two broadly parallel lines of pits, 22m long and between 7m (at the east end) and 8m (at the west end) apart (illus 41; 42). There are eight postholes on each side. Both ends are formed by a pair of postholes. The distance between all the postholes varies between 2.5m and 3m. The two sides bend slightly north at their mid-point. Of the 20 postholes, seven were fully excavated in the first season, and seven half-sectioned in the second. All were found to be simple single-phase postholes with more or less clear postpipes (illus 43; 44). The timbers in the holes varied between c. 0.7m and 1.1m in diameter. The postholes varied between 0.65m x 0.75m and 1.15m x 1.2m across, and between 0.64m and 1.05m deep below the adjacent subsoil (illus 43). However, the contour survey of the subsoil confirmed that the surface from which we were measuring their depth was far from even (illus 45).

Fourteen of the boundary postholes were excavated in the two seasons (see table 10 below and illus 43). All showed the characteristics of postholes where the post, fairly large in each case, had rotted in situ. Burnt material in varying quantities was found in all the postpipes, implying the presence of burnt material on the surface during post rotting. The postholes were deep (usually c. 1m) and relatively narrow, little larger than the large posts they held. We would suggest that the size of the timbers and the depth and narrowness of the postholes would have given them great stability.

Samples from two of the postholes gave dates of 3030-2660 cal BC (feature L3, AA-19620) and 3510-3108 cal BC (feature L11, GU-4827).
RESULTS OF EXCAVATION AT LITTLEOUR

Illus 43
Section drawings of the excavated postholes in the boundary of the Littleour structure.
Illus 44
Littleour: posthole L15 before excavation showing the very clearly-defined postpipe.

Illus 45
Contour plan of the cleaned subsoil surface at Littleour.
<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
<th>Size</th>
<th>Depth</th>
</tr>
</thead>
<tbody>
<tr>
<td>L1</td>
<td>Posthole of structure. N wall.</td>
<td>75x65cm</td>
<td>66cm</td>
</tr>
<tr>
<td>L2</td>
<td>Posthole of structure. N wall.</td>
<td>90x78cm</td>
<td>75cm</td>
</tr>
<tr>
<td>L3</td>
<td>Posthole of structure. N wall.</td>
<td>70x75cm</td>
<td>77cm</td>
</tr>
<tr>
<td>L4</td>
<td>Posthole of structure. E end.</td>
<td>70x75cm</td>
<td>64cm</td>
</tr>
<tr>
<td>L5</td>
<td>Posthole of structure. E end.</td>
<td>80x75cm</td>
<td>91cm</td>
</tr>
<tr>
<td>L6</td>
<td>Posthole of structure. S wall.</td>
<td>90x90cm</td>
<td>80cm</td>
</tr>
<tr>
<td>L7</td>
<td>Posthole of structure. S wall.</td>
<td>80x80cm</td>
<td>50cm</td>
</tr>
<tr>
<td>L8</td>
<td>Posthole of structure. S wall - not excavated.</td>
<td>80x??cm</td>
<td>not exc.</td>
</tr>
<tr>
<td>L9</td>
<td>Major pit on axis of structure.</td>
<td>1.75x1.7m</td>
<td>65cm</td>
</tr>
<tr>
<td>L10</td>
<td>Possible pit to NE of structure.</td>
<td>1.15x1.2m</td>
<td>1.05m</td>
</tr>
<tr>
<td>L11</td>
<td>Posthole of structure. S wall.</td>
<td>1.1x1m</td>
<td>not exc.</td>
</tr>
<tr>
<td>L12</td>
<td>Posthole of structure. S wall.</td>
<td>80x80cm</td>
<td>80cm</td>
</tr>
<tr>
<td>L13</td>
<td>Posthole of structure. S wall.</td>
<td>90x90cm</td>
<td>not exc.</td>
</tr>
<tr>
<td>L14</td>
<td>Posthole of structure. S wall.</td>
<td>95x105cm</td>
<td>82cm</td>
</tr>
<tr>
<td>L15</td>
<td>Posthole of structure. W end.</td>
<td>90x85cm</td>
<td>70cm</td>
</tr>
<tr>
<td>L16</td>
<td>Posthole of structure. W end.</td>
<td>70x70cm</td>
<td>48cm</td>
</tr>
<tr>
<td>L17</td>
<td>Posthole outside W end.</td>
<td>85x95cm</td>
<td>88cm</td>
</tr>
<tr>
<td>L18</td>
<td>Posthole of structure. W end.</td>
<td>80x85cm</td>
<td>80cm</td>
</tr>
<tr>
<td>L19</td>
<td>Posthole of structure. N side.</td>
<td>75x75cm</td>
<td>not exc.</td>
</tr>
<tr>
<td>L20</td>
<td>Posthole of structure. N side.</td>
<td>80x85cm</td>
<td>not exc.</td>
</tr>
<tr>
<td>L21</td>
<td>Posthole of structure. N side.</td>
<td>105x78cm</td>
<td>84cm</td>
</tr>
<tr>
<td>L22</td>
<td>Posthole of structure. N side.</td>
<td>60x65cm</td>
<td>30cm</td>
</tr>
<tr>
<td>L23</td>
<td>Pit containing pottery and flint.</td>
<td>75x75cm</td>
<td>not exc.</td>
</tr>
</tbody>
</table>

Table 10
Dimensions of postholes and pits of, and associated with, the Littleour structure.

Illus 46
Section drawings of pits and postholes at Littleour: the axial posthole (L9), the pit containing Grooved Ware and flint (L23) and the two pits outside the structure (L10 and L17).
PIT L9

Pit L9 was more complex (illus 46; 47); it was massive, measuring 1.75m x 1.7m and 0.65m deep, containing two groups of fills. The first were clean gravel primary fills, surviving at the base and sides, particularly on the east; the edge of these soils was steep at the east and at a much shallower angle to the west. Within and above the primary fills were fills showing varying effects or traces of burning, including charcoal-stained soils, charcoal masses and fire-reddened soils in situ.

Excavation of the feature allowed the following interpretation. First, a post, c 0.6m in diameter, was set in the pit, packed into place with clean gravels. It is possible that the post fell or was extracted. During this process, or later, burnt or burning material found its way into the pit. This may be interpreted as the result of a major timber being displaced during a fire, or the disturbance of the pit after a fire, or a combination of both. A date of 3650-3100 cal BC (GU-4379) was obtained from charcoal in the pit.

FEATURES L10 AND L17

Immediately outside the west end of the structure, some 2.5m to the south of the axis, was a further posthole (L17), measuring 0.7m x 0.7m x 0.48m deep from which two radiocarbon dates were obtained from charcoal found in the postpipe: 2460-1890 cal BC (GU-4829) for a piece of unabraded oak roundwood, and 2140-1880 cal BC (AA-22907) for a fragment of pine. In a similar location to the NE of the structure a further, but far shallower, feature was located (L10). It measured 0.8m x 0.55m x 0.17m deep. Its fills may be those of a truncated posthole, but it is impossible to tell.

PIT L23

Within the enclosure c 1m SSE of posthole L23 was a circular pit, L23 (illus 42; 46; 48). The pit was 0.73m x 0.64m x 0.3m deep. It contained a single homogeneous fill of brown loamy soil. Within this fill, but not touching bottom or sides, were found numerous sherds of pottery and ten flints. The pottery comprises the remains of eight or nine Grooved Ware vessels. The flint includes three large retouched pieces in high quality, translucent, dark grey flint. In addition a pebble of micaceous schist, rounded at one end and pointed at the other, was recovered during the flotation of a soil sample. The pebble (find no 54) measured 33mm x 23mm x 19mm and the point seemed unlikely to be a natural shape—the pointed end in particular seemed to have been shaped by human action (identification and comment by British Geological Survey). A date of 2350-2030 cal BC (AA-22906) was obtained from a fragment of birch charcoal in the pit.

A programme of wet-sieving and flotation recovered some carbonised seeds, which were identified by Ruth Pelling and Ciara Clarke. The results of their work are summarised in table 11.

<table>
<thead>
<tr>
<th>Feature</th>
<th>L2</th>
<th>L6</th>
<th>L23</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cerealia indeterminate</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>cf. Fruit indeterminate</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Plantago lanceolata</td>
<td>2</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Corylus avellana L fragments</td>
<td></td>
<td>141</td>
<td></td>
</tr>
<tr>
<td>Malus sylvestris Miller</td>
<td></td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>cf. Malus sylvestris Miller ef.</td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>endocarp</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Avena sp.</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weed indet.</td>
<td>2</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 11

Summary of the nature and location of carbonised macroplant remains from Littleour.

DATING

Six samples were submitted for radiocarbon dating (table 12), after identification of the samples by Michael Cressey. Two were large enough, after cleaning and identification, for conventional radiocarbon dating at the Glasgow University dating laboratory at the Scottish Universities Research and Reactor Centre. The others could only be dated by AMS, at the University of Arizona. Two were samples from postholes of the boundary of the structure (L3, L11), two were from a posthole (L17) just outside the west end of the enclosure, one was from the major axial posthole (L9), and the last from the small pit that contained the Grooved Ware and the exceptional flint.
Table 12
Radiocarbon determinations from Littleour.
4.3 THE NATURE AND DATE OF THE LITTLEOUR MONUMENT

A ROOFED STRUCTURE?

When the authors first considered excavating the Littleour structure, we thought that it might represent a building comparable in scale, if not in structural detail, with Balbridie (illus 96 below); if it were also broadly contemporary, then it might represent a building of the period of the Dyke, perhaps even part of a domestic site. At the end of the first season this possibility seemed quite strong, as the vague indications on aerial photographs and geophysical surveys hinted at the presence of a second axial posthole near the west end. That second posthole, however, did not exist.

It seems unlikely to us that the Littleour structure, even if all its surviving different elements were contemporary, could be roofed, unless there are significant elements that have not survived. We would suggest that this is improbable—the structural elements that do survive are on a massive scale. It might be more likely that any internal settings would be on the same scale. The plans of roofed structures of the Neolithic are discussed below (7.5).

David Hogg, who analysed the Balfarg Riding School structures (Barclay & Russell-White 1983), was invited to comment on the likelihood of the Littleour structure being a roofed building. His observations are as follows:

'[Almost] anything could be a roofed building. This pattern of postholes could represent a building, where the rafters would rest on the opposed pairs of wall; the span for a pitched roof is reasonable and member sizes would not be great. My objections, however, are as follows:

1 The alignment of post group L6 to L15: if this is a building, either the ridge line would not be straight, the roof pitch would vary or the wallhead height would vary. This could be accommodated but would not be desirable for ease and efficiency of construction.

2 Spacing of 3m between posts: if this reflects the rafter spacing, the span carrying wet thatch and wind load gets rather large. There could be a massive wallhead beam supporting rafters at closer centres, but this would require three member jointing and four member jointing at one point; the curve on line L6-L15 would make the joinery unnecessarily difficult.

3 Misalignment of pairs of posts across the axis of the building, carrying assumed roof timbers: once again not a serious objection but an easily avoidable source of awkwardness.

4 Presence of L9: this is patently not necessary to the structure of a building, or there would be one at the other end. It is conceivable that it could have been used to provide E-W stability for the first pair of rafters but this would be getting quite clever for builders who cannot set out a straight line.

All that this body of data shows is a set of vertical or near-vertical posts of indeterminate height; any speculation on further members is based on modern cultural assumptions or other bodies of data. If one looks for buildings, one will find them; the only evidence here shows a real or symbolic enclosure; therefore, while the eye, with its enthusiasms for pattern recognition sees this as a round-ended figure, it is just as valid as an E-W avenue with a pair of posts at either end.'

Given our own and Hogg's doubts we will leave reconstruction of a roofed building to more sanguine interpreters.

In considering the structure as unroofed, we must first consider whether the elements of the structure were contemporary. There are five distinct elements to be considered (the terminology used inevitably includes assumptions about function, which should be set on one side if possible):

1 The main setting: two lines, both of seven or eight posts, run broadly parallel for a distance of up to 19m. Both lines bend somewhat near their mid-point, the southern line in a much more pronounced way. The area defined by these two lines of posts (if contemporary) is closed by a setting of posts at both ends.

2 The large posthole L9: if the posts of (1) do form a setting, then the post in the posthole would have lain very close to the axis of the setting.

3 The small pit (L23) containing the pottery and flint.

4 The posthole (L17) near the west end of (1), and on the same sort of scale.

5 The small pit (L10) to the east of (1) but much shallower.

We can see that the radiocarbon determinations (table 12 above), at first sight, do not suggest that the various elements are contemporary. The oldest dates are for (2) L9 (GU-4379) and for one of the boundary postholes of
The nature of the main setting (1) suggests to us the erection of the posts over a relatively short time, the product, if not the intention, being a single coherent setting of posts. There is no evidence as to whether or not these posts were used to support a fence or were free-standing.

There is no evidence for the relationship of the axial post (2) to the main setting (1). The location of the post close to the main axis implies a considerable coincidence in the location of features of different dates, or that one element was erected in a clearly understood relationship to the other, at the same time, or one after the other, while the pre-existing element was still visible or marked in some way. The radiocarbon-dating of charcoal from the two elements does not actually help very much. The single determination from the axial pit L9 (GU-4379), which may date quite old wood (part of the massive post in the hole) provides a calibrated range of 3650-3100 BC. The range of determinations from charcoal postholes from the main setting is 3510-3108 (L11) and 3030-2660 (L3). The latter seems likely to be material finding its way into the postpipe; the former, from observations on site, has a greater chance of being the charred crust of the post burning in situ.

In this context the result of radiocarbon dating of elements of the mortuary structure at Street House, Cleveland (Vyner 1984, 184-5) is instructive. The dating of the central post of the façade (the largest timber on the site) produced radiocarbon determinations over 400 years earlier than other elements of the façade, which is certainly a single-phase structure; the calibrated ranges were 3990-3780 cal BC (BM-2061) for the central post, and a weighted calibrated mean of 3505-3100 cal BC for the other portions of the façade. The mortuary structure, taken to be part of same phase, has a weighted calibrated mean of 3610-3370 cal BC (all new calibrations). At Street House the older date was put down to the dating of older wood from the more massive post. If the situation at Littleour was analogous, then the latest date might provide the more accurate estimate for the date of construction.

Depending on how the charcoal from which the determinations were taken relates to events on site, a number of possibilities emerge:

1 The axial post was erected in the late 4th millennium cal BC; at around the same time the 'enclosure' was erected around it; or vice versa. Charcoal from a later episode of activity found its way into the postpipe of L3 (see Barber 1997, 139 for processes). The enclosure and posts pre-date the posthole L17 and the Grooved Ware pit L23 by around 1000 years. The relationship between the enclosure/axial post and the Grooved Ware is unclear; L23 may have been dug on a known site where little was visible.

2 The enclosure and post were erected in the early to mid 3rd millennium (taking the L3 date as the representative one, and taking the L1 and L9 determinations to be the product of dating pieces of heartwood; that is, the part of the trees that had stopped exchanging carbon with the atmosphere (the event the radiocarbon method would date) long before the trees were felled and used on the site. The enclosure and axial post are therefore less than 1000 years earlier than the deposition of the Grooved Ware in L23 and the episode dated by the charcoal in posthole L17.

3 All the features are broadly contemporary, but there is more than one period of burning on site. By a range of mechanisms (animal burrowing, worms) charcoal from these various episodes found its way into the postholes and pits, giving the impression of a diachronic construction of the enclosure and the other features. Accepting this explanation would require special pleading of a remarkable degree.

Of the three options the second seems to us the most probable.

The relationships of the posthole L17 and the pit L10 outside the main setting are not clear. The posthole is of the same order of magnitude, and had the same appearance, as those of the main setting. At first it seemed likely to be contemporary with the enclosure, acting as a free-standing post or even part of a complex offset entrance, designed to prevent direct visual access into the enclosed area. However, the radiocarbon determinations suggest that the charcoal, if not the feature that contained it, was considerably later than the enclosure.

The function, let alone the purpose, of the axial pit is unclear. The crest-line position of Littleour would have ensured the prominence in the landscape of any monument erected there, whether composed of one element or many.
THE ANALYSIS OF THE STRUCTURE

If, for a moment, we can accept that the Littleour timber enclosure and the axial post are of one phase, we can attempt an analysis. An early report (Barclay & Maxwell 1996) described the Littleour structure as having eight postholes in each side-wall, with two more at each end, the side-walls bending slightly north at their mid-point. However, as illustration 42 shows, the plan is more subtly complex: the easternmost post of the northern side-wall (L3) and the westernmost of the southern wall (L15) lie noticeably closer to the interior than the alignment of their adjacent wall-sector would demand; on the other hand, the opposite end-posts of each side-wall are not similarly displaced. The effect is to give the ends of the structure an offset, rounded appearance, and indeed the five postholes (L2-L6) at the east end, and their mirror-images (L14-L19) at the west, lie on or close to the arc of a circle marginally greater than the width of the building itself. This picture of reversed symmetry is also illustrated by the staggered positions of the flexing-points in each side-wall: at posthole L22 in the north side, but obliquely opposite at L11 in the south. The structure at Littleour thus may be more appropriately described as round-ended parallelogram.

Such a distortion, which is unlikely to have resulted from negligent laying-out, brings the axial pit L9 to occupy a more central position in the easternmost ‘bay’ of the enclosure. The Grooved Ware pit (L23) seems to straddle a line joining the centre posts of each side (L11, L22), but if this was achieved over a gap of 1000 years, it may merely be a coincidence, unless the elements of the earlier structure were clearly marked. The uniformly skewed geometry of the structure (which comprises four separate building modules—two equilateral parallelograms and two near-semicircular arcs) suggests that this was a building in which form took precedence over practicality, a possibility that is enhanced by the strict regularity of its post-spacing; perhaps the subtleties of the plan strengthen a non-domestic interpretation already suggested by the character of the items deposited, such a long time after, in pit L23. In this context, the nature of the massive timber erected in the axial pit may become clearer; its position and girth make it seem possible that it was a, or the, focus of significance on the site, recalling,

4.4 THE POTTERY FROM LITTLEOUR

Alison Sheridan

The ceramic assemblage from the small pit L23 comprised some 71 sherds (now reduced to 51 by refitting conjoining pieces) plus a few fragments, together with two lumps of probable daub, the whole weighing just over 1.6kg. An estimated eight, possibly nine, vessels are represented; all had been broken, and deposited incomplete in the pit. The relatively lightly weathered nature of the sherds' ancient fracture surfaces suggests that the pots had been broken shortly before deposition.

Most of the conjoins resulted from the inevitable fragmentation of the pottery during and after the recovery process, when it was still damp. However, a significant number of joins are between sherds found in different areas of and at different levels within the homogenous fill of L23.

THE POTS

Pot 1 (illus 49)

Pot 1 is represented by 18 (originally 23) pieces, constituting most of the base, around a third of the rim, and various parts of the body of a medium-coarse, flat-based, bucket-shaped pot, decorated over its exterior with a comb-impressed design. The estimated rim diameter is 200-210mm, and the base diameter is c.105mm; assuming a gently tapering body, the estimated height is c.225mm. Wall thickness varies from 9.3 to 13.4mm, and the maximum base thickness is 21mm.

The rim is slightly pointed and inturned, and has a low moulded bevel on its interior, the purpose of which may have been to aid the seating of a lid. Around 20mm below the rim is a single perforation, bored from the exterior of the fired pot inwards, and there are traces of a possible second hole on another rimsherd (with at least 60mm separating the two). Assuming that these were repair holes, this indicates that the pot was not new when deposited. The base is pedestalled, and its interior surface is slightly domed. Decoration extends over most of the exterior, and consists of impressions of one or more rectangular-toothed comb. of maximum length 27.5mm. No overall scheme can be reconstructed, although on the upper body at least 12 roughly roughly horizontal lines extend down from the rim, crossed in some areas by diagonal lines rising from L to R. The body sherds have decoration varying from horizontal lines (continuous and discontinuous) to diagonal lines and mixtures of the two, and towards the base there is one plain area, one area with discontinuous horizontal lines and another with L to R-falling diagonal lines. The exterior surface had been carefully smoothed prior to decoration, but probably not slipped.

The exterior is a mottled reddish-brown and orange-brown and the core is mid to dark grey. The interior is covered from base to rim with a blackish encrustation up to c.1.5mm thick in places, presumably representing the burnt residue of the pot's former contents. The clay is slightly micaceous, and inclusions comprise sand-sized grains and
sparse angular grits up to 3mm x 2.5mm in size, the latter (if not also the former) almost certainly added deliberately as temper. The grits include a white, quartzitic mineral.

Pot 2 (illus 50)
This vessel is represented by 16 (originally 25) pieces of a large, coarse pot. Unfortunately, the rim and base are represented by only two sherds (illus 50: 2a, 2b), the latter relatively small. The estimated rim diameter is around 240mm, and judging from the size and curvature of the body sherds, this would have been a large, probably bucket-shaped, pot taller than Pot 1, and with flaring walls. Wall thickness ranges from 11.8 to 17.3mm; maximum base thickness is 19mm.

The rim, which was probably slightly intumesced, has an internal moulded bevel, and its rounded top has diagonal slashed decoration. On its exterior is a band of shallow incised diagonal lines rising I. to It, and further down the body there are applied ribs, decorated with rough alternating indentations (illus 50: 2c). The ribs appear to run roughly vertically, but are not regularly spaced, and the area between the ribs appears to be undecorated, except on one sherd, where a line of diagonal ‘pinpricks’ may be decorative (illus 50: 2d. The alternative possibility that these may be a housing for a now-detached rib seems less likely, there being no other surface indications.) One of the body sherds appears to have a post-firing perforation, drilled into a barely perceptible rib (illus 50: 2e); if this was intended to repair a crack, then it implies that this pot, like Pot 1, was not new when deposited.

The exterior and interior surfaces had been covered with a micaceous self-slip prior to the pot’s decoration; subsequent finger smoothing marks are visible on the exterior. The exterior surface and outer part of the core is a rich, mottled red-brown colour, and the rest of the core and interior is a blackish-grey. Some of the body sherds have small patches of blackish encrustation on their interior surface. Inclusions consist mainly of fairly angular, sand-sized grains, but also include larger subangular and angular grits of several rock types (including the white mineral noted in Pot 1) up to 6mm x 6mm, some protruding from the surfaces; together they constitute around 5-10% of the body of the pot. There is also one impression of straw, and on the inside of the rim there is a globular depression, 6mm in diameter, which does not appear to be a grain impression.

Pot 3 (illus 51: 3)
This apparently consists of a single large rim-and-upper body sherd; there are other sherds in the Littleour assemblage which share the same ‘rusticated’ decorative motif, but these are insufficiently similar in thickness, colour and fabric to be attributable to this pot, and have therefore been allocated to Pots 4 and 5 (see below).

A large, medium-coarse pot is represented. The rim is intumesced, as in Pot 1, but is less pointed and lacks the internal bevel; its estimated diameter lies between 230mm and 270mm, and is probably around 240mm. The maximum wall thickness is 13.7mm; once more, a bucket-shaped pot may be represented.

Decoration is by loosely-twisted cord and by paired, scooped, thumbnail impressions (‘rustication’). The former occurs as four roughly horizontal lines on the outside of the rim, and a corresponding set inside the rim; the latter extends over the outside surface in an irregular ‘polka-dot’ arrangement. The surfaces had been smoothed carefully before decoration, but show no obvious signs of having been slipped. The exterior is a dark reddish-brown, grey towards the rim, and the core is blackish-grey. All of the interior surface is covered by a 1-2mm thick blackish encrustation.
Illus 50
Littleour: Grooved Ware Pot 2, from pit L23.
The clay is slightly micaceous, and inclusions comprise rounded and subangular sand-sized grains, plus sparse subangular grits up to 1.5mm x 1.5mm.

Pot 4 (illus 52: 4a, 4b)
This is represented solely by seven (originally eight) body sherds; enough survives to indicate that this was a large, fairly coarse vessel, with a body diameter of c 300mm at one point. Wall thickness varies from 12.5mm to 15.5mm. The largest sherd (illus 52: 4a) is decorated with an applied, slightly sloping rib, with scooped paired thumb impression on either side and extending onto it. Another sherd (illus 52: 4b) bears further nail impressions, this time single and simply stabbed into the clay. This sherd also has a hint of a horizontal rib; and the sherd’s thickness and curvature suggest that it may have belonged to the upper part of the body. The other body sherds are undecorated. A tentative overall scheme may therefore be proposed, featuring a band of simple nail decoration extending from the rim; a zone of ribbed and nail-impressed decoration covering much of the body, perhaps framed by a continuous or discontinuous horizontal rib at the top; and then perhaps a plain zone towards the base.

The vessel had been smoothed and covered in a micaceous self-slip after the addition of the ribs but before the nail decoration. Post-slip (finger-)smoothing marks are visible. The exterior and interior surfaces are a purplish-brown, and the core is a rich reddish-brown. Only the smallest sherd has any traces of black encrusted material. Inclusions consist mainly of rounded to angular sand-sized grains, together with occasional angular and subangular grits up to 5.5mm x 1.5mm. The latter mostly consist of the white quartzitic rock noted in Pots 1 and 2, and some of these grits contain mica, making it the likely parent material for the sand-sized grains. The maximum inclusion density is around 10%.

Pot 5 (illus 52: 5)
This vessel is represented by one intact body sherd (formerly two), plus a sherd the external surface of which has spalled off, and a fragment. The two base-and-wall sherds described under Pot 8 could conceivably belong to this pot.

The intact body sherd (illustrated) is from a large, medium-coarse pot, c 14mm thick and with a body diameter of at least 240 mm; the wall appears to flare slightly. Its exterior is decorated with a haphazard design of single and paired (thumb?) nail impressions, some scooped. Its exterior is orange-buff; the core varies from reddish-buff to dark grey; and the interior surface is covered with a blackish encrustation up to 1mm thick. There are no obvious traces of a slip. Inclusions are similar to those seen in Pot 4—including mica particles—but are less numerous.

Pot 6 (illus 51: 6)
This is represented by two small body sherds and one substantial rim-and-body sherd (97.5mm x 95mm, reconstituted from five pieces), forming a 15% of the circumference of a thin, fine, decorated, probably tub-shaped pot. The rim is 170mm in diameter and is slightly inturned; its top is rounded, and its interior is thickened by having been rolled over and smoothed down. The vessel’s height cannot be estimated exactly, but is unlikely to exceed 150mm and may be between 130mm and 140mm. Wall thickness is 6.5mm to 9.5mm; along its lower edge, the large sherd had broken along a coil joint line.

The pot is decorated with an incised design and with an applied rib, arranged as an inverted, squared U. The top of the U has two vertical perforations, 3-4mm in diameter and 10mm apart, probably made by jabbing a piece of straw through the rib whilst the clay was still wet. Their function may have been to suspend the pot, or perhaps to secure
a lid; but there is no cord wear, either within the perforations or lower down the pot, to indicate heavy use.

The incised decoration consists of closely-spaced slashes across the rim; nested pendant chevrons below the rim, one on either side of the U-rib; and a panel of alternating L to R-sloping and R to L-sloping lines within the U, resembling basketwork. The pot had been carefully smoothed and covered with a micaceous self-slip prior to the decoration. The exterior is a mottled reddish-brown/grey-brown, with a thin and discontinuous black encrustation, suggesting spillage of the vessel’s contents. The core is dark brown, and most of the interior (excluding a peculiar medium-brown patch) is covered with a blackish encrustation, up to 1mm thick in places.

Inclusions comprise the sand-sized grains as seen in the other pots, plus sparse, angular grits of the white mineral noted in Pots 1, 2, 4 and 5, up to 2mm x 1mm.

Pot 7 (illus 52: 7)
This is represented by a single small sherd and fragment, of distinctive vesicular texture, from a relatively fine vessel. Most of the external surface has spalled away, and it is hard to tell whether the remaining irregularities represent decoration. The sherd is 9.4mm thick; its exterior and core are greyish-brown and the interior is purplish-brown.

The surviving interior surface has been carefully smoothed but probably not slipped. The vesicular texture is caused either by the burning-out of a finely-chopped organic temper, or by the leaching out of an unstable grit; no remaining traces of such a grit are visible, however, and the former interpretation seems most likely. There are also sand-sized inclusions of mica and the quartzitic mineral, plus two small, subangular pieces of the latter.

Pot 8 (illus 52: 8a, 8b, 8c)
This is represented by a single curving undecorated sherd, 52mm x 48mm and up to 10mm thick, which may be part of an inturned rim. Two base-and-wall sherds (illus 52: 8b, 8c) may belong with this pot, or alternatively with Pot 5, or they could represent a ninth vessel.

The interior surface of the rimsherd has a moulding as seen in Pots / and 2; if this is from the rim area, then a diameter of c 160-200mm can be estimated. The fabric is slightly coarse. The surfaces have been smoothed, and the interior (but not the exterior) has a slipped appearance, possibly caused by wet-smoothing. The exterior, core, and part of the interior are a light reddish-brown; the rest of the interior is grey-brown. There is no encrusted material. The clay is slightly micaceous, and the inclusions comprise the usual sand-sized grains, plus sparse larger angular grits up to 5mm x 4.5mm, including the white quartzitic mineral noted in the other pots.
The two base sherds are undecorated; they make up around 30% of the circumference of a base c 150mm to 160mm in diameter. Maximum base thickness is 16.5mm; the wall thin to c 11mm. The base sags slightly, and just above the base-wall junction the wall sags at an angle of 105° to 110°. The exterior, probably unslipped, surface is orange-brown; the core dark grey, and most of the interior (down to a ‘tide line’ at the wall-base junction) is covered with a blackish encrustation. Inclusions are similar to those in the Pot 8?rimsherd and in Pot 5.

**DISCUSSION**

Represented here is a group of bucket- and tub-shaped vessels, of varying size and fabric, but all, except one, attributable to the family of pottery known as Grooved Ware; the fragment of vesicular Pot 7 is too small and undiagnostic to be given any plausible attribution. Most of the pots have clearly been used to contain—possibly to heat—a substance(s) the residue of which remains as a blackish encrustation; at least two were probably not new when used. All seem to have been deliberately and deposited incomplete, the sherds of any one vessel finding their way into different parts of the fill of the pit. The similarities in inclusions among most of the pots suggest that they could derive from a single provenance. The find context is suggestive of deliberate burial following a single event (eg a ceremony). The significance of the two daub-like pieces is unclear: lining of the pit with wattle and daub seems unlikely, and would not explain the signs of burning, whereas the use of a partly-covered cooking structure during the hypothetical ceremony might explain their presence.

Parallels for specific aspects of shape and decoration can be cited from various Grooved Ware assemblages throughout Britain: for example, bucket-shaped pots with inturned rims are present in abundance at Durrington Walls (Longworth 1971), and are known from Yorkshire assemblages such as the North Carnaby Temple sites and Low Caithorpe (Manby 1974). However, as MacSween has convincingly argued (1995a), it would be inappropriate to apply Longworth’s ‘Clacton - Woodlands - Durrington Walls - Rinyo style’ classification system to north British Grooved Ware since the material does not fall into such neat stylistic pigeonholes. A better way to understand Grooved Ware in north Britain is to regard it as a long-lived ceramic tradition with a basic ‘vocabulary’ of design elements, with chronological, regional, local, and site-specific variations on a few basic themes (*ibid*). Unfortunately, despite progress with the Orcadian material (MacSween 1992; Richards 1994), it has not yet been possible to disentangle chronological variation from other aspects of variation for north Britain as a whole.

The Scottish assemblages most similar to the Littleour material are not those nearest to the site; that is, Beech Hill House (MacSween 1995b), Tentsmuir (Longworth 1967) and the Balfarg sites (Henshall & Mercer 1981; Henshall 1993), but rather those from Hillend (Armit et al 1994) and Wellbrae (Cowie pers comm), both in Clydesdale. The Hillend material, for example, includes bucket-shaped vessels with inturned rims, applied vertical ribs, differentiated rim vs. body decoration and scooped nail impressions (Armit et al 1994, illus 5). It also includes the use of comb-impressed decoration (*ibid*, illus 6), a rare feature on Grooved Ware, which Longworth, in his discussion of the Durrington Walls Grooved Ware, attributed to Beaker influence (Wainwright & Longworth 1971, 244). Like the Littleour material, the Hillend vessels had been broken and then deposited deliberately in three pits, probably following a single event. The more fragmentary Wellbrae material includes plain vessels, a large bucket-shaped pot with irregularly-spaced vertical/diagonal ribs, and two pots with twisted cord impressions. As Trevor Cowie has pointed out in his Hillend report (Armit et al 1994), decorative and formal affinities can be drawn with the aforementioned Grooved Ware from Yorkshire and Durrington Walls. Further parallels for specific aspects of decoration can be cited from within Scotland: the use of paired nail impressions, for example, features on a large pot from Beckton, Dumfriesshire (Cormack 1963).

If accepted at face value, the date of 2350-2030 cal BC for the Littleour pottery places it within the later period of currency of Grooved Ware in Britain as a whole (Armit et al 1994), and makes it the latest dated Grooved Ware from Scotland. Comparability with some of the Durrington Walls pottery is thus partially accounted for, although the mechanism for shared design ideas still demands clarification. Problems arise, however, in accounting for the comparability of the Littleour pottery with some of the Hillend material, the assemblage from which is dated (once more, regrettably, by a single determination) to the significantly earlier date of 3340-2910 cal BC (4410±70 BP, Beta-73955).
One is forced to conclude, as noted above, that there are simply too few dates available for Grooved Ware from northern Britain to produce a coherent typo-chronological framework. It may be that certain design elements enjoyed a long currency: if the Hillend and Littleour dates are accurate, then this is indeed implied.

Furthermore, if the overall set of radiocarbon dates for British Grooved Ware is accepted, it appears that the idea of using Grooved Ware had spread southwards from Scotland long before the Littleour pottery was in use. However, meaningful discussion will have to await a larger corpus of dates.

### 4.5 THE CHARRED RESIDUES ON THE LITTLEOUR GROOVED WARE VESSELS

**Deborah J Long**

Organic residues from four Grooved Ware vessels excavated at Littleour have been analysed for their possible pollen content at time of use or burial, and in particular, to investigate the hypothesis that the vessels had been used in a ritual context (Bohncke 1983; Dickson 1978; Tipping 1994b; Whittington 1993). This hypothesis is based on the excavation of apparently deliberately broken vessels occurring with several flints from a rectangular pit structure at the site, and from the similarities of the structure to one excavated at Balfarg (Barclay & Russell-White 1993), also interpreted as having a ritual context.

**METHODS**

Residues in the form of hard, organic and charcoal-rich crusts from the apparent interiors of the vessels were sampled by careful scraping with a clean scalpel into clean and sealable glass vials. The precise location of the sampling sites was recorded, and this information is available in the site archive and from the author. Samples were prepared using standard but highly rigorous chemical techniques (Moore et al. 1991). Exotic marker pollen was added in tablet form to estimate pollen concentrations and to check for laboratory error and sampling biases.

Microscope slides were examined routinely at magnification x400 on an Olympus BX40 microscope, and at magnification x1000 for problematic grains. Pollen preservation (Cushing 1967; Tipping et al. 1994) was recorded (table 13), and measures of 'reliability' (Tipping et al. 1994) used to assess the feasibility of palaeoecological interpretation of the data.

<table>
<thead>
<tr>
<th>Preservation category</th>
<th>Pot 1</th>
<th>Pot 1b</th>
<th>Pot 2</th>
<th>Pot 3</th>
<th>Pot 6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Well-preserved</td>
<td>3</td>
<td>5</td>
<td>45</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Lightly crumpled</td>
<td>6</td>
<td>9</td>
<td>56</td>
<td>16</td>
<td>7</td>
</tr>
<tr>
<td>Highly crumpled</td>
<td>6</td>
<td>11</td>
<td>28</td>
<td>39</td>
<td>5</td>
</tr>
<tr>
<td>Broken</td>
<td>4</td>
<td>7</td>
<td>28</td>
<td>20</td>
<td>9</td>
</tr>
<tr>
<td>Lightly corroded</td>
<td>1</td>
<td>0</td>
<td>37</td>
<td>11</td>
<td>0</td>
</tr>
<tr>
<td>Highly corroded</td>
<td>6</td>
<td>4</td>
<td>42</td>
<td>32</td>
<td>10</td>
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<tr>
<td>Total grains</td>
<td>26</td>
<td>36</td>
<td>236</td>
<td>120</td>
<td>34</td>
</tr>
</tbody>
</table>

Table 13
Summary of pollen preservation.

**RESULTS**

All four residues contained pollen (table 14), although pollen concentrations were very low in all samples. The most pollen-rich samples, from Pots 2 and 3, had estimated pollen concentrations of 2977 and 2518 pollen grains per ml respectively. Samples from Pots 2 and 3 generated pollen counts of 200 and 100 grains respectively. The pollen concentrations and counts from Pots 1 and 6 were too low to be statistically valid, probably reflecting biases in residue quantity, type and pollen preservation.

Pollen preservation was dominated by some form of mechanical damage, either crumpling or breakage (Havinga 1984). However, there was little evidence for microbiological attack in the form of corrosion or degradation (table 13). This would be in keeping with the

<table>
<thead>
<tr>
<th>Pollen / spore type</th>
<th>Pot 1</th>
<th>Pot 1b</th>
<th>Pot 2</th>
<th>Pot 3</th>
<th>Pot 6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alder</td>
<td>2</td>
<td></td>
<td>4</td>
<td></td>
<td>6</td>
</tr>
<tr>
<td>Birch</td>
<td>2</td>
<td>25</td>
<td>6</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Hazel</td>
<td>10</td>
<td>3</td>
<td>25</td>
<td>9</td>
<td>6</td>
</tr>
<tr>
<td>Pine</td>
<td>1</td>
<td></td>
<td>2</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Oak</td>
<td>3</td>
<td></td>
<td>3</td>
<td></td>
<td>1</td>
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<td>Willow</td>
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<td>Rowan type</td>
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<td></td>
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<td>Heath type</td>
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</tr>
<tr>
<td>Ling</td>
<td>6</td>
<td>9</td>
<td>12</td>
<td>29</td>
<td>5</td>
</tr>
<tr>
<td>Grasses</td>
<td>4</td>
<td>16</td>
<td>17</td>
<td>4</td>
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<td>Sedges</td>
<td></td>
<td></td>
<td>1</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Buttercup type</td>
<td>1</td>
<td></td>
<td>1</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Dandelion type</td>
<td>1</td>
<td></td>
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<td>1</td>
</tr>
<tr>
<td>Daisy type</td>
<td>2</td>
<td></td>
<td>2</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Common vetch type</td>
<td>1</td>
<td></td>
<td>1</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Crucifer type</td>
<td>1</td>
<td></td>
<td>1</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Meadowsweet</td>
<td></td>
<td></td>
<td>1</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Nettle</td>
<td>1</td>
<td>4</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ribwort plantain</td>
<td>3</td>
<td>4</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ferns undiff</td>
<td>4</td>
<td>39</td>
<td>13</td>
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<tr>
<td>Common polyopod</td>
<td>2</td>
<td>3</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bracken</td>
<td>2</td>
<td>4</td>
<td>49</td>
<td>6</td>
<td></td>
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<tr>
<td>Sphagnum</td>
<td>20</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Indeterminable</td>
<td>1</td>
<td>2</td>
<td>9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Concealed</td>
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<td>10</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total identifiable grains</td>
<td>25</td>
<td>34</td>
<td>206</td>
<td>100</td>
<td>24</td>
</tr>
</tbody>
</table>

Table 14
Palynological results of residues.
archaeological evidence for rapid burial of the pots by infilling sediment, and thus limited opportunity for microbiological attack. Poor pollen preservation is also reflected in the relatively high values of grains rendered indeterminable to taxonomic identification. Up to 30% of pollen grains were concealed by charcoal or plant debris that could not be separated from the matrix; this may bias the identifications in favour of those grains easily recognised, although the vast majority of concealed grains were made indeterminate through other processes.

Measures of 'reliability' were calculated for the pollen spectra from each vessel (Tipping et al 1994). Three measures were used: Polypodiaceae undiff as a percentage of total pollen, the ratio of fern and moss spore concentration to total pollen concentration (concentration ratio) and the ratio of numbers of spore-producing taxa to numbers of pollen-producing taxa (taxonomic ratio). Using all three measures, Pot 3 was shown to have a 'reliable' pollen assemblage, apparently unaffected by differential pollen preservation. Pot 2 had high reliability scores in two of the three measures. Pots 1 and 6 have already been disregarded for palynological interpretation, owing to the low initial pollen counts.

Pot 1: Rimsherd
Low pollen counts were achieved. The assemblage was dominated by hazel, with alder, ling, bracken, grasses and nettle (Urtica-type). The residue contained comparatively few charcoal fragments, and was principally composed of unidentifiable plant remains. Base sherd No. 46 also had a low pollen count, from a charcoal-rich residue, and was dominated by ling and grasses with evidence of undifferentiated ferns, bracken, birch and hazel.

Pot 2
This vessel produced a count reaching 200 pollen grains. The assemblage was dominated by hazel and birch, with bracken and fern spores, oak, willow, rowan-type, ling, dandelion-type, ribwort plantain, meadowsweet and crucifer-type present. Sphagnum spores were also recorded. The matrix was charcoal-rich.

Pot 3
A count of 100 pollen grains was achieved and was dominated by ling and grasses with undifferentiated fern spores, with alder, birch, hazel, pine, oak, heather type, sedge, daisy type and ribwort plantain, buttercup, bracken and common polypody. 'Reliability' measures showed that there has been no apparent differential decay within the pollen assemblage and that the assemblage may therefore be interpreted.

Pot 6
Very low pollen counts were achieved from the matrix of unidentified plant remains with low amounts of charcoal. The pollen assemblage is characterised by hazel, ling and grasses with evidence of birch, dandelion type, ribwort plantain and buttercup with undifferentiated fern and bracken spores.

**DISCUSSION**

Pollen in the residues from the vessels at Littleour is heavily damaged, by either crumpling or breakage. Crumpling of pollen grains from soils and archaeological deposits is common and may relate to relatively dry micro-environmental conditions.

Estimates of 'reliability' have suggested that the pollen assemblage from Pot 3 does not appear to have been affected by preservational biases. The 'reliability' measures have also suggested that Pot 2 has a pollen assemblage that may be interpreted with caution. The assemblage does contain a high proportion of fern and moss spores and this may reflect some differential decay. However, the pollen preservation analyses do not indicate high rates of decay in any of the pollen or spore types recorded. The remaining two measures suggest a relatively robust pollen assemblage. Pots 1 and 6, with low total pollen counts, are not considered to be interpretable for this reason, although the pollen and spore types recorded and their relative counts, are in line with those from Pots 2 and 3.

The high proportion of concealed grains, contained and enmeshed within residue of unidentified plant tissues, may suggest that this pollen is contemporary with the residue, and is not a post-depositional contaminant. There is no obvious enhancement of particular pollen types in these residues. There are also no distinctive ingredients for either food, drink or hallucinogenic preparations. The main pollen constituents of the residues and known uses of these plant types in edible preparations (Darwin 1996) can be summarised:

- **Main pollen constituents of residues:** ling, birch, hazel, grasses, fern spores, bracken.
- **Possible edible constituents:** hazel, ling, nettle, ribwort plantain, dandelion, meadowsweet, crucifers.
- **Possible weeds from gathering:** sedges, buttercup, common vetch.
- **Unexpected constituents:** Sphagnum moss.

However, it is stressed that none of these pollen taxa are present in the vessel residues at proportions high enough to warrant discussion.

The pollen and spore types identified within the organic residues are all likely to have originated from an open woodland environment and may represent plants gathered from such an environment. The pollen evidence from the vessel residues does not suggest any enhancement by selected plant materials.
CONCLUSION

The pollen types identified in the residues from the pots at Littleour suggest their origin within the ‘background’ pollen ‘rain’ inherent in any environment. The probability exists, from the way pollen is embedded within the organic residue, that the pollen is contemporaneous with use or burial of the pot. Pollen may have been incorporated into the residue when it was viscous, and probably before it had congealed into the crust that was then preserved. The pollen taxa, however, do not provide any indication that the organic residue contained plants that were gathered for a particular purpose and placed in the vessels. The pollen taxa indicate an open woodland environment. This need not necessarily represent woodland around the pit structure if the vessels were used elsewhere and transported to Littleour. There is no enhancement of pollen types that would suggest preferential selection or cultivation of certain plants. There are thought to be two possible sources for the pollen spectra present in the pot residues at Littleour: the contemporaneous local environment at the time and place of use of the pots, or at the time and place of burial.

4.6 THE FLINT FROM LITTLEOUR

Alan Saville
with microwear report by Bill Finlayson

THE PIECES (illus 53)

Only ten pieces of flint were found during excavation. They are referred to below by their site small-find (SF) numbers. Three of these were from the topsoil or otherwise unstratified; the remainder were from the fill of pit L23, the same context as the Grooved Ware pottery (Sheridan 4.4 above). The assemblage, for reasons set out below, is odd; there is a preponderance of ‘special’ pieces and the flint used is of unusually high quality.

The three unstratified pieces comprise an unlocated, unclassifiable burnt fragment (53), an unretouched flake (2) from the NW edge of the excavation area, and a small, broad flake with some irregular edge-trimming (7) from the topsoil surface to the SE of the site.

SF 2
This piece, which is in a fresh condition and must have come from a previously protected context, is a hinged-out flake from the face of a bidirectionally-flaked parent object. It is of some interest because its raw material correlates with that of the larger pieces from pit L23, but unlike them it has a ridged, crushed platform of the kind found on flakes from scalar, anvil-struck cores.

Dimensions—L: 31.7mm; B: 20.1mm; Th: 6.7mm. Weight: 4.3g.

The seven pieces from pit L23 include two instances of broken segments which refit, making a total of five separate items. These are described individually below.

SF 4 and 7
A substantial, thick-butted flake with faceted platform, comprising two segments, conjoinable at the snap-break near the distal end. The proximal segment (7) is also incomplete on the right-hand side, from which a further snapped segment is missing, and this somewhat hampers reconstruction of the history of the artefact.

The larger proximal segment has shallow, scraper-like retouch along the upper part of the left-hand edge, continuing beyond the overhanging lower left-hand corner of the distal segment. The retouch on this edge is uniform and continuous, however, and is most likely to post-date the break entirely.

The retouch on the smaller, distal segment (4) is also best explained as post-dating the break. This is obviously the case with the modification effected from the break-edge itself, but it is also difficult to relate any of the other retouch to the overall form and potential typology of the proximal segment. The most substantial retouch, on the top left-hand edge, firstly dorsally then subsequently inversely, could just conceivably pre-date the break, but it is unlikely in view of the bifacial thinning retouch at the top right-hand side.

Without knowing at what stage the snap break on the right-hand side of the proximal segment occurred, it is difficult to speculate on its history, but it can be suggested that the intention may have been to create a scraper, abandoned either because of the right-hand side break or because the thickness and steepness of the distal break-edge hindered further retouch. The distal segment appears to have been in the process of modification into an implement in its own right, presumably an arrowhead. Although potentially complete in its present form it appears unused and may have been rejected because of dissatisfaction with the thickness of the piece at the remaining break-edge.

Dimensions—L (total on bulbar axis after refitting): 74.9mm; B: 42mm; Th: 12.1mm. Weight: 19.6g. Maximum dimension of the distal segment is 37.3mm, Th: 3.2mm. Weight 2.5g.

SF 6 and 9
An elongated blade with plain platform, pronounced bulb, and lipped platform-edge on the ventral surface. The pointed distal tip of the blade (6) refits to the main segment (9) at a simple snap break. The size of the blade, the nature of the dorsal flake-scars, and the absence of cortex, indicate it has been struck from a very substantial core. Despite the blade-character of this piece, however, the flake-sear pattern shows the core need not have been a specialised blade type.
The distal tip is unmodified, but the blade has trimming inversely along both edges. It is clear from the way the trimming stops at the snap edge that it either post-dates the loss of the tip, or that the break and the trimming were essentially contemporary, the break occurring as part of the same process which produced the trimming. The snap edge is fresh and unmodified and both segments of the blade appear to have been abandoned at the time of the break.

Dimensions - total L: 98.4mm; B: 27mm; Th: 7mm. Combined weight: 11.5g (the tip on its own weighs 0.7g).

SF 32
End scraper on a flake with faceted platform, pronounced bulb, and lipped ventral platform-edge; the retouch forming the convex scraping edge is extended slightly further down the right-hand edge than the left. Ancillary retouch both dorsally and inversely has modified the lower edges on both sides, presumably to facilitate hafting/handling. The lowermost edges on both sides exhibit abrasion consistent with the scraper having been hafted or used with some sort of wrapping or binding, and the scraping edge itself has signs of use.

Dimensions - L: 54.6mm; B: 34.8mm; Th: 8mm. Weight: 14.8g.

SF 36
Unretouched bladelet with plain, punctiform platform.

Dimensions - L: 34mm; B: 12.6mm; Th: 4mm. Weight: 1.3g.

SF 39 (not illustrated)
Unretouched, distal-tip snapped flake fragment.

Max dimension - 20.6mm; Th: 1.4mm. Weight: 0.3g.

RAW MATERIAL

The three large pieces from pit L23 are of high-quality, translucent dark grey flint, undiscoloured by any post-production, post-depositional modification of the flint surfaces. The flint is not entirely uniform in colour, but has variegation between patches of dark and less dark grey. Pieces 4/7 and 32 could have been struck from close by on the same core, and 6/9 could also have derived from the same core. Pieces 1, 36, and 39 are all of lighter grey flint and are certainly not from the same core as the previous pieces, though they need not be from a different flint source. On the other hand, piece 2 is identical in flint type to pieces 4/7 and 32 and definitely from the same source. Both pieces 2 and 6 have small areas of light grey variegation.

Consideration of the raw material origin is hampered by the complete absence of cortex on any of the pieces. In itself, however, this points to the relatively large size of the parent material and, combined with the obvious quality, suggests the flint was obtained from a primary geological context outside Scotland. In colour and texture this flint does not match that from Northern Ireland, and a source from somewhere within the chalk zone of England seems probable.
MICROWEAR EXAMINATION

Bill Finlayson

In summary the following observations were made as a result of examination using the combined low and high power microscopy methods detailed elsewhere (Finlayson 1989):

SF 1
Unused

SF 2
Unused; some manufacture traces

SF 4
The break edge has a narrow band of polish, which does not appear to be the result of the break. It might be the result of a brief use-episode, but it appears more like a general rubbing of this area, possibly as the result of holding or hafting. Given the unfinished nature of the piece, perhaps the most likely explanation is that the polish arises from holding the piece during retouching.

SF 6
Unused

SF 7
Unused

SF 9
Unused, with traces probably related to the break. The suggestion by Saville (above) that both pieces were abandoned at the time of the break is supported by the absence of subsequent trace development.

SF 32
The ventral surface along the scraper edge has a narrow band of polish along the extreme edge. In addition there are some linear polish features perpendicular to the scraper edge. In combination they suggest that the scraper has been used, but as both are poorly developed, the use was probably not intensive. The abrasion on both lateral margins is matched by a very bright polish, both in the abrasion scars and on the surrounding ridges. This type of wear is most typically produced by a very hard contact material, such as stone. The location of the wear, however, does not indicate edge contact. Given that the matching abrasion on both sides suggests some form of hafting, it may be that this polish has developed as a result of the flakes from the abrasion scars rubbing under pressure between haft/hafting and the tool.

SF 39
Unused

In general the flint surfaces are all fresh and show few signs of post-depositional damage or polishing. This would accord with the suggestion (see below) that the flints are contemporaneous with the filling of the pit, and have not been left lying in an exposed depositional context; equally, they could not be residual. The slight use of the scraper (32) might be seen as supporting the notion that the flint has representational value, as it has clearly not been worn out by its use before deposition.

SIEVED RESIDUES

In addition to those flints recovered during the actual excavation, post-excavation fine sieving of two samples from the fill of pit L23 produced numerous very small pieces of struck flint.

Only one of these pieces, from sample 3, is larger than 10mm. This is an unclassifiable flake fragment (max dimension 18.8mm; Th: 2mm; weight: 0.5g) with slight traces of edge modification on the only intact edge. It is of translucent, non-cortical, grey flint of similar quality to that of which blade 6/9 is made, but does not refit to this or to any other artefact from the feature.

Sample 3 also contained 12 pieces of flint in the size range 5-10mm, including one burnt fragment, together weighing 0.3g; and 51 pieces in the size range 0.5-5mm, including 3 burnt fragments, together weighing only 0.1g.

Sample 4 contained one burnt piece of flint in the size range 5-10mm, and 11 pieces of flint in the range 0.5-5mm. All 12 pieces together weighed only 0.1g.

Apart from the flake fragment, which could possibly have been part of an implement, these pieces of flint are all spalls and chips, most of which are likely to be retoch spalls or the incidental product of general flint-knapping activity or flint tool use. No flint of any kind was recovered by excavation or in the sieving of soil samples from any other feature on site.

DISCUSSION

Most of the flints come from the pit L23. Pieces 4/7 and 6/9 were in the top 50mm of the east half of the pit fill; piece 32 was 100mm down in the western half. Piece 36 was 50mm down in the western half and piece 39 was also in the western half. The fresh condition of the flints suggests contemporaneity with the infilling of the pit; there is certainly no way in which the larger pieces could have been residual, unless one imagines they had been disinterred from another protected context and re-interred in this pit. Piece 2 is also fresh and clearly has been disturbed from its context, which conceivably could have been the top of pit L23. Although all together in the same pit fill, the flints were dispersed rather than appearing to represent a cache or the contents of a decayed container of any kind.

The virtual absence of any other flints from the Littleour site is problematic. Evaluation of the composition of the recovered assemblage is not helped by the fact that the mechanical stripping of topsoil during excavation leaves the question of background flint presence unanswered. While 76 tiny pieces of struck flint were recovered from the sieving of part of the fill of pit L23, as noted above, the sieving of other pit fills did not produce similar results. This raises the issue of whether sieving of topsoil would have produced similar results.

Whatever the case, the assemblage available is clearly, as it stands, odd; there are no cortical pieces or cores, and an unusual predominance of ‘special’ pieces. Both 4/7 and 6/9 appear to derive from an actual event; in the case of 4/7 an event with separate episodes, both of which resulted in discard in the same place. A degree of intentional curation of these two segments at least is implied. One might speculate that this circumstance could have arisen within a social context in which flint of this quality had some intrinsic representational value beyond the mundane.
However, while the temptation to suggest some kind of structured deposition of a 'ritual' nature is strong, there can be no substantive justification for such an interpretation without knowing what evidence may originally have been present on the contemporary ground surface surrounding the pit. The presence of spalls, which could derive from the same flint from which 4/7, 6/9, and 32 were made, or from the actual manufacture of those pieces, raises the possibility that they were knapped over the pit or over the material with which the pit was infilled. On the other hand, the absence of any cores or cortical flakes suggests the artefacts themselves may have arrived on site already roughly shaped.

The inclusion of burnt flints among the spalls and chips from pit L23 is also of some interest. These could not have become burnt within the feature, so, assuming they are contemporaneous with the other spalls and not in some way subsequently intrusive, they suggest the fill is derived from a deposit containing debris derived from more than one activity, that is, not just flint-working. Such a mixture of burnt and unburnt spalls might be anticipated in a context of domestic debris, and points to the fill relating to deposits which are otherwise now completely unrepresented amongst the excavated remains.

Of note is the quality of the imported flint available to these users of Grooved Ware. Reference has been made in the literature to the prevalence of dark grey flint used for oblique and chisel arrowheads in Scotland, types usually considered as linked to Grooved Ware use (Saville 1994, 66, n.5), but it is difficult to find published parallels from Scotland for flints of the size represented here. There are examples of large flakes and implements of good-quality dark grey flint among the surface-collected pieces amassed by early collectors and now in the National Museums of Scotland collections. These, however, are isolated examples with no context.

Typologically there is little that can be said about the present assemblage. The scraper is a classic Neolithic type and this association with Grooved Ware in Scotland is useful. The preliminary classification of piece 4, before the realisation that it refitted with piece 7, was as a broken transverse arrowhead. The refitting made it clear that it was not a broken implement but one being modified, presumably into an arrowhead, in its present form. This insight into a manufacturing strategy capitalising on a presumably fortuitous break is a cautionary tale, as is the revision of the preliminary classification.
5

SURVEY METHODOLOGY AT THE CLEAVEN DYKE AND LITTLEOUR

5.1 CONTOUR MODELS AND DIGITAL TERRAIN MODELLING IN ARCHAEOLOGICAL SURVEY: THE DEVELOPMENT OF APPROACHES TO THE CLEAVEN DYKE

Christopher Burgess

The survey of the Cleaven Dyke was carried out over five seasons between 1994 and 1997. The aim of the exercise was to provide a survey that clearly showed all of the features, details and complexity of a monument that had in the past been assumed (wrongly) to be reasonably uniform. The monument presents a unique set of challenges to the surveyor; it consists of an asymmetric bank located between two ditches traversing over c 1800m of occasionally undulating terrain. The problem was further complicated by the fact that 80% of the monument’s length was under a maturing crop of spruce, which in places reduced visibility to a few metres. Considerable care therefore had to be taken to ensure that the separate segments of the survey were married together accurately and tied in to the real and mapped landscape.

The digital terrain model (DTM) approach to the site was decided upon to allow the complex nature of the monument to be depicted consistently and objectively over its whole length. The initial survey was carried out over a 300m length of the Dyke that had previously been cleared of trees. At that time constraints of hardware and software led to a gridded survey approach being used. Points were recorded at 0.3m intervals over the bank and ditches and at 5m intervals in the area between the features. The completed model from this first season consisted of 10,000 spot heights collected over five days.

Upon returning to the site in the autumn of 1995 new software and hardware allowed the site to be surveyed as a series of strings and spot heights. The use of strings (groups of points taken along a feature) allowed for subjective archaeological input into the survey. It was also decided to re-survey the 300m covered during the first season, to make the whole survey consistent. The resultant DTM prepared over four one-week seasons consists of some 12,000 points in total (for the whole upstanding length of the Dyke), with the key topographic features (top of bank, bottom of bank etc.) defined as strings (and consequently breaklines—lines marking a break in slope). These subjective strings were supplemented with three sets of spot heights: one on the monument features themselves (crest of the bank and base of the ditch) at c 5m intervals, one set between the ditches and the bank at c 10m intervals, and one out with the ditches to define the surrounding terrain at 50m intervals.

The data collection was hampered by the dense tree-cover on and around the site. Lines of sight on the monument were reduced in places to less than 10m, were never more than 300m, and averaged c 50m. This led to problems in establishing reliable reference objects and relating the stations along the monument accurately. The acquisition of control also proved difficult (though not impossible), the final survey being tied in using fence-lines at either terminal and the A93 road that crosses the monument c 400m from the SE terminal. Considerable time was spent checking the accuracy of the survey by re-surveying stations, establishing control and re-checking prominent features on the monument. The final survey was overlaid on vector-based Ordnance Survey data which confirmed that the results of the survey were accurate to within c 2m over the length of the Dyke (the equivalent of 0.11% of the overall length).

PURPOSE & METHODOLOGY

Traditionally, earthwork sites have been depicted using hachures. To do this the surveyor must record the tops and bottoms of slope features; the draughtsman then pens hachures between these lines to mark the slope, the broad end of the hachure marking the top break of slope and the hachure tail marking the bottom. Hachures generally imply a high degree of subjectivity, involving the pre-selection of significant features, thus rendering the survey more opaque to subsequent re-assessment, should that be required. What follows is an
appreciation of the considerable advantages of survey by contour terrain modelling, especially in the light of the experience on the Cleaven Dyke. That is not to say that the representation of earthworks by hachure is completely superseded if both and an archaeological survey collects the same information for both forms of presentation, leaving the choice of style or approach to the needs of a particular monument and the way the information is to be published.

An alternative approach to the depiction of such sites is to produce a digital terrain model (DTM) or contour plan of the features. It has been asserted in the past that the production of such surveys is both time-consuming and unnecessary—merely a distraction or a waste of time. It may be that this attitude originated in a time (not too many years ago) when the recording of each individual survey point was time-consuming and the recognised method of producing a DTM would involve the collection of a much greater number of points than necessary for a hachure survey. Relating the feature or site to the surrounding terrain would require an even greater investment of time.

The vast majority of earthwork surveys follow a very similar pattern, with individual features being surveyed in strings such as 'top of bank', 'top of ditch' and 'bottom of break of slope'. This survey method gives us a linear computer illustration that is usually interpreted by hand to produce a hachure drawing. This is different from the methods employed in surveying with instruments such as plane table/aldile combinations, where the tops and bottoms of features are recorded and the hachures are added between the lines.

However, if these lines are recorded electronically in three dimensions, they can be designated as breaklines within the software used. This designation allows the computer to interpolate a contour model around the strings treating the gradient as constant between them (of course, where the gradient changes, a new string should be surveyed, even for a hachure survey). Therefore, the collection of the same amount of information allows for the option of the contour display while additional time has been spent on site.

This author tends to illustrate only one key part of the feature, e.g. the bottom of a bank or the top of the ditch, as these are the parts of the feature which define its extent. This can be seen clearly in the example of the Cleaven Dyke. The monument stretches for over 1800 metres, but the c 300 m shown here has been surveyed once by RCAHMS (illus 22) and twice by this author. RCAHMS undertook a standard earthwork survey with the results displayed as hachures. While of the highest pictorial and metrical standard, the hachure presentation, is, in the opinion of this author, an inadequate depiction of the complexity of the monument.

Indeed, the scale and underlying complexity of the monument challenged all the existing archaeological survey techniques, leading to experimentation with two different methods to find the best approach to produce a DTM. The contour plans clearly show the segmented nature of the monument that RCAHMS has attempted to illustrate in the hachure drawing. It is interesting to note that the two surveys, RCAHMS's (illus 22) and the author's (fold-out illus 98/99) are constructed from basically the same information. Little or no additional site time was required to produce the contour plan, yet at the same time it provides us with much more information about important aspects of the site in question.

The first DTM of this area was prepared on a grid basis. It is ironic that the 10,000 points recorded over five days to form this DTM provide us with less information than the survey for the same area (which took 1.5 days) within the second contour model (fold-out illus 98/99). The first DTM survey carried out on a grid at c 0.3m over the Dyke itself tended to produce more 'bubbled' results with individual points becoming 'contour islands' in the drawing. Also, this survey of this DTM had little or no element of interpretation, resulting in any feature more subtle than the resolution of the grid being lost. The second DTM carried out by means of recording breaklines allowed for this interpretation, and produced results with fewer 'bubbles' and 'islands' that gives a better indication of the nature of the monument. Illustration 54 is a key to line types used by the author in such plans.

The Cleaven Dyke is a case in point; the monument itself consists of a bank and two parallel ditches with a surviving length of c 1800m in length. Over that distance the terrain undulates to some extent, and the elements of the monument change in size to deal with this. While most of the site is situated on level ground, at one point, c 500m from the SE end, the monument runs across sloping terrain. The only previously existing survey of this part of the monument was at 1:2500 carried out by the Ordnance Survey in the 1970s. As the 1:2500 survey does not have an associated DTM (unlike the 1:10,000 or 1:25,000 surveys), it is impossible to appreciate the complex relationship between the monument and the terrain, and the effect one has had on the other (illus 55, upper). In the most recent 1:2500 plan, produced from digital data in 1996, a line marking the approximate bottom of the bank of the Cleaven Dyke has been added (illus 55, lower).

To survey this stretch of the monument in the traditional manner (previously employed by RCAHMS) would allow us to study only in the most general way the nature, size and disposition of the earthwork. The survey carried out during April 1996 to create a DTM survey allows the user of the survey results to visualise the form of the monument and of the terrain in which it sits (fold-out illus 98/99), and thus better to understand their relationship.

The advantages of this kind of DTM production are clear:

1 It is just as quick, if not quicker, than traditional methods employed at comparable degrees of resolution.

2 The final product is more objective and provides more information.

3 These surveys are three-dimensional; in the simplest terms this means that we can take accurate measurements from them not only in the horizontal plane, as one might from a standard hachure illustration, but also in the third (vertical) dimension.

It might be said that no modern survey should record less information than that required to produce a terrain model. Frequently with
CONCLUSION

The results of the DTM survey of the Cleaven Dyke (discussed in 3.1 above) have clearly shown that the monument is constructed of a series of shorter mounds, with at least four deliberately constructed breaks. The bank can be seen to change in size in direct relationship to the terrain that it crosses, and the larger the bank gets, the larger the ditches get. Calculations have been undertaken to compare the volume of material in the bank with the apparent volume of the ditches. The DTM has also been used to allow modelling of inter-visibility between parts of the monument. Ordnance Survey data has been used to provide details of the terrain beyond the extents of the monument. These data are supplied at 50m intervals and complements the 50m spot heights collected during the survey.

Future uses of the DTM may include more detailed GIS work and reconstruction of the features recorded from such sources as aerial photographs, geophysics and excavation. One of the major problems in the interpretation of such material is the timing and orientation of the monument. In the case of Cleaven Dyke this is clearly made worse by the tree-cover. In the future, the existing DTM could be used to prepare animated sequences that display the monument in its environment, as it is today and as it was at the time of its construction. This animation could be presented as a video, on CD ROM or on any similar media, making the monument accessible to a much wider audience.

At the end of the day, the information required by the draughtsman to produce a traditional hachure drawing will still be available. If it is felt that the contour survey is misleading or difficult to interpret, the traditional option still remains. It is not suggested that creating a DTM is the solution for all sites, or all surveyors. Hachures remain particularly useful when a site has to be viewed at a glance, or by people who would find a contour plan difficult to interpret.

In summary, it should be clear that the extra time taken to gather the additional information needed to produce a DTM is worthwhile in enabling the production of plans displaying the third (height) dimension: the addition of the third dimension allows the presentation of 33% more useful information about a site and its landscape.
5.2 GEOPHYSICAL SURVEY ON THE CLEAVEN DYKE AND LITTLEOUR

Lorna Sharpe & Paul Johnson

Our involvement with the work at the Cleaven Dyke began with a geophysical survey at the Littleour enclosure. An area of 900m² was surveyed in advance of the first season of excavation. Survey at the two sites was undertaken during 1995 and 1996. At the Cleaven Dyke electrical resistivity profile surveys were carried out at the NW terminal, over the SE cropmark portion of the monument, and at an upstanding portion of the Dyke adjacent to the area excavated in 1995. At Littleour resistivity and geomagnetic surveys were undertaken. Soil samples were taken from the enclosure features and surrounding area as they were excavated, to determine their magnetic susceptibilities.

IMPLICATIONS OF THE AREA'S GEOLOGY FOR GEOPHYSICAL SURVEY

The surveys at Littleour illustrate the widespread problems encountered in Scotland in conducting geophysical surveys in areas of glacial drift. The major problem, particularly in relation to resistivity survey, is the non-uniform nature of deposits over small areas. These deposits consist of boulders, through gravels and sands, down to silty- and clay-sized particles. Random distributions of lenses of material of different sizes occur as a result of local variations in transport and depositional environments which cause abrupt changes in drift materials over relatively short distances. This can create considerable difficulties for archaeologists (eg Mercer 1981), not least when attempting geophysical survey. The effect can often be seen clearly in aerial photographs as geological cropmarks (Wilson 1982) which occasionally can be confused with archaeological marks.

Electrical resistivity surveys measure changes in resistance as electrical current travels through different subsurface media, reflecting differences in composition, particle surface area, porosity, permeability and structure (Scollar et al 1990,12). It is often difficult to obtain coherent survey results over the constantly changing compositions of a typical glacial drift: the larger scale bulk differences that are the result of geological processes are prone to mask the much more subtle anomalies that archaeological features produce. If there are lateral changes in the make-up of the deposit, the resistive properties of any features present will themselves be affected by the change in substrata. So, for example, if there are two ‘postholes’ with similar dimensions and a humic, water-retentive fill, but one posthole is cut into a lens of sand and gravel, and the other into boulder clay, the anomalies they are likely to produce could be very different.

Geomagnetic survey is often hindered by the presence in the drift of iron-rich minerals eroded from the higher volcanic, igneous and metamorphic areas ubiquitous in the north of Scotland, over which many of the ice sheets advanced (Bluck pers comm). Presence of these minerals makes possible their conversion to highly magnetically susceptible iron minerals, maghemite and magnetite. The main mechanisms of conversion are combustion and fermentation. These processes allow the detection of past human activity below the ground, and are the basis for magnetic survey in archaeology (Aitken 1972). However, as can be seen at Littleour, these processes also occur through more recent activities such as stubble burning, and can cause more subtle archaeological signals to be obscured.

There are several implications for geophysics in Scotland to be addressed from the work at Littleour and the Cleaven Dyke. Most importantly, we must realise that a negative survey result does not necessarily mean that an area does not contain any archaeology. This is most important when considering developer-led rescue archaeology. Geophysical survey is seen as a good, rapid method of assessing large areas of ground, which is necessary in this area of archaeology. However, it is easy to see how many sites producing similar responses to Littleour could be overlooked and destroyed; not every site has the luxury of producing such obvious cropmarks.

The initial survey results presented us with a practically irresistible challenge: to design a sampling regime that might work at Littleour, and to find out whether the Cleaven Dyke and its surroundings would prove equally elusive were we to attempt to gather more information about that monument.

Sandstones tend to provide ‘quiet’ backgrounds to geophysical survey, as has been proven from results obtained in Mainland, Orkney (Dockrill & Gater 1992). The area around the Cleaven Dyke is underlain by Old Red Sandstone (ORS). However, the overlying fluvo-glacial drift revealed during excavations at Littleour proved troublesome for both survey techniques employed in this study, particularly at Littleour. Both the Cleaven Dyke and Littleour produce good, well-defined cropmarks, suggesting that clearly-defined changes exist in the subsurface media, which is necessary for successful survey. Because of this we believed that we should be able to detect with reasonable ease at least the features producing the cropmarks.
SURVEYS AT LITTLEOUR

All surveys were carried out using Geoscan Research Ltd instruments: an FM36 Fluxgate Gradiometer and an RM15 Resistivity Meter. Data was processed from the area surveys at Littleour using Geoscan's Geoplot 2.00. The 1995 surveys covered a 30m square grid (900m²), using a 0.5m sampling interval. The resistivity survey employed a twin electrode configuration with the mobile electrodes set at a 0.5m inter-electrode spacing.

It was only with hindsight that any anomalies representing the postholes could be identified. The most obvious features on the gradiometer plot were linear, running N-S; these were traces of ploughing, still visible on the ground today as narrow furrows defining low ridges c.2m wide and of negligible height. Disturbance to the cultivation lines in the middle of the plot, although these are of later date than the enclosure, marked its position.

The central area of the resistivity plot also displayed evidence of disturbance. It is less obvious that the enclosure is the cause, however, because of the effect of the drift geology on the survey. The plot illustrates perfectly the problems involved in surveying over fluvio-glacial drift deposits discussed above. An area of low-resistance material in the NW corner of the grid terminates in a sharp boundary (illus 56; D, R1). This is a response to the increased depth of topsoil, or plough headland, which has accumulated against the field boundary. From here, south-eastwards across the site, materials of increasingly high resistance were recorded.

Unfortunately, the high-resistance material blankets most of the area of the enclosure. This could be explained as a change in resistance in response to the construction of the enclosure, but, as illustration 56 shows, the high resistance marks an area of gravel. This tends to give high resistivity readings and is the more likely explanation for the results. In short, the resistivity survey successfully sampled the underlying drift at the expense of the archaeology!

In the 1995 excavation, the postholes that defined the enclosure were immediately obvious, their dark fill contrasting dramatically with the surrounding subsoil. As the excavation proceeded, it became clear that they were substantial features. At this stage, before the survey results became available, it was thought that the geophysical survey should have located most, if not all, of these postholes.

When this proved not to be the case we decided to return to Littleour to re-survey the unexcavated, western portion of the enclosure to try to identify the factors preventing detection of these relatively large features. We were curious to find out whether a modification to the survey methodology, specifically an increase in sampling density, would allow the postholes and any other features of the enclosure to be detected. These ideas had been explored in some depth by Sharpe (1996). Alternatively, could failure to detect the postholes have been due to some feature associated with the site, such as the solid or drift geology, the soils present, or the posthole fills?

Illus 56
A final interpretation of the results of both seasons of geophysical survey at Littleour. The unlabelled dashed lines mark the boundaries between sand and gravel.
R = anomaly detected by resistivity survey
G = anomaly detected by gradiometer survey
THE MAGNETIC SUSCEPTIBILITY MEASUREMENTS

Measurement of the soil samples from Littleour (using a Bartington MS2D Magnetic Susceptibility Meter) showed that the topsoil on the site possessed a high magnetic susceptibility. These measurements also revealed that the pit fills and the surrounding subsoils have similar magnetic susceptibility values, which means that there was very little magnetic contrast between the features and surrounding subsoil. Without such a contrast, there is little scope for detecting archaeological features by means of geomagnetic techniques. This, together with the high susceptibility topsoil, meant that the much weaker contributions of the pit fills to the total vertical field strength could easily have gone undetected.

The anomalous values recorded along the cultivation lines in the field during the gradiometer survey indicate magnetic enhancement and suggest that stubble may have been burnt in the field over some time. This is likely to be responsible for the high topsoil susceptibility values.

In direct contrast to this, we are also considering the possibility that at Littleour iron is present in a different form, such as limonite (Hall pers comm), which is non-magnetic, but like all substances will have magnetic susceptibility. We hope to examine the samples taken from Littleour, in particular those from the postholes, using X-ray diffraction and fluorescence to determine in what form, and in what quantities, the iron minerals exist.

We also wanted to explore the possibility that the first survey strategy might have prevented us from detecting the features. The 1995 excavation revealed the postholes of the main setting to be between 0.75m x 0.65m (L) and 1.15 by 1.2m (L11) across. The sampling interval chosen for the first survey was 0.5m. This suggested that there was a real possibility that the sampling points lay between the pits, thus missing any maximum anomaly being produce by them. This situation is known as 'aliasing', and should be considered very seriously when planning a survey. Therefore, during the 1996 survey of the unexcavated, western portion of the enclosure, the sampling density was increased to 0.25m over a maximum area of 400m², once again using magnetic and electrical prospecting techniques. To exclude the effects of shallow resistivity changes, and with the knowledge that the topsoil was < 0.3m deep, a twin electrode resistivity frame with an inter-electrode separation of 1m instead of 0.5m was employed, biasing the measured apparent resistance to a depth of 0.5-1m, rather than to the 1995 0.25-0.5m depth, to equate with the depth at which the archaeological remains were thought to occur. Illustration 56 summarises the results of the surveys.

THE 1996 RESULTS

The gradiometer once again revealed the plough marks that were visible in 1995. There were certain other features in this plot including the disturbance caused by the 1995 excavation trench. Based on the results of this survey, and on slight indications on the aerial photographs, it was originally thought that there was a second axial pit in the west end of the enclosure. However, no such feature was discovered when the whole enclosure was excavated in 1996.

The resistivity plot was less affected by the drift deposits, producing a much more consistent background resistance. However, despite the increase in the measuring depth of the survey, the cultivation remains could also be seen to affect the resistance on this plot. A linear feature (illus 56: D, R2) present was once again caused by the plough headland. Despite the lessened effects of the drift deposits, the resistivity plot still failed to produce a clear picture of the enclosure. The final resistivity grid could not be completed due to instrument failure.

Individually, the four plots do not provide much information about the enclosure. In comparison with the cropmark of the site the geophysics results were disappointing. Illustration 42 shows the plan of the enclosure after full excavation in 1996. As the final plan of the site was made, changes in drift geology over the site were also noted (illus 45). These ranged from patches of quite coarse gravel through to an area of very fine sand in the western half. The final retrospective interpretation of the surveys, together with the actual features and drift geology is presented as illustration 56 which shows the areas of anomalous resistance (R1 and R2) and magnetic values (G1 and G2); those detected by both instruments, indicated by dashed lines, can most confidently be said to indicate postholes, since there is an increased likelihood of the existence of a tangible feature if both instruments detect a change in ground properties.

Generally the features present at Littleour have produced very subtle, weak anomalies, if any at all. This poor response is assumed to be due in part to the high magnetic susceptibility values measured in the topsoil, but mainly to the lack of magnetic susceptibility contrast between the feature fills and the surrounding drift deposits. The survey results were improved slightly by sampling at a smaller interval, and by measuring resistance values at a deeper level, as witnessed by the cleaner responses seen in the 1996 survey plots.
SURVEYS AT THE CLEAVEN DYKE.

We performed a series of vertical electrical resistivity profiles at the NW terminal of the Dyke (illus 58), commencing at the boundary between the wood and the arable field where the extant portion of the southern cursus ditch terminates. These profiles appeared to be successful, therefore the investigation was continued across the NW end of the Dyke in an attempt to ascertain whether the cropmarks seen further to the NW in the field adjacent to the Dyke might be linked to the monument, or, as is now thought, whether the terminal in the wood was the original end of the earthwork.

We also examined a section of the extant earthwork close to the position of the cross section dug in 1993 to try to correlate resistivity figures with excavation information concerning the Dyke’s construction.

Illus 58
Cleaven Dyke: the results of the six resistivity profiles across the southern ditch. Resistance is measured in ohms.
METHODS

The profiles were made using a configuration of electrodes known as the Wenner array (Clark 1990; Keary & Brooks 1984). For each point at 1 m intervals along each profile line, the electrode configuration is expanded so that the inter-electrode spacing is increased progressively from 1 m to 4 m. This biases the current increasingly deeper into the ground so that resistance for each point along the profile line is measured at a depth of around 0.5 m, 1.5 m and 2 m. The results of these measurements are reproduced in illustration 57.

THE 1995 VERTICAL ELECTRICAL PROFILES

The evidence for the southern ditch of the Cleaven Dyke proper extending into the arable field from the wood near the NW terminal is limited to a few records of cropmarks. It was therefore important to gather as much information as possible about any further continuation. Six profile lines were set out over the expected line of the southern ditch (illus 57).

As the results of the profiles reveal (illus 58), there are features in the field causing variations in the resistive properties of the ground along the profile lines.

Generally, the irregularity in the resistance readings along each profile line decreases when a larger electrode separation is used. This irregularity is due to the weathered topsoil layer, resulting in part from cultivation. The 2 m and 3 m profile lines are considered to be most important in this survey. Representing average measurement depths of 1 m and 1.5 m respectively, these profile lines are most likely to contain anomalies relating to the ditch. The ditch in the upstanding portion of the Dyke today is between 0.5 and 1 m deep. The profiles depict low resistance values on their south sides, at between 1 m and 3 m along profiles A-E, at approximately these depths, which is consistent with the continuation of the ditch.

When the inter-electrode separation reaches 4 m, the profile lines can be seen to flatten out. This would indicate that the depth to which the current is biased exceeds the depth of the presumed archaeological feature.

A narrow band of lower resistivity can be seen in the northern side of the profiles, from profiles B to F at between 6 m and 8 m along the profiles. The strength of the anomalies is comparable to those produced by the presumed continuation of the ditch along the south of the profiles. It is possible that these anomalies may represent a second ditch closer to the cursus bank in this area, but this interpretation is uncertain. An interpretation of the profile results is given in illustration 57.

THE 1996 RESISTIVITY PROFILES

In 1996 the profiles across the NW terminal of the Dyke were completed, along with a profile at the SE end of the monument, and one over the extant portion of the Dyke. The 1996 profiles across the NW terminal are marked 1 and 2 on illustration 57.

Illustration 57 presents the results of the 1995 and 1996 resistivity profiles to give an interpretation of the features present at the NW terminal. One interpretation of the survey results is that there may be two ditches running along the south side of the cursus bank in this area. Across the terminal, the first profile detected three resistivity lows in the immediate area of the Cleaven Dyke bank-terminal. Two may be interpreted as the two ditches found by Adamson in 1975, or a reflection of the complex turf revetment of the mound. The high-resistance feature may represent the ploughed-out bank. The continuation of the postulated inner ditch appears to align with both the excavated ditch feature and one of the southern low-resistance areas detected in 1996, although it is perhaps unwise to extrapolate this feature over such a large area of unsurveyed ground.

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![Profile 1](image1)

![Profile 2](image2)

**Illus 59**
Resistivity profiles at the NW end of the Cleaven Dyke (see illus 57 for location).
The higher resistance seen at the southern end of profile 1 may be associated with the beginning of the hollow-ways caused by cattle droving along the Dyke; it is suggested below that the southernmost low-resistance area could also be associated with this activity, rather than the continuation of the outer ditch.

The second 1996 profile indicates that the monument did not reach as far as 15m out from the surviving bank-terminal. This confirms the view of Pitts and St Joseph (1985) and Barclay and Maxwell (this volume) that the Cleaven Dyke does not extend any further to the NW.

THE PROFILE ACROSS THE EXTANT PORTION OF THE DYKE

This profile was located parallel to the cross-section dug in 1993, 5m NW of it. It was expected that the results from this profile would show the cursus ditch producing a low resistance because of the water-retentive silts in its fill, and that the central bank would produce a higher resistance feature. The results actually provided a much more subtle indication of the Dyke’s subsurface composition. This could only be fully appreciated with the benefit of excavation. However, it does suggest that if results such as these could be quantified and examined with regard to the features and materials that could be causing the anomalies, we would have a much more powerful predictive tool in geophysics.

For the first 3m of the 1m profile line, and possibly up to the first 10m, there is disruption from nearby trees (illus 60). The small decrease in ground resistance around the 6m mark may be associated with the bottom of the cursus ditch, where natural silting at the lowest point of the depression would cause a lower resistivity due to the large total surface area of the silt-sized particles (Scollar et al 1990, 12). At c 12m the resistance decreases again. This decrease is also seen in the 2m and 3m profile lines. It is possible that the lower resistance may indicate the presence of a second ditch, similar to that postulated from the 1995 profiles, at the NW terminal. However, it is difficult to judge this from one measurement; this low could be caused by a hole, or be related to the agricultural ridgeing parallel to the Dyke, detected by the RCAHMS survey (illus 22). The feature appears on the 2m profile as a slight rise in resistance. If this feature represents a second ditch, agricultural ridge or erosion hollow, it could indicate a water-retentive upper layer, sampled at the 1m inter-electrode spacing, covering a deeper, less conductive medium such as the sands and gravels that constitute the inner layers of the cursus bank or indeed a layer of compacted soil such as that which would be produced along a trackway. It should be noted that the detailed RCAHMS survey of this area, and two episodes of contour survey and excavation immediately adjacent, located no trace of a ditch in this area; given the clear survival of the Cleaven Dyke ditch, the presence of a second ditch here must be considered unlikely.

From the 21m point along the profile the resistance values become more erratic, and represent the influence of the cursus bank on the resistance measurements. The effect can be seen to a lesser extent in the three deeper profile lines. The exaggerated peaks and troughs in the profile are likely to result from rabbit burrows or stones; the former become more concentrated towards the cursus bank. Although the 1m profile line is most likely to have sampled the uppermost peaty and loamy layers of the cursus, the resistance values recorded would also be expected to be affected, in part, by the underlying soil layers. For example, the high resistance over the cursus bank is probably due to the increased drainage in the underlying sands and gravels causing the uppermost layers also to be drier.

The cursus bank is marked on all four profiles by a drop in resistance at the northern edge, before the rise of the bank. This decreased resistance may be a response to the turf revetments, or to soil slumping along the base of the bank. As expected, a similar low-resistance feature is seen at the S-facing bank base.

The 2m profile line shows a higher resistance at the crest of the bank with a flattening out over the top. This is thought to be in response to an underlying area of sandy material on the flanks with a return to an increased depth of loamy material towards the centre of the bank. This is seen to be a common feature of the bank construction (Barclay et al 1995; 2.3 this volume).

The 2m profile line, which measures to a depth of c 1m, defined the position of the ditch well at between 5m and 6m along the profile. The 3m and 4m profile lines, which measure at a depth of c 1.5 and 2m respectively also indicate the position of the external ditch between 6m and 8m. Although these measurement depths are deeper than the ditch, again, the resistivity of the material below the cut feature will be affected by changes in drainage and moisture content caused by the ditch.

As the 1995 surveys suggested, the 2m and 3m inter-electrode spacing measurements again appear to be the most responsive to the features known from the excavations to be present. Resistivity rises at either side of the ditch in the 2m profile line could be in response to the gravel patches at the outer edges of the ditch bottom.

PROFILE ACROSS THE CROPMARK SECTION OF THE DYKE

The 1996 profile at the SE end of the Cleaven Dyke lay across both ditches and the bank of the Dyke, in the arable field just west of the wood, and c 30m out from the corner of the field (illus 61). The ditches, and to a lesser extent, the bank can be seen to affect the resistivity measurements, even though the monument is ploughed-out here. The southern ditch appears in the profile from 0 to 3m. The following resistivity rise is in response to the bank material. The profiles show a disturbance from c 3m to 33m, in the form of increased resistance at the start of the profile line, changing to a decreased resistance approaching the 33m measuring point. This may represent the spread of the bank material under the plough, with its combination of sands and gravels, and more humic turf edges producing local variations in the resistive qualities of the cultivated soils. The sharp drop in resistance at 25m on the 4m profile line on the northern edge of the bank area probably represents the turf revetment used in the bank’s construction, although, less likely, it may relate to a ditch at the base of the bank. Several of the aerial photographs of the SE cropmark show the edges of the bank to be defined by two darker, presumably more water-retentive, lines (eg CUCAP print DD 58); on
The results of the geophysical investigations at the Cleaven Dyke suggest the following:

1. At the NW end what may be the southern ditch of the cursus can be detected in the arable field up to profile E.

2. There is evidence for what may be an inner ditch from profiles B to F, which may be a continuation of the southern ditch next to the mound, as located by Adamson (in its correct location).

3. The NW end of the Dyke does not affect the resistivity profile 15m from the terminal bank. At this distance from the bank, the resistance values indicate an undisturbed profile to a maximum depth of 2m.

4. The profile across the cropmark portion of the Dyke, at the SE, indicates low-resistance features flanking the bank on either side. These may be caused by a depth of water-retentive material, probably the turf.

c. 33m to 42m implies the presence of the berm, and the rise and sudden fall in values from here to the end of the profile indicates the northern ditch. The anomaly relating to this ditch again displays the shoulder effect that the Wenner array produces at the edge of some cut features, as was discussed for the extant northern ditch above.

We await the results of the soil analyses for Littleour. If, as is suspected, the iron takes a form other than magnetite or maghemite, even though there has obviously been burning or at least decay of organic matter in some of the postholes at Littleour, we hope to take this study further. We feel that it is important to determine the form of the iron present at Littleour, and whether it is being converted into a form that cannot be detected by magnetometers. This is obviously an important question, specially given the difficulties often associated with producing coherent survey results in Scotland.

On a brighter note, we appear to be achieving consistently good and informative results using resistivity profiling. Apart from the results at the Cleaven Dyke, we have experienced successes at Ardoch Roman Fort (Johnson, in press), and the Lamington Roman Temporary Camp and Iron Age Fort in the Clyde Valley (Bertok 1997).

5.3 ESTIMATING SOIL LOSS FROM CROPMARK SITES: USING THE CAESIUM 137 METHODOLOGY AT LITTLEOUR

Andrew N Tyler, Donald A Davidson & Ian C Grieve

The implementation of policies for the protection of archaeological sites necessitates both evaluation of their archaeological importance and assessment of the risk of partial or total damage by natural or human agencies. One major process affecting archaeological features such as cropmark sites in the rural environment is soil erosion and there is thus a need to develop methods for assessing erosion rates and potential risk to such sites.
This need for erosion risk assessment is predicated upon evidence for recent increases in soil erosion. Several recent reports have highlighted the areal incidence of soil erosion in England and Wales (eg Skinner & Chambers 1996). Although the significance of soil erosion in Scotland has been questioned (Frost & Speirs 1996), there is significant evidence for severity of soil erosion in both the lowlands (Kirkbride & Reeves 1993; Davidson, DA & Harrison 1995) and the uplands (Grieve et al 1995). A range of factors is thought to have contributed to an increased incidence of erosion in recent decades, including changes in cropping patterns towards more autumn-sown cereals, increases in livestock pressure, increases in rainfall during the autumn and winter when soils are generally bare, deterioration of field drainage systems and degradation of soil properties such as content of organic matter. Erosion is certainly more prevalent in fields under autumn-sown cereals (Skinner & Chambers 1996) and where cultivation is up and down the slope of the field.

A major difficulty in the assessment of soil erosion risk has been the problem of acquiring reliable data on erosion rates over several decades. Soil erosion events are episodic and risk cannot be assessed from measurements based on individual erosion events or over
a typical two-three year research project. Knowledge of rates of soil loss measured over the medium term of a few decades is essential if meaningful assessments of the risk from soil erosion to features such as cropmark sites are to be made. The development of techniques of estimating erosion rates from Caesium 137 (137Cs) determinations (Walling & Quine 1991) is applicable at this time-scale but suffers the considerable drawback for use on archaeological sites since it necessitates excavation of soil cores and thus considerable site disturbance. However, recent research has led to the development of in situ methods of measuring total 137Cs activity and its vertical distribution using a detector sited on a tripod above the ground (Tyler et al. 1996a, 1996b). Such methods offer exciting possibilities for estimating medium-term erosion rates directly in the field without site disturbance.

137Cs, which has a relatively long half-life of 30.2 years, was released into the atmosphere during atomic weapon testing in the 1950s and 1960s. Following deposition on the soil, the positively charged Cs+ ion is irreversibly adsorbed on illite clays in a similar manner to potassium ions (Walling & Quine 1991). In an undisturbed site the vertical distribution of 137Cs activity in the soil approximates an exponential decline with depth, but in cultivated soils the added 137Cs is mixed uniformly through the plough layer. 137Cs activity within a soil core can be lost when the fine clay particles to which the 137Cs ions are adsorbed are eroded by water or wind. Increases in 137Cs activity result from deposition of eroded particles. The mean net erosion or deposition over the period since weapon testing began can then be estimated from the total 137Cs activity, provided the initial 137Cs added to the site by atmospheric deposition is known. The initial Cs can be estimated from measurements of 137Cs activity at nearby undisturbed control sites.

We have measured 137Cs activity on core samples and by in situ methods along a number of transects across a field at the Littleour site. Our aims were:

1. to compare soil erosion rates estimated from 137Cs activity measurements from soil core samples and directly from in situ measurements;
2. to examine the spatial pattern of erosion rates at the Littleour site;
3. to assess the significance of soil erosion for archaeological conservation both at the Littleour site and for Scottish cropmark sites more generally.

We used two sites in uncultivated grassland at the edge of the field to determine total 137Cs activity at undisturbed sites. Measurements at these sites provided the control data against which gains and losses of the 137Cs activity, and hence soil, were estimated.

**MATERIALS AND METHODS**

The Littleour structure is located within a field c. 6ha in area (illus 62). The structure is sited on a gently sloping bend towards the upper boundary of the field, and from this area there is a convexo-concave slope down to the lower boundary. Soils are humus-iron podsols of the Corby series derived from fluvo-glacial sands and gravels. Textures are loamy sand or sand and the cultivated Ap horizon varies in thickness down the slope of the field from c. 0.2m to more than 0.5m. At the time of sampling the field was uncultivated and in set-aside.

Soil sampling points were spaced according to slope characteristics and located along transect lines from the bend down the convexo-concave slope along the line of maximum slope angle (illus 62). The field boundaries and sampling points were accurately surveyed in May 1996 using an EDM to locate points relative to known bench marks and differential GPS to provide absolute co-ordinates for the survey points. Illustration 62 shows the locations of the sampling points within the field. One transect was sampled during 1995 and core samples at 050mm or 25mm vertical intervals were obtained from six points for laboratory determination of 137Cs activity. This provided preliminary estimates of soil erosion rates for six points reported previously (Tyler et al. 1995).

In situ measurements of 137Cs activity were made in May 1996 at sites L1-L6 (illus 62). At each site an n-type 35% relative efficiency HPGe detector was used to collect γ ray emission spectra for periods of up to 8000s. The detector was sited on a tripod at a height of 1m above the ground, giving a field of view of approximately 10m radius.

Core samples were obtained from five points at each of sites L2-L6, located according to a systematic sampling scheme within the theoretical field of view of the spectrometer. Depending on the stone content of the soil, either a cylindrical core 105mm in diameter was extracted or a small pit was dug and a column with surface area 2.5cm² excavated. The core or column was sectioned at pre-determined depth intervals to provide samples of known volume. A detailed analysis of the vertical distribution of 137Cs activity was obtained by subdividing at 0.05m intervals from 0 to 0.15m, 025mm intervals from 0.15m to 0.25m, and at 0.50mm intervals to 0.3m. The 0.25m samples between 0.15m and 0.25m permitted more accurate definition of the base of the ploughed layer.

At sites LG1 and L7, samples were obtained from a single pit subdivided at the same depth intervals to measure total and vertical distribution of 137Cs activity in the laboratory. At sites L8-L19, samples were obtained from the 0.0-0.15m and 015-0.3m layers in a single pit to measure total 137Cs activity.

Mass of all samples was determined on return to Stirling and used with field volume to calculate field-moss bulk density. Samples were then oven-dried and re-weighed. Moisture content and dry bulk density were calculated from the oven-dry mass. The samples were then ground and packed into sample chambers. The n-type 35% relative efficiency HPGe detector was used to collect γ ray emission spectra in the laboratory. Counting times varied from 20,000 to 40,000s depending on the activity of the sample.
THE CLEAVEN DYKE AND LITTLEOUR MONUMENTS

EROSION RATE ESTIMATION

Simple conversion of $^{137}$Cs activity estimates (Bq m$^{-2}$) to erosion rates as mm a$^{-1}$ were made by:

1. the directly proportional technique to estimate soil lost from the ploughed layer (assumed to be 0.2m), where the erosion rate $E$ (mm a$^{-1}$) is estimated from:

$$E = M \left( \frac{C_i - C_r}{C_r} \right) \frac{1}{n}$$

2. Kachanoski's (1993) power function model, where $E$ is estimated from:

$$E = M R^{-1} \left[ 1 - \left( \frac{C_i}{C_r} \right)^{\frac{1}{n}} \right]$$

where $M$ is the depth of the ploughed layer, $C_i$ is the $^{137}$Cs activity (Bq m$^{-2}$) at any one point, $C_r$ is the reference site $^{137}$Cs activity, $n$ is the number of years since $^{137}$Cs deposition, and $R$ is the ratio of the concentration of $^{137}$Cs in the eroding sediment to that in the ploughed layer (here assumed to be 1).

RESULTS

SOIL CORE DERIVED EROSION RATES ESTIMATES

Illus 62 shows the sample locations at the Littleour site in relation to the cropmark site. Illustration 63 shows the vertical activity distributions across the area of marked topographic change, CL1 to CL6, sampled in 1995. The results show a relatively uniform activity distribution with depth to about 0.2m. Illustration 64 shows an example of the spatial variability of the $^{137}$Cs depth distribution.

Illus 63
$^{137}$Cs activity distributions observed in the samples collected along the 1995 pilot Transect: CL 1 = 2.4 Bq m$^{-2}$; CL 2 = 1.42 Bq m$^{-2}$; CL 3 = 1.70 Bq m$^{-2}$; CL 4 = 1.84 Bq m$^{-2}$; CL 5 = 1.38 Bq m$^{-2}$; CL 6 = 2.27 Bq m$^{-2}$.

Illus 64
Variation in the vertical distribution of $^{137}$Cs activity. Total activities for each site are: L 3/1 = 2.04 kBq m$^{-2}$, L 3/2 = 1.91 kBq m$^{-2}$, L 3/3 = 1.82 kBq m$^{-2}$, L 3/4 = 1.71 kBq m$^{-2}$, L 3/5 = 1.69 kBq m$^{-2}$.
sampled at site L3 in 1996. Here more detail is observed in the soil profile and the depth of the ploughed layer is observed to be about 0.22m, although this does vary slightly. Both legends of illustrations 63 and 64 show the variation in the total $^{137}$Cs activity loading at each site.

Total $^{137}$Cs activity and calculated erosion (negative) and deposition (positive) rates are shown in table 15. When comparing time-scales, and differences in the ploughed layer depth, estimates shown in table 15 are directly comparable to Kachanoski’s erosion rate estimates derived from erosion plots and his regression model (Kachanoski 1987).

It should be noted that it is standard practice to assume that the ploughed layer depth is 0.2m. Evidence shown here suggests that this assumption may lead to 10% or more underestimation in the erosion rate estimate. However, we recognise that the directly proportional methodology may lead to an overestimate in the erosion rate as a result of, for example, particle selectivity in the erosion process (Quine 1995). These opposing systematic influences may cancel each other out to some degree.

Illustration 65 shows a simple contour map of the erosion rates estimated by the directly proportional technique, superimposed on the aerial photograph of the Littleour site. The erosion rate over the cropmark site was estimated through spatial interpolation and is likely to be of the order of 0.5mm a$^{-1}$.

Illus 65
Soil erosion rates in mm a$^{-1}$. 
88 ♦ THE CLEAVEN DYKE AND LITTLEOUR MONUMENTS

<table>
<thead>
<tr>
<th>Site No.</th>
<th>Soil Sample Results</th>
<th>Directly Proportional Model</th>
<th>Kachanoski Power Function</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Activity kBq m⁻¹</td>
<td>error mm a⁻¹</td>
<td>error mm a⁻¹</td>
</tr>
<tr>
<td>CL 1 R</td>
<td>2.40 0.30</td>
<td>0.00 0.00</td>
<td>0.00 0.18</td>
</tr>
<tr>
<td>CL 2</td>
<td>1.42 0.18</td>
<td>-1.94 0.29</td>
<td>-2.48 0.18</td>
</tr>
<tr>
<td>CL 3</td>
<td>1.70 0.24</td>
<td>-1.39 0.22</td>
<td>-1.64 0.19</td>
</tr>
<tr>
<td>CL 4</td>
<td>1.84 0.14</td>
<td>-1.11 0.15</td>
<td>-1.26 0.15</td>
</tr>
<tr>
<td>CL 5</td>
<td>1.38 0.20</td>
<td>-2.02 0.31</td>
<td>-2.62 0.19</td>
</tr>
<tr>
<td>CL 6</td>
<td>2.27 0.15</td>
<td>-0.26 0.04</td>
<td>-0.27 0.14</td>
</tr>
</tbody>
</table>

October 1995 Results

<table>
<thead>
<tr>
<th>Sample</th>
<th>Activity kBq m⁻¹</th>
<th>error mm a⁻¹</th>
<th>error mm a⁻¹</th>
</tr>
</thead>
<tbody>
<tr>
<td>L 1 R</td>
<td>2.37 0.40</td>
<td>-0.06 0.01</td>
<td>-0.06 0.21</td>
</tr>
<tr>
<td>L 2</td>
<td>1.93 0.40</td>
<td>-0.93 0.19</td>
<td>-1.04 0.24</td>
</tr>
<tr>
<td>L 3</td>
<td>1.90 0.13</td>
<td>-0.99 0.14</td>
<td>-1.11 0.14</td>
</tr>
<tr>
<td>L 4</td>
<td>1.64 0.15</td>
<td>-1.51 0.21</td>
<td>-1.81 0.16</td>
</tr>
<tr>
<td>L 5</td>
<td>1.37 0.18</td>
<td>-2.04 0.30</td>
<td>-2.65 0.18</td>
</tr>
<tr>
<td>L 6</td>
<td>1.48 0.20</td>
<td>-1.83 0.28</td>
<td>-2.29 0.18</td>
</tr>
<tr>
<td>L 7</td>
<td>1.44 0.13</td>
<td>-1.90 0.26</td>
<td>-2.42 0.15</td>
</tr>
<tr>
<td>L 8</td>
<td>3.13 0.20</td>
<td>1.45 0.22</td>
<td>1.27 0.14</td>
</tr>
<tr>
<td>L 9</td>
<td>2.06 0.17</td>
<td>-0.67 0.10</td>
<td>-0.73 0.15</td>
</tr>
<tr>
<td>L 11</td>
<td>2.42 0.17</td>
<td>0.04 0.01</td>
<td>0.04 0.14</td>
</tr>
<tr>
<td>L 12</td>
<td>1.82 0.12</td>
<td>-1.15 0.16</td>
<td>-1.31 0.14</td>
</tr>
<tr>
<td>L 13</td>
<td>2.47 0.18</td>
<td>0.14 0.02</td>
<td>0.14 0.14</td>
</tr>
<tr>
<td>L 14</td>
<td>3.00 0.20</td>
<td>1.19 0.18</td>
<td>1.07 0.14</td>
</tr>
<tr>
<td>L 15</td>
<td>2.26 0.18</td>
<td>-0.28 0.04</td>
<td>-0.29 0.15</td>
</tr>
<tr>
<td>L 16</td>
<td>2.17 0.17</td>
<td>-0.46 0.07</td>
<td>-0.48 0.15</td>
</tr>
<tr>
<td>L 17</td>
<td>3.39 0.20</td>
<td>1.96 0.30</td>
<td>1.65 0.14</td>
</tr>
<tr>
<td>L 18</td>
<td>3.60 0.21</td>
<td>2.38 0.37</td>
<td>1.94 0.14</td>
</tr>
<tr>
<td>L 19</td>
<td>2.82 0.19</td>
<td>0.83 0.12</td>
<td>0.77 0.14</td>
</tr>
</tbody>
</table>

May 1996 Results

<table>
<thead>
<tr>
<th>Sample</th>
<th>Activity kBq m⁻¹</th>
<th>error mm a⁻¹</th>
<th>error mm a⁻¹</th>
</tr>
</thead>
<tbody>
<tr>
<td>L 1 R</td>
<td>2.37 0.40</td>
<td>-0.06 0.01</td>
<td>-0.06 0.21</td>
</tr>
<tr>
<td>L 2</td>
<td>1.93 0.40</td>
<td>-0.93 0.19</td>
<td>-1.04 0.24</td>
</tr>
<tr>
<td>L 3</td>
<td>1.90 0.13</td>
<td>-0.99 0.14</td>
<td>-1.11 0.14</td>
</tr>
<tr>
<td>L 4</td>
<td>1.64 0.15</td>
<td>-1.51 0.21</td>
<td>-1.81 0.16</td>
</tr>
<tr>
<td>L 5</td>
<td>1.37 0.18</td>
<td>-2.04 0.30</td>
<td>-2.65 0.18</td>
</tr>
<tr>
<td>L 6</td>
<td>1.48 0.20</td>
<td>-1.83 0.28</td>
<td>-2.29 0.18</td>
</tr>
<tr>
<td>L 7</td>
<td>1.44 0.13</td>
<td>-1.90 0.26</td>
<td>-2.42 0.15</td>
</tr>
<tr>
<td>L 8</td>
<td>3.13 0.20</td>
<td>1.45 0.22</td>
<td>1.27 0.14</td>
</tr>
<tr>
<td>L 9</td>
<td>2.06 0.17</td>
<td>-0.67 0.10</td>
<td>-0.73 0.15</td>
</tr>
<tr>
<td>L 11</td>
<td>2.42 0.17</td>
<td>0.04 0.01</td>
<td>0.04 0.14</td>
</tr>
<tr>
<td>L 12</td>
<td>1.82 0.12</td>
<td>-1.15 0.16</td>
<td>-1.31 0.14</td>
</tr>
<tr>
<td>L 13</td>
<td>2.47 0.18</td>
<td>0.14 0.02</td>
<td>0.14 0.14</td>
</tr>
<tr>
<td>L 14</td>
<td>3.00 0.20</td>
<td>1.19 0.18</td>
<td>1.07 0.14</td>
</tr>
<tr>
<td>L 15</td>
<td>2.26 0.18</td>
<td>-0.28 0.04</td>
<td>-0.29 0.15</td>
</tr>
<tr>
<td>L 16</td>
<td>2.17 0.17</td>
<td>-0.46 0.07</td>
<td>-0.48 0.15</td>
</tr>
<tr>
<td>L 17</td>
<td>3.39 0.20</td>
<td>1.96 0.30</td>
<td>1.65 0.14</td>
</tr>
<tr>
<td>L 18</td>
<td>3.60 0.21</td>
<td>2.38 0.37</td>
<td>1.94 0.14</td>
</tr>
<tr>
<td>L 19</td>
<td>2.82 0.19</td>
<td>0.83 0.12</td>
<td>0.77 0.14</td>
</tr>
</tbody>
</table>

-ve indicates erosion rate
+ve indicates accumulation rate
R Samples collected on assumed uneroded sites (control sites)

Table 15

<table>
<thead>
<tr>
<th>CI 1R</th>
<th>CI 2</th>
<th>CI 3</th>
<th>CI 4</th>
<th>CI 5</th>
<th>CI 6</th>
</tr>
</thead>
<tbody>
<tr>
<td>1R</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>R</td>
<td>R</td>
<td>R</td>
<td>R</td>
<td>R</td>
<td>R</td>
</tr>
</tbody>
</table>

-ve indicates erosion rate
+ve indicates accumulation rate

In situ derived erosion rates estimates

Illustration 66 shows the vertical distribution of ¹³⁷Cs activity in terms of mass depth (g cm⁻²) at site 3. Variations in soil density play an important part in changing the observed linear vertical distribution. These changes must be accounted and corrected for when calibrating in situ gamma spectrometers.

Tyler et al. (1996a) showed how calibration corrections can be made for variations in the vertical activity concentration which can influence the detector response. The ratio of the full energy peak area to forward scattered step in the spectrum was shown to be sensitive to small changes in the vertical activity distribution and can be used to derive an in situ calibration correction. Illustration 67 shows an example of an in situ spectrum collected at Littleour. Whilst the

Illus 66
Mass depth distribution profiles of ¹³⁷Cs activity.
enhanced forward scattering can be observed around the 40K peak resulting in the observed step (itself proportional to soil wet bulk density), the 137Cs step is less easily observed, but its presence and magnitude are statistically easy to define given relatively large windows on either side of the 137Cs full energy peak.

Table 16 and illustration 68 show a comparison between in situ derived 137Cs activity estimates and soil core/pit derived estimates. From the replicate samples collected at sites L3 and L4, considerable spatial variability in total activity and activity distribution with mass depth within the detector field of view is evident. For example, a 2σ

<table>
<thead>
<tr>
<th>Site No.</th>
<th>137Cs</th>
<th>QCs</th>
<th>Activity</th>
<th>β</th>
<th>δ</th>
<th>Directly proportional</th>
<th>Kachanoski Power func.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>kBq m⁻²</td>
<td>g cm⁻²</td>
<td>g cm⁻²</td>
<td>mm a⁻¹</td>
<td>mm a⁻¹</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ref. Site (not eroded)</td>
<td>2.4±0.3°</td>
<td>0.0</td>
<td>0.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>L2</td>
<td>1.85±0.10</td>
<td>2.6±0.1</td>
<td>1.9±0.3°</td>
<td>22.8±2.8°</td>
<td>40.0±3.6°</td>
<td>-1.1±0.14</td>
<td>-1.24±0.13</td>
</tr>
<tr>
<td>L3</td>
<td>1.94±0.10</td>
<td>2.3±0.1</td>
<td>1.9±0.13</td>
<td>24.0±1.7</td>
<td>39.4±2.4</td>
<td>-0.91±0.12</td>
<td>-1.0±0.13</td>
</tr>
<tr>
<td>L4</td>
<td>1.75±0.10</td>
<td>2.5±0.1</td>
<td>1.6±0.15</td>
<td>17.7±1.2</td>
<td>31.0±4.0</td>
<td>-1.3±0.16</td>
<td>-1.5±0.21</td>
</tr>
<tr>
<td>L5</td>
<td>1.36±0.10</td>
<td>3.0±0.2</td>
<td>1.37±0.18°</td>
<td>19.6±2.5°</td>
<td>33.0±4.0°</td>
<td>-2.1±0.33</td>
<td>-2.69±0.42</td>
</tr>
<tr>
<td>L6</td>
<td>1.78±0.10</td>
<td>2.5±0.1</td>
<td>1.48±0.20°</td>
<td>25.5±3.0°</td>
<td>41.0±4.0°</td>
<td>-1.23±0.16</td>
<td>-1.42±0.18</td>
</tr>
<tr>
<td>L7</td>
<td>1.53±0.13</td>
<td>2.6±0.3</td>
<td>1.44±0.20°</td>
<td>25.5±3.0°</td>
<td>41.0±4.0°</td>
<td>-1.3±0.33</td>
<td>-2.1±0.4</td>
</tr>
</tbody>
</table>

Poisson errors on QCs are calculated from 1σ errors within each region and are dominated by the error on full energy peak A. Error on in situ 137Cs are estimates are controlled by the error on A and initial calibration site error (site 3). Spatially weighted standard errors are quoted on soil core activity estimates. Erosion rate estimates incorporate additional error from the reference site estimate and the dry specific mass per unit area. ° Estimated from a single core/soil pit. Not sufficient core data or range in values to calibrate to β or mass depth of ploughed layer. °° Estimated from 1995 data set. °°°Laboratory sample analyses incomplete.

Table 16
Comparison of erosion rates derived from in situ spectrometry and soil core samples.
coefficient of variation of about 30% for total $^{137}$Cs activities estimated from soil cores is observed at each site. Table 16 shows a comparison of activities determined by laboratory and in situ methods and activity distributions in terms of mean mass depth distributions $(b)$ and mass depth of the ploughed layer $(d)$. There is excellent agreement between the $^{137}$Cs activity measurements from both techniques when the analytical and sampling errors are considered. Changes in the observed QCs, whilst not yet calibrated to $b$ or $d$, demonstrate changes in the mass depth distribution of activity. As expected, a comparison between QCs and the mass depth functions for sites 3 and 4 (estimates derived from five cores each) suggests an increase in QCs with decrease in $b$ or $d$. Without the complete set of results it is difficult to define the relationship between mass depth distribution of activity and QCs. The incorporation of a spectrally derived calibration correction coefficient would improve the relationship between core derived $^{137}$Cs activity and in situ derived $^{137}$Cs activity estimates.

Conversion to erosion rates used exactly the same methodology as given above.

**ILLUS 68**
Relationship between full soil core and in situ derived $^{137}$Cs activity estimates (Bq m$^{-2}$).

**DISCUSSION**

Within the field studied at Littleour, redistribution of soil over the last 43 years has resulted in a pronounced spatial pattern of erosion and deposition. The maximum erosion rate of just over 2 mm a$^{-1}$ was found on the slope and the maximum deposition of just over 2 mm a$^{-1}$ was found at the base of the slope in the southern corner of the field. Both the directly proportional and power function calculations indicate a similar pattern and this is consistent with the downslope variations shown by the in situ measurements. The location of the zone of maximum accumulation can also be seen from the aerial photograph (illus 65) to be directly downslope from the dominant direction of ploughing within the field, further confirming the relationship between ploughing direction and soil redistribution.

By interpolation from this spatial pattern, an erosion rate of at least 0.5 mm a$^{-1}$ can be proposed for the area of the cropmark since about 1953. This estimate is based on the redistribution of $^{137}$Cs activity since the start of atomic weapon testing which peaked in 1964. Even taking into account the errors associated with this estimate, as discussed earlier, the erosion rate at the crop site is markedly higher than the soil loss tolerance value of 0.1 mm a$^{-1}$ which Evans (1981) considers appropriate to UK conditions. Thus the immediate and obvious implication from the Littleour investigation is that, if the average erosion rate which has been present for the last c.43 years continues, the net result will be an overall thinning of the depth of topsoil. Further ploughing at the site will have the effect of penetrating to an increasing depth into the Bs horizon and this will lead to damage to, and ultimately loss of, the archaeological features cut into it.

Looking at the pattern in more detail, however, it can be seen that at comparable locations to the cropmark, just above the edge of the slope (e.g. at L2 and CL2) annual loss rates of 0.93 mm and 1.94 mm per annum have been recorded. This may confirm the suggestion that sites close to the edges of slopes are the most vulnerable to soil erosion effects thus it is conceivable that the erosion rate experienced over the cropmark site is closer to 1 mm a$^{-1}$ than to 0.5 mm a$^{-1}$.

The depth of the topsoil (Ap horizon) on the excavated site ranges from 0.2 m to 0.3 m. In the lower part of the field where deposition is dominant, the depth of topsoil (Ap and A horizons) is between 0.5 m and 0.6 m. A simple calculation thus suggests that a loss of 0.15 m from the area of the cropmark could account for the observed increase in thickness in the lower part of the field. On the basis of the estimated erosion rate of at least 0.5 mm a$^{-1}$ the accumulation of soil in the lower part of the field could have been achieved over a period of up to 300 years. It seems likely, however, that an acceleration in erosion rate has occurred during this time, with greater erosion rates following the introduction of new cultivation and cropping techniques since 1945. The recent pattern of increasing rainfall during the winter months in central Scotland may also have contributed to greater erosion rates in the recent past (Davidson, DA & Harrison 1995).
CONCLUSIONS

1 The erosion rate of at least 0.5mm per annum within the past few decades has important implications for cropmark sites on erodible soils derived from fluvio-glacial sands and gravels. Such sites must be deemed to be subject to potentially serious erosion in both the short and long term under current conditions.

2 Considerable spatial variability in rates of erosion within the field was identified and this demonstrates the need for detailed in situ investigations of soil erosion rates at such sites.

3 The in situ method provides estimates of the underlying spatial change at temporal scales appropriate for field systems. It has the additional advantages of being non-invasive and, by integrating activity measurements over a relatively large area, avoiding the errors associated with spatial variability of soil cores.

4 The potential reliability of the in situ method is clear from the close agreement between the erosion and deposition rate estimates derived from this method and those derived from detailed field sampling and laboratory analysis of soil cores.

5 Rapid methods using in situ gamma ray spectrometry thus have the potential to quantify soil erosion rates which can then be considered as part of a wider policy to conserve archaeological sites and landscapes.
CURSUS MONUMENTS AND BANK BARROWS OF TAYSIDE AND FIFE

Kenneth Brophy

In this section, I will discuss two monument types—cursus monuments and bank barrows—the physical characteristics of which define the Cleaven Dyke. Although both types occur throughout Britain, I will consider mainly the sites closest to the Cleaven Dyke, those in Tayside and Fife.

These monument classes (mainly appearing as cropmarks) are currently defined solely by their morphology, based on often arbitrary length and width limitations. Only two sites within these classifications have been excavated in the study area: the Cleaven Dyke, and a pit-defined rectilinear enclosure at Douglassmuir, Angus (Kendrick 1995); little more than superficial examination of the general landscape locations has been undertaken for any of the other sites (Brophy 1995).

The concentrated programme of aerial reconnaissance in Scotland which began in the 1970s, along with the re-interpretation of existing photographs, and a growing awareness on the part of those interpreting and taking aerial photographs that these sites exist in Scotland, has increased the known number of possible cursus and bank barrow sites from one or two to over 40. This cropmark record has flaws—it is inevitably biased towards gravel lowlands and river valleys, and the drier east of Scotland, where cropmarks more often appear (Hanson & Macinnes 1991). However, it has also shown the wide variety of sites regarded as belonging to these monument classes within Scotland.

I will consider first the cursus monuments, looking in turn not only at the archaeological characteristics of each site but also at its location within the general topography. I will then describe the only bank barrow identified in the study area, Kilmany in Fife, and look more generally at these sites across Scotland. Finally, I will briefly consider the relationships between these linear monuments and the natural world in their construction and usage. The Cleaven Dyke, which has the characteristics of both bank barrow and cursus, must be considered as only one aspect of the 'ritual' life of the Neolithic of this area, to be viewed against a rich and varied background of linear monumentality.

6.1 THE CURSUS MONUMENTS

WHAT IS A CURSUS MONUMENT?

Cursus monuments are found across Britain, primarily located in lowland river valleys or the chalklands of southern England. It was not until the early 1970s that their existence in Scotland was recognised (Williams & Anderson 1972). The 30 or so cursus sites now identified in Scotland (illus 69), including the few excavated examples, have shown a wide variation in size and form of definition, more so than that in the sites across the rest of Britain.

All cursus monuments share the common feature of being long, or even very long, rectilinear enclosures, usually defined either by a ditch enclosing the site with a bank running along the inner edge of the ditch, or, in many cases in Scotland, by pits (which may or may not have held wooden posts). Length and width can vary greatly, from the Dorset cursus, roughly 10km long, to the Douglassmuir enclosure, only 65m long. The common linear form does not, of course, mean that they were all used in the same way and for the same purpose, nor that they had the same meaning for the people who built them. Furthermore, in their builders’ eyes, members of different archaeological categories may have been quite closely related in meaning or function.

Loveday and Petchey (1982) attempted to classify cursus monuments by length (and to a lesser extent, width), and shorter sites were removed from the class altogether. It seems difficult to class together monuments which appear so different in character, and perhaps it is better first to look at monuments individually, rather than part of a larger class. I will therefore make no attempt to break
Illus 69
Distribution map of cursus monuments and bank barrows in Scotland.
down the 'cursus' label any further in the study area, but rather, will consider instead the individual properties of each site.

I have already mentioned that some cursus sites are defined by posts or pits. This appears present at present to be a purely Scottish phenomenon. Maxwell (1979) was the first to suggest that these sites were cursus monuments. Morphologically, they are 'cursus-like' in form, but have no visible earthwork component (although there is no surviving evidence for banks at many ditched sites). Two excavated pit-defined enclosures in Scotland have been shown to have held posts, and have produced Early Neolithic dates (Douglasmuir, Kendrick 1995; Bannockburn 2, Stirlingshire, Rideout forthcoming), while another (Bannockburn 1) has been shown to consist of pits with complex histories of re-use and deliberate backfilling. In other periods of prehistory alignments of pits have been shown to be quarry pits for accompanying continuous earthen banks (Strong 1988).

Construction dates in Britain seem to vary from the Early to the Late Neolithic, although unequivocal dating evidence is scarce, and increasingly it is recognised that some sites may have had several phases of construction. Many show evidence for being foci for activity long after the initial building, in the form of later burials and through the continued construction of monuments, either around the cursus or sharing its alignment. Most cursus monuments are associated in some way with other sites, including causewayed enclosures and henges, round barrows and ring-ditches, long barrows and 'long mortuary enclosures', timber circles and stone circles. These relationships range from alignments and intervisibility, to actually being incorporated in the monument itself.

The location within the landscape is a further common feature which these sites seem to share. They are usually located within river valleys, on low-lying gravel river terraces and flood plains: there are very few cursus monuments which are not very close to a river. Even the few sites which are situated on the chalk uplands in England are closely associated with rivers and dry valleys. In Scotland, this is certainly the case (see below).

The range of functions represented by cursus monuments remains unclear after over 60 years of excavation. Early antiquarians suggested that the long Wessex cursus monuments were Roman chariot racing arenas (hence the name cursus). Atkinson felt that the Dorset cursus and other cursus monuments might have been ritual avenues: 'it is clear that the function must have been religious or ceremonial, rather than domestic, and the activity which took place in them was of a processional, or at least a linear pattern' (1955, 9). This has been the accepted view for some time, although it is now more than ever being embellished and elaborated. Tilley (1994) studied the Dorset cursus from within the site itself, moving along and through it, experiencing the relationship of monument to landscape. He saw the cursus as playing host to a rite of passage ceremony, involving water, a series of 'surprise' encounters for subjects passing along the cursus, and long barrows incorporated into the cursus itself. In similar fieldwork in Scotland I have also suggested that topography and water were involved in the experiences of moving along cursus monuments (Brophy 1995).

Harding (1995) has suggested that cursus monuments represented an increasing degree of control over the landscape, and movement through the landscape, as the Neolithic went on. They were one aspect of wider social changes, illustrated also by changes in funerary practice from communal to individual graves. The idea of control on the landscape echoes Bradley's suggestion (1993) that cursus monuments were some form of boundary, perhaps between 'wild' and 'domesticated' land. On a more immediate level, cursus monuments have been associated with mortuary activity, partly because of the close relationship both physically and morphologically with 'long mortuary enclosures' and long barrows. Secondary burials have been discovered at several cursus sites.

Many of the new approaches to the so-called 'cursus problem' (Hedges & Buckley 1981) are very personal, indeed subjective, interpretations, reflecting the current trend towards an interpretative archaeology. These interpretations involve looking closely at individual sites, and on a more descriptive than interpretative level, I will now go on to look at the cursus monuments of Tayside: as yet, none are known of in Fife.

THE CURSUS MONUMENTS OF TAYSIDE

Of the 16 cursus monuments in Tayside, 11 are pit-, and five ditch-defined. In particular, the pit-defined sites dominate the known cropmark record of Angus, nine to two. All sites (save one) have low-lying locations, near or on river flood plains and terraces. Only one has been excavated, Douglasmuir, which I will look at first, along with other cursus monuments in the Friockheim area.
The village of Friockheim, near Arbroath, is surrounded by cropmark sites of many periods, including two of the longest known pit-defined cursus monuments, Milton of Guthrie and Balneaves Cottage, close to the substantially smaller enclosure just to the south at Douglasmuir.

The Douglasmuir enclosure was excavated in 1979 and 1980 (Kendrick 1995) in advance of development on the site (illus 70). The pit-defined enclosure was originally identified in one set of aerial photographs from 1970, and excavation revealed an enclosure, 65m x 20m, defined by large postholes. A transverse line of pits divided the enclosure roughly in half. The enclosure itself was fairly irregular, and postholes showed a variety in both spacing and size. Some posts were burnt in situ, and radiocarbon dating of some of this burnt material placed the site within a period of c 4000-3350 cal BC (GU-1210, GU-1469, GU-1470; Kendrick 1995, 33). A large pit lies on the axis of the monument in the northern half.

Artefacts found included sherds of decorated Neolithic pottery and some Beaker sherds (Cowie 1993). Some of
these finds came from a group of pits and postholes to the east of the enclosure. Barclay (1995) interpreted the site as being defined by free-standing timbers, with no roof, perhaps constructed in two stages, the transverse post-line initially being a terminal. He also suggests, however, that alternative explanations might exist, for example, perhaps in two phases laterally (as opposed to transversely), leaving an open ‘E’-shaped structure at one point. The function and meaning of the site remains unclear.

The nearby monuments, Balneaves Cottage and Milton of Guthrie, both have a width only a little larger than Douglasmuir (25m), straight, occasionally oblique, terminals (where visible) and internal divisions. They are, however, both much longer than Douglasmuir. Balneaves Cottage cursus is visible for 500m, running NE-SW. One terminal is visible, at the NE end, and c100m short of this is the only visible internal division (illus 71). The enclosure this defines, just over 100m long, is slightly wider than the rest of the cursus, suggesting two phases of construction, perhaps beginning as a relatively small Douglasmuir-type enclosure, with the longer cursus added later (Loveday 1985). The cursus lies amidst many varying cropmarks, and runs across a gravel terrace above the Lunan Water, terminating short of both sides of the terrace.

Milton of Guthrie, just over 1km to the NW of Balneaves Cottage, is a straight-sided, rectilinear, pit-defined enclosure, almost 600m long, with three visible internal divisions splitting the enclosure into four ‘compartments’ 100-200m long. Both terminals are square (illus 72a; 72b). It is cut by both the A933 and a railway embankment, and has a low-lying location, on the flood plain of the Lunan Water. The eastern terminal lies within 40m of the current course of the river, and is within 150m of the confluence of the Lunan Water and the Vinny Water. This site was originally interpreted as two individual cursus monuments, known as Milton 1 and 2.

There are a further six pit-defined cursus sites in Angus, about which very little is known of any of them. At Newbarns, a few hundred metres from the current coastline, and barely visible on aerial photographs, is a narrow rectilinear enclosure which appears to have at least one internal division, and lies alongside a series of other cropmarks, including an unenclosed settlement and souterrains (presumably much later than the cursus). It runs across a level area, and is lost from visibility at the top of a ‘fossil cliff’ (Pollock 1985).

Further to the north, and inland again, near the village of Inchbare, lies a series of parallel pit-alignments, all with a very similar ENE-WSW alignment (illus 73). These appear to form two pit-defined cursus monuments,
known as Inchbare 1 and 2. One of these (Inchbare 1) was first identified from aerial photographs taken by St Joseph (1976), who described it as an enclosure 20-30m wide, and 200-240m long. The other cursus (Inchbare 2) to the north is of similar dimensions. Only one terminal is visible on either site, a square terminal at the west end of Inchbare 1. The east end of this cursus unfortunately, may have been destroyed by gas and water pipeline laying. Both sites consist of several fairly regular parallel pit-lines; Inchbare 2 is defined by at least six such lines which all follow the same orientation. It is not entirely clear which two actually define the enclosure, if indeed the boundaries were single lines. Another interpretation, that of multiple boundaries, has already been noted for two ditch-defined sites in Scotland—Monktonhall, Edinburgh (Hanson 1984) and Carmichael Cottages, Longforgan (Armit 1996). Like these cursus sites, Inchbare 1 and 2 have been interpreted as Neolithic,
although St Joseph (1976) suggested that they may have had Early Historic origins.

Both Inchbare 1 and 2 lie on the flat gravel flood plain of the West Water, just 1.5km west of its confluence with the North Esk. Both cursus sites are very close to the West Water, and Inchbare 2 is last visible just a few tens of metres from the current course of this river.

Further pit-defined sites in Angus include a wide enclosure at Woodhill, east of Dundee. It is far wider than any pit-defined site which I have mentioned—at least 50m wide—and is visible for over 100m. It is orientated roughly SW-NE, and only the rounded SW terminal is visible. The only internal division is slightly curved also, giving the appearance of being a terminal of a smaller earlier enclosure. The irregular sides curve in to meet the internal division, adding to this effect.

To the west of Dundee, near the village of Longforgan, are two further cursus sites—Star Inn and Carmichael Cottages—one pit-defined, the other ditch-defined. The site at Star Inn Farm (also known as Greystanes Lodge) consists of two short parallel pit-alignments, visible for less than 100m (illus 74). They are roughly 35m apart, and appear to be joined at one end by a curving terminal. A series of cropmarks in and around this ‘cursus’ includes two circular enclosures on the northern lateral pit-line, and an oblong enclosure within the ‘cursus’ itself.
West of Star Inn Farm at Carmichael Cottages is a possible ditch-defined cursus, discovered recently through the re-interpretation of old aerial photographs. The cursus consists of two lateral ditches, 300m long, 60m apart, and with a transverse straight ditch running across the cursus near its west end. There is a double ditch at one point. Armit (1996, 97) notes that: ‘the site occupies a well-defined natural plateau with a moderately steep drop around three sides’, a location shared by many cursus sites.

By way of contrast, one final pit-defined cursus in Angus, Kinalty, near Kirriemuir, sits on slightly higher land (80m above sea level) with no nearby rivers. It is visible as a cropmark for almost 200m, defined by pit-lines 30m apart, with a rounded southern terminal, and one internal division. The lateral pit-lines curve outwards, and then into the junction with the internal division (illus 75), again suggesting at least two phases of construction. It runs across the brow of a ridge, ending at the top of a downward slope. A circular ditched enclosure lies just to the south, on the alignment of the east side, and a few other pit features (enclosures and arcs) are visible in and around the cursus.

To the west of Montrose and the Montrose Basin, south of the village of Barnhead, lies a large cropmark complex (illus 76). Lying on a level plateau in the centre of the valley of the River South Esk (contained within an area defined by the 15m contour line), the cropmarks include a large ditch-defined cursus, square and round barrows, ring-ditches, an unenclosed settlement, a circular enclosure, and a very large subrectangular enclosure (not illustrated: possibly a 19th-century horse-racing track, according to local information: Armit pers comm).

The cursus, known as Old Montrose (or Powis), runs eastward from the western edge of the plateau for just over 600m; it is 75m wide, and has one internal division near the west end. The western terminal, facing up the valley of the South Esk, is obscured by a circular enclosure overlapping it, but appears to consist of short straight sections of narrow ditch, giving the impression of a rounded terminal. The eastern terminal, however, is straight, although set at an angle to the main axis. The cursus widens towards this end, the ditch of the south side describing an outward curve in this sector, in contrast to the much straighter northern ditch. A few breaks are visible along the ditches of this cursus, including two or three around the western terminal ditch, a long stretch of the northern lateral ditch (where the cursus passes through a field which appears to show no cropmarks), and in the centre of the septal ditch. Whether these represent true ‘causeways’ cannot be properly established from aerial photography alone (cf Buckley 1988). The relationship of the Powis cursus with the other cropmark sites is unclear. Several barrows and ring-ditches lie within the line of the cursus, as does part of the large circular enclosure. Excavations at other cursus sites have shown such barrows to be later than the cursus construction (Christie 1963; Reaney 1966). A scatter of flint tools and agate and chalcedony flakes was discovered less than 1km to the south of the cursus (Sherriff 1982) and a flint borer was found to the NE (Stuart pers comm). Certainly, there is much to suggest a long history of activity in this area, possibly from the Mesolithic onwards.

A relationship with barrows has also been noted at Blairhall cursus (Loveday forthcoming), just north of Scone in Perthshire. There are few known cursus monuments in Perthshire and Kinross, the majority of which are ditch-defined. These include Blairhall, which
Illus 77
The cursus monument at Blairhall: a) view (Crown Copyright: RCAHMS); b) plan based on a computer-generated plot of the cropmarks prepared by RCAHMS.
lies within a field full of fascinating cropmarks. The complex is captured best in a series of excellent aerial photographs taken in 1992 (illus 77a). The cursus itself is defined by a pair of narrow ‘wobblly’ ditches 24m apart, and 190m long (RCAHMS 1994a). Both terminals are visible and straight (although the western terminal is not completely clear), and there appears to be one internal division. Two ring-ditches intersect the side ditches towards the east end of the cursus. The cursus may have had two phases of construction, the eastern half being wider and on a slightly different alignment (illus 77b).

At least five ring-ditches, which have been identified as round burial mounds because they appear to have central burials (King 1993), lie in a line, parallel to the cursus which sits less than 100m to the south. Further similar round enclosures lie within this same field, along with a series of confusing linear cropmarks. All lie on a low plateau, cut to the north and east by a stream. The River Tay flows southwards 1.5 km to the west.

To the south of Crieff two cursus monuments face each other across the River Earn; both lie on terrace edges above and overlooking the flood plain of the river. The northern of the two, Broich, is defined by two widely-spaced parallel ditches, both running N-S, up to 80m to 100m apart, and is visible for perhaps 900m, running from the river terrace edge to the town itself, curving slightly and then disappearing beneath school buildings at the edge of the town (Maxwell pers comm). No terminals are visible.

The eastern ditch line is intersected by the edge of a large circular enclosure, c 100m in diameter, with a narrow bounding ditch, near the edge of the river terrace. This enclosure has been partly destroyed in the last few years by development. A small ring-ditch lies within a gap in the western ditch, and this ditch may also pass through the general location of Crieff Barrow, now excavated and destroyed (Childe 1946, 109). A standing stone was located c 100m west of the side of the Barrow.

The cursus itself seems to have been constructed in this particular place partly to exploit the local topography. It terminates at its south end on the edge of the terrace, in a very prominent location. Approaching both southern terminal and terrace edge within the cursus line, one must pass between two large natural hollows, one on the line of each ditch. Standing within them, the view in most directions is obscured other than towards the river and cursus interior. The cursus lies within a large ‘U’ shape formed by the River Earn and a small tributary, the Hoolet Burn, and structurally it mimics the general flow of water, N-S, in this area.

Across the Earn, 1 km to the south, on the opposite terrace at Bennybeg, lies a pit-defined cursus. Its orientation is almost the same as that of Broich, and both lie just above the 40m contour. This cursus enclosure is c 110m long, and 30m to 35m wide. The sides are bowed and both terminals are roughly squared (illus 78). At the N end, an irregular line of pits projects from each of the corners, forming what appear to be ‘horns’. Around this enclosure is a series of pit-defined features, including a clearly-defined pit-circle (Tolan 1988), two short pairs of pit-lines and a few circular and subcircular enclosures. A presumably complete oval/circular enclosure to the E is partially obscured by woodland.

Two further sites near the Cleaven Dyke again illustrate the varied nature of the cursus class in this area. To the north at Milton of Rattray, just outside Blairgowrie, lies a pair of straight parallel pit-lines (illus 79). The pits, in contrast to all other known pit-defined cursus sites, are widely-spaced (4m apart), set in opposing pairs (18m apart), and can be traced for just over 100m (RCAHMS 1994a). This site lies on the flood plain of the River Erich, within 100m of the river itself, and closer still to a stream just to the N. Recent small-scale excavation revealed that at least the pit excavated was shallow and elongated (Brophy 1998).

Four kilometres NW of the Cleaven Dyke, at Mains of Gourdie, aerial photography has revealed an unusual pair
of linear cropmarks. Running N-S, the western ditch is straight and regular, whilst the eastern ditch is very irregular, the distance from the other varying from 12m to 25m. The linear cropmarks run for over 200m and no terminals are visible (illus 80). A small hengiform enclosure lies to the east. Nothing more is known of these sites, and it is difficult to speculate what, if any, relationship they may have had with the Cleaven Dyke. It is interesting to note, however, that Mains of Gourdie lies at the foot of the Hill of Lethendy, on which the Cleaven Dyke aligns to the NW.
6.2 THE BANK BARROWS

WHAT IS A BANK BARROW?

In contrast to cursus monuments, very little has been written about bank barrows, and even less is understood about their function. The name itself is slightly misleading, in that not all identified bank barrows have been associated with primary burial deposits. Like cursus monuments, however, excavation and associations have shown these to be monuments of the earlier Neolithic, probably contemporary with cursus monuments (Bradley 1983).

Essentially, in physical appearance they are massively elongated long barrows, usually with a length well over 100m. When appearing as cropmarks (as most of Scotland's examples do), they are usually differentiated from cursus monuments by their width; bank barrows are much narrower than ditch-defined cursus sites because the ditch lies close to the single central mound, which is built from material quarried from them. Cursus monuments enclose an open rectangular space, bank barrows consist of a single long mound.

Very few of these sites have been identified in Britain. The Cleaven Dyke (which shares features of both bank barrow and cursus monument) and the monument (or pair of monuments?) known as Tom's Knowe/Lamb Knowe, Eskdalemuir, Dumfries and Galloway, are among the best preserved examples known anywhere in Britain (and certainly the longest). Crawford (1938) listed only three bank barrows, all in Dorset, when discussing parallels he had come across in Germany. These included the first excavated bank barrow, at Maiden Castle, which runs through a slightly earlier causewayed enclosure (Wheeler 1943) and for many years served as a type-site, having provided evidence of mortuary practice (although it has been suggested that it pre-dated the barrow (Sharples 1991, 53)). Radiocarbon dating of material from the primary fills of the ditch of the Maiden Castle bank barrow suggests it was built by c 3100 cal BC (OxA-1146) (using calibrations expressed at the 95% level of confidence) (ibid, 103-5).

Bradley (1983) listed six bank barrows across Britain, three outwith Dorset, including the supposed cursus at Scorton, Yorkshire, which after excavation was shown to enclose an axial central mound (Topping 1982) and perhaps offers the closest known parallel to the Cleaven Dyke, particularly as the central mound appeared on aerial photographs as 'a contiguous series of mounds', suggesting segmentary construction. A further narrow rectilinear enclosure, North Stoke, Oxfordshire, has also been excavated (Case 1982). This enclosure, 225m x 9-12m, was visible only as a cropmark (as was Scorton). The silting pattern of the ditches showed no clear evidence of mounds adjacent to their inner edges, leaving little or no room for anything else within the enclosure other than a single central mound. Radiocarbon dating of antler on the bottom of the western ditch has produced a calibrated range of 3620-3350 cal BC (BM-1405), broadly comparable to the estimated date of the Cleaven Dyke.

Loveday defines bank barrows as having 'a length greater than normal, sides parallel, mound of a uniform height....' (1985, 236). He included eight sites as bank barrows, in addition to North Stoke and Scorton. Amongst these was a 100m-long mound of turf and topsoil running through an earlier causewayed enclosure at Crickley Hill, Gloucestershire. A large post stood at one end, and slabs lined the side of the mound (Dixon 1988). Yet Loveday later questioned the validity of this site as a Neolithic bank barrow, suggesting it also possessed the characteristics of an artificial rabbit warren, or 'pillow mound', a type of structure generally built between AD 1600 and 1800, to encourage or establish local rabbit populations. Crickley Hill, in particular, shares several constructional features with pillow mounds, and the unusual location—within a natural gully—again is ideal for encouraging rabbits (Williamson & Loveday 1988). In the absence of full presentation of the excavated evidence this matter remains unresolved.

I will now turn to the only bank barrow so far identified within the study area (save for the Cleaven Dyke), and then consider other sites in Scotland, including the well-preserved earthworks at Eskdalemuir.

KILMANY: A BANK BARROW IN FIFE

Near the small village of Kilmany in north-east Fife, on a valley side overlooking the course of the Motray Water, is the cropmark of a narrow rectilinear enclosure. The enclosure is roughly 180m long, and less than 10m wide, and both terminals are rounded. Although classified as a cursus monument in the NMRS, it is perhaps more aptly described as a bank barrow (Brophy forthcoming). A ring-ditch lies just beyond the eastern terminal, just offset from the line of the bank barrow (Illus 81).
The interpretation of this site as a bank barrow is made on a morphological basis—it is very narrow in appearance, narrower than perhaps we would expect a cursus to be. Its location on a fairly steep valley side differs from that of most cursus monuments. Although the greater part of the length of the enclosure runs along the contour and is level for much of its length, it is still on a higher and more undulating piece of land than most of the monuments described above. It is, however, as with the cursus monuments, close to water.

A closer look at the site itself, and the landscape in which it sits reveals much of interest. The west end of the bank barrow appears to kink slightly to the south. This may be partly because 30m or so of the land on that side of the site drops away dramatically, presumably leaving neither end of the site visible from the other. Nevertheless, similar 'kinks' have been found at the end of other bank barrows in Scotland, at the NW terminal and on the SE side of Section-break Y on the Cleaven Dyke, and the Tom's Knowe terminal of the Eskdalemuir site(s) described below. Changes of alignment can also be seen at two further cropmark bank barrows, Springbank and Redbank, in Dumfries and Galloway, and further afield, the Maiden Castle bank barrow.

The location of Kilmany offers outstanding views upstream, along the valley to the west. Indeed, the structure may align on a gap between two hills a few kilometres to the west, through which the modern A914 road passes. The view downstream—eastwards—is completely obscured from the western end of the site, and only becomes partially clearer as one moves eastward. The Motray Water is visible from anywhere on the bank barrow.

The possible bank barrow at Eskdalemuir, first recognised by RCAHMS (1997), consists of two long mounds, known as Tom’s Knowe and Lamb Knowe, on opposite valley sides of the River White Esk. They run approximately N-S, and have the same general alignment. If originally one monument, they would have formed an earthwork running in a slight curve for over 2km, running down either valley side, and crossing the valley floor and river. Unfortunately, evidence for any central section is now obscured or lost as the result of land improvement and fluvial activity. Both long mounds consist of a bank 5.5m to 6m wide, up to 0.5m high, flanked by a ditch (c. 2.75m to 3m across) on each side, 3.5m from the base of the bank. The Tom’s Knowe sector of the monument can be traced for 255m, Lamb Knowe intermittently for 650m. In each case only the upper terminal has survived. Both terminals have recently been surveyed (RCAHMS 1997), the results making interesting comparisons with some of the Cleaven Dyke's section terminals.

The Tom’s Knowe terminal occupies the southern end of
a natural promontory, set back from its edge and overlooking lower lying land to both the north and south. It consists of a large subcircular mound (interpreted when first discovered as a free-standing burial cairn (Yates 1984, 91–2, No. ED 5)) with an average diameter of 10m, which tapers off into a long mound (illus 82). The chronological relationship here is unclear - which came first? The oval mound is offset from the alignment of the long mound at a slight angle. The ditch continues around this terminal mound.

To the north, the Lamb Knowe terminal occupies a less dominant location, on a hillside with a series of natural spurs of similar appearance to the terminal. The long mound runs gently northwards uphill, gradually narrowing in width until it meets a prominent circular mound, 9.7m in diameter, at the terminal. Again, the ditch surrounds the terminal mound. At both ends, the circular, barrow-like terminals are much more substantial than the adjoining banks.

The phenomenon of bank barrows running towards, or joining, mounds and enclosures has been noted at several other sites across Britain, including Crickley Hill (Dixon 1988, pace Williamson & Loveday 1988), North Stoke (Case 1982), and Pentridge 21 and 22 on Cranborne Chase, Dorset (Bradley 1983). The Cleaven Dyke runs from the relatively massive circular mound at its NW end (and possibly towards another mound at Section boundary Y - section 7.1 below) and Kilmany runs to or from a ring-ditch at its east end. Loveday (1985) suggested that in the cases he identified this was the result of a three-phase linear sequence of development, with enclosures having a long mound added, then a subsequent enclosure constructed at the further end.

Two further cropmarks, interpreted as possible bank barrows, have been discovered recently in Dumfries and Galloway. One of these, Springbank, near Stranraer, appears to have a circular enclosure, roughly 30–40m in diameter, at the single visible terminal. Very little is known of this site and, as a cropmark, it appears as a pair of parallel ditches, fairly close together, with perhaps a major change of alignment near the terminal. Further east along the Solway Firth coastline, at Redbank, is a further pair of ditches, visible as a cropmark for up to 200m. The narrow enclosure they form is fairly sinuous, and appears to define a low mound on the ground (Gannon pers comm). It sits on the lower slopes of Drumbuie Hill, and narrows towards the east end, perhaps being joined to a rounded terminal, where it overlooks a stream.
The final Scottish example was found in 1996 at Muirton in Moray, just south of Lossiemouth (illus 83). A pair of ditches, parallel and fairly regular, runs across two fields for several hundred metres. Muirton is similar in appearance to the North Stoke bank barrow, and lying between the ditches, at what appears to be each end, a large pit is visible. There is a possible circular enclosure nearby.

The very long cairn at Auchenlaich, Callander deserves mention here, as a possible bank barrow-type monument, but built in stone. I am grateful to Dr Sally Foster and Mr J B Stevenson for the following description:

‘Early in 1991, fieldwork by Mrs Lorna Main led to the discovery of a long, apparently artificial, stony mound at Auchenlaich, near Callander, Perthshire. Subsequent examination by staff of the Royal Commission on the Ancient and Historical Monuments of Scotland confirmed Mrs Main’s identification of the mound as the remains of a remarkable chambered long cairn (illus 84) (Foster & Stevenson, forthcoming).

It comprises a trapezoidal chambered cairn, aligned NNW-SSE, with, at its NNW end, a very long stony mound. The mound measures 342m in length overall and varies in width from a maximum of 15m at the SSE end to 11m at the NNW. On the NNW the original mound appears to have been extended by about 20m, on a slightly different alignment, by the addition of a considerable amount of field-cleared stone (although it resembles the ‘terminal deviations’ noted on the Cleaven Dyke and elsewhere), and at three points the mound has been breached by relatively recent trackways. The chambered cairn which forms the SSE end of the mound, has been much-disturbed by stone-robbing, and its original length is difficult to determine, but it was probably trapezoidal on plan, measuring up to 48m in length by 15m in breadth at the SSE end, narrowing to about 11m on the NNW, and now standing to a maximum height of 1.6m (although a pronounced narrowing at c 80m along the length of the monument may mark the end of the ‘normal’ cairn and the beginning of a further phase of construction). There is an apparent swelling of the cairn near its SSE end which corresponds with an increase in the height of the mound, but it is uncertain whether this merely indicates a section of the mound where less stone-robbing has occurred, or suggests that the cairn is of multi-period construction, parallels for which are not hard to find. About 118m from the SSE end of the cairn there are the disturbed remains of a lateral chamber opening from the west side of the mound.’
6.3 DISCUSSION

In this section I have attempted to show the wide range of elongated rectilinear enclosures and mounds, of which the Cleaven Dyke is one. This disparate group of sites classed morphologically as 'cursus monuments' and 'bank barrows' shares two defining physical characteristics—linearity and, often, extreme length. It would be difficult to argue that sites as contrasting as Douglasmuir, Old Montrose, Blairhall and the Cleaven Dyke had the same function and meaning to the people who built them. Yet, this author would argue that they display sufficient similarity for it to be legitimate to consider them together. There are three particular aspects already discussed in relation to individual sites—location, linearity, and the use of natural features of the landscape in both the sitting and use of the enclosures.

The Neolithic period across Britain saw the development and construction of many monument types, generally considered to be of a ritual or mortuary nature. This has included a large variety of linear monuments, including 'mortuary houses', 'long mortuary enclosures', long barrows, houses, small pit-defined enclosures, pit-alignments, avenues, bank barrows and cursus monuments. These have been viewed as parts of a continuum (Loveday & Petchey 1982), defined and broken down into groups by length, or as part of a developing trend of larger and larger linear monuments. Thus, Loveday (1985) saw a link between long mortuary enclosures at one end of the range, and cursus monuments at the other. Bank barrows could thus be seen as simply massively extended long barrows (Ashbee 1970). Loveday (forthcoming) has suggested that cursus monuments may in some cases be intended to represent the idea of field boundaries and rectilinear houses.

Certainly, a degree of overlapping between these 'fixed' categories can be discerned. Bradley (1983) suggested bank barrows and cursus monuments were interchangeable within the Neolithic of Dorset, and Barclay (1995) suggested the same regarding pit-defined and ditch-defined cursus monuments in Scotland. The Cleaven Dyke, as discussed elsewhere in this volume, shares characteristics of both a bank barrow and a cursus monument, and does indeed have a connection with a more conventional long barrow (Herald Hill), which aligns on the same low hill on which the Cleaven Dyke seems to end. The Neolithic rectilinear pit-defined enclosure at Littleour (described in 4 above) sits within view of the cursus. Elsewhere in Scotland, a cursus enclosure at Mill of Fintry, Aberdeenshire, consists of a series of connected enclosures, one pit-defined, the others ditch-defined. The Hollywood North cursus, Dumfries, is ditch-defined, but a line of posts follows the interior edge of the ditch.

The Cleaven Dyke fits into this pattern of ambiguity very well, and it may suggest that the linear nature of such defined spaces may have been more important than how the site was defined. The apparent connections of mortuary practice, ritual, domesticity and control of movement suggests that perhaps we should not so readily break down social life into these distinct categories, but rather see cursus monuments as places where, perhaps through ritual activity, control of movement and exclusion of certain people, any such boundaries in people's minds were blurred. The linear form may have encouraged movement from one experience to another, bringing them together in the participants' minds.

The inclusion of natural features within the architecture of cursus monuments may add a further dimension to this overall view of social life, and add to the complexity of meaning of the sites. The location near rivers has been explained as a factor of practicality—ease of construction on river gravels, and flat space in river valleys and terraces (Loveday 1985). Yet it is difficult to dismiss this constant relationship. Amongst the sites discussed, there are structures aligned on watercourses and on the direction of water flow, dominant terminal locations overlooking rivers and flood plains, sites actually on flood plains, or close to rivers and river confluences, and even one site (Eskdalemuir) possibly crossing water or aligned on a river crossing.

Other features of the natural landscape have also been incorporated into the structure and alignments of cursus monuments—terminals on the edges of plateaux or on promontories, alignments on hilltops or points on the horizon, and subtle changes in topography such as hollows and mounds along the course of cursus and bank barrow sites.

Such relationships—which are only those which we can still observe today—may have been deliberately exploited (and sought after) by those who built the sites. They incorporated the natural world into the humanly constructed architecture of cursus monuments and bank barrows. Recent studies (Bender 1992; Bradley 1993; Tilley 1994, 1996; Richards 1996) have highlighted the significance of places within the natural landscape, places given significance and histories by local people, part of an increasingly culturally defined landscape. Rivers, hilltops, trees, rock outcrops, ridges and valleys may have become parts of ritual pathways and cultural biographies. Later architectural formalisation brought them further into a controlled ritual landscape.

In this brief discussion, I have suggested that cursus monuments and bank barrows were part of increasing
attempts, through monumentality in Scotland’s Neolithic, to connect aspects of social life from burial to domestic life and ritual, and to merge the natural with the cultural. This may have been done through ritual activity contained within, and controlled by, linear enclosures. Connections with water (and so fertility and agriculture), topography, burial and rectangular groundplan may have been drawn together at such sites as the Cleaven Dyke, a focus for generations of users and builders. It is perhaps through programmes of research such as the Cleaven Dyke Project that we can hope to capture most of the elements to which these sites may have imparted a cumulative significance.
THE CLEAVEN DYKE AND LITTLEOUR: CONTEXT, FORM AND PURPOSE

Gwendolen [glibly]: “Ah! that is clearly a metaphysical speculation, and like most metaphysical speculations has very little reference at all to the actual facts of real life, as we know them.’ Oscar Wilde The Importance of Being Earnest, 1895.

7.1 CLEAVEN DYKE: THE CONSTRUCTION OF THE MONUMENT

THE BUILDING SEQUENCE

From the evidence of the new survey and the excavations we suggest that construction of the monument began at the NW terminal, and that the first element was an oval or subcircular burial mound (its axis E-W) of a type common in the area in the Neolithic (eg Pitnacree: Coles & Simpson 1965). Subsequently, a c 80m-long barrow was added to the SE (with defining ditches a few metres from the base of the mound on both sides), but not on the apparent axis of the oval barrow; this mound may itself have been built in two episodes. From the SE end of this mound (segment-boundary A1) the nature of the monument alters; it seems to us that only at this point does the cursus/bank barrow proper begin.

The bank was continued at first on the same line as the long barrow but then re-aligned slightly to the south. It was accompanied by regular quarry-ditches, set further back from the foot of the bank, with the familiar cursus-like spacing. The monument was then constructed in segments, towards the SE, possibly over a prolonged period. Eventually, at a point about 300m along its length, the overall alignment of the Dyke settled down (later perturbations notwithstanding) appearing to point at the hill to the SE where we believe it terminated (illus 85).

The builders felt it necessary, at certain points, to leave gaps in bank and ditches, breaking the monument into

Illus 85
Extract from the RAF vertical aerial photograph (CPE/SCOT/303-3070) of the Cleaven Dyke flown 26 September 1947. The road near the left-hand edge of the photograph is the Perth-Blairgowrie road. To the right (SE) of the road the irregular course of Section C can be seen clearly. Section break Y also shows clearly, as does the more recent circular enclosure overlying the northern ditch at that point. The soil mark of Section E is visible towards the right-hand edge of the photograph. (Crown Copyright: RCAHMS)
five Sections which varied in structural character and scale, and also to leave gaps only in the ditches at certain points. Section C was, in comparison with A and B, very irregular, and terminated at its SE end in a long mound with an oval swelling strongly reminiscent of the NW terminal of the Dyke. That the oval portion of this feature may have had a separate existence, with its own defining ditch, lends strength to such a comparison, especially as it occupies the summit of a local eminence lying squarely on the adopted alignment of the bank.

After this possible mirroring of the 'founding' monuments the segmentary construction of the monument was resumed. The penultimate Section, D, which measures only c 175m long, displays a disuniformity of construction similar to that of C, although it resumes the asymmetrical bank cross-section of Sections A and B of the monument. The ditches of the final Section are visible on aerial photographs for more than 350m, extending as far as the top of the low hill to the SE. The bank of this Section has been recorded for only c 240m, as an earthwork by the Ordnance Survey in 1864, and more recently by aerial photography; its omission in this final sector would, of course, accord with our hypothesis of progressive departure from the earlier uniformity of standards of construction.

The present-day appearance of the Cleaven Dyke as a unitary monument naturally inspires our expectation that its primary function was related to its elongated, linear character. However, it is clear from the excavation and detailed survey of this monument, that it developed into its present form piecemeal, possibly over a prolonged period. Of the five Sections, four, A-D, are upstanding, exhibiting 28 identifiable segments. If Section E had the same number of segments as Section B, which is of the same length, then the Dyke would have had 34 segments. If each segment represented, say, an annual construction event, then the building of the whole of the Dyke from segment-boundary A1 to the SE terminal could have been encompassed within a lifetime.

It is possible that the less regular construction of the SE part of the Cleaven Dyke reflects a weakening in the traditions of construction, or a change in the perceived needs of the builders later in the possibly prolonged construction process. The differentiation between segments—into narrow and broad—may be a deliberate way of emphasising the separateness of constructional events, while not prejudicing the continuous nature of each Section. In this context the breaks between Sections may take on a greater significance. They clearly represent deliberate punctuations, but what determined that such breaks should occur? While one might speculate on the causes—the passage of time, the death or birth of an individual, the occurrence of a natural phenomenon—the arguments concerning lengths of Sections (in 3.2 above) suggest a more deliberately planned programme of construction. We must note that there are occasionally more pronounced segment boundaries, which may themselves have had more than normal significance (eg segment-boundary B3).

THE CHOICE OF TERRAIN AND ALIGNMENT FOR THE DYKE

The character of the ground occupied by the Cleaven Dyke is so striking as to suggest it provides strong evidence for the intentions of the monument's builders. It is the only extensive area of very level ground for some distance around the confluence of the Rivers Tay and Isla; it adjoins and is defined by four watercourses, including the two rivers, but is itself well-drained and dry. From the NW terminal to a point barely 50m beyond Section boundary X (a distance of 1400m), the changes in ground level are scarcely perceptible. To the SE, however, gradients are more acute, especially in the first 220m of Section C, where the Dyke crosses a broad gully, or in the last 150m, where it obliquely ascends the flank of a low hill. Not surprisingly it is in this SE sector that the monument also displays its greatest irregularity. We therefore consider it not unreasonable to suggest that, when work started on the Dyke proper, those responsible already intended to exploit a great part of this level expanse, although not necessarily all at once. This exploitation of level ground may be considered standard practice in the location of cursus monuments. Elsewhere in Britain (Brophy, 6 above) level river terraces near confluences evidently represent preferred sites. It hardly needs to be emphasised that the conception, planning and laying out of such extensive monuments would be facilitated not only by level terrain but also by the absence of dense vegetation. It is significant therefore that the palaeoenvironmental evidence offered above (1.2 and 2.4) indicates that the monument was built over a landscape probably already cleared of woodland, but probably not in intensive agricultural use. It should be noted that conditions were also suitable for the stripping of turf during construction.

The question then arises: what factors influenced the adoption of the main alignment, which differs sharply from the orientation of the original oval barrow (c 80° magnetic) and slightly from that of the secondary long barrow (c 118° magnetic)? To the NW, the Dyke aligns on the rounded summit of the Hill of Lethendy, a relatively undistinguished hill; on the SE it appears to terminate near the highest point of a sinuous hill. Neither
feature seems an irresistible target, and it is possible that other significant objectives (or indeed none) were in view. The long barrow on Herald Hill is aligned on the same sinuous hill at the SE end of the Dyke; it is unclear whether the barrow was aligned on the terminal of the Dyke (making it later than the construction of the whole monument) or whether both barrow and Dyke were aligned on the same hill.

There is another possibility: that the Dyke originally had an intermediate objective. At the SE end of Section C, the line of the bank crosses with what may be a composite long/oval mound possibly reversing the order of construction where the Dyke began at the NW end. The possible interpretation of the disjointed stretch of the southern ditch opposite the oval element as an indication of an independent existence need not imply anything other than phased construction of a unitary whole; and, indeed, the immediate approach to this terminal over the awkward terrain and the glaring disuniformities of Section C scarcely proclaims the working out of a grand design, rather the stuttering addition to a monumental statement already clearly enunciated. Moreover, such an assessment fairly characterises the Dyke for the remainder of its course.

It therefore follows that we might seek the proximate objective further to the NW. Suitable candidates include the conspicuously enlarged terminals of Sections A and B, both noticeably regular and uniform in appearance and local alignment, although both the result of aggregated construction. Of these, special attention should be directed at the terminal of Section B, where the final segment (B5) is not only much more massive than the preceding portion of the bank, but is also linked to it by an uncharacteristic double change of alignment. The precise significance of this change may resist interpretation without excavation, but, as noted above, only 50m or so to the SE, the Dyke leaves the level ground for less even terrain. It could thus be argued that at a comparatively early stage, it was intended that the Dyke went no further than this, terminating on a perhaps pre-existing long mound at the limit of favourable terrain. It might be argued that Richmond’s excavation in 1939 had demonstrated that this portion displayed the standard internal structure and asymmetrical profile, and was thus part of the original design. However, the oval mound at the NW end of the Dyke seems to show the same pattern of construction—the gravel mound held in place by a turf toe; this, however, is merely a constructional technique.

On the other hand, the mound on the NW side of most of the Section boundaries (W, X, Y, and the end of the bank of the Dyke as surveyed by the Ordnance Survey in 1864) is broader. Thus, the marking of one or both terminals of each Section with an enlargement of the bank, however effected, appears to be part of the overall plan, and there may have been a purpose other than monumentality—for example, provision of elevated platforms for a range of purposes, perhaps including viewing of the previously constructed portions.

THE ENVIRONMENT OF THE CLEAVEN DYKE’S CONSTRUCTION

We are fortunate in having palaeoenvironmental evidence from three sources, providing background to the construction of the Cleaven Dyke. The column from Rae Loch (1.2 above) provides a general picture of the area to the north of the Dyke; the soil micromorphology (2.4 above) tells us about the soil and vegetation conditions immediately under the bank; and the pollen in the soils buried below the Dyke (2.5 above) gives us an idea of the vegetation cover in the vicinity.

The portion of the Rae Loch pollen sequence that relates to the period of the Dyke’s construction is RAE-5, the beginning of which is defined by the elm decline at 4010 cal BC. The expansion of grasses and other species, perhaps indicative of Neolithic pastoral activity, was noted in zone RAE-5a, although the landscape was still (in the vicinity of the loch at least) dominated by woodland. Possible podsolisation of the soils may also be indicated at this time. Cereal-type pollen appears at 3040 cal BC. At around 2510 cal BC the percentage of tree pollen drops from 80% to 67%, showing continuation of the clearing of woodland.

The soil micromorphology results (2.4 above) confirm that podsolisation of the sandy soils in the area was indeed underway when the Dyke was built. The presence of phytoliths in the thin sections suggests that grassland was a component of the ground cover. The lack of morphological indicators of major anthropogenic activities such as cultivation, intensive burning and substantial woodland vegetation clearance in the immediate area of the excavated sections of the Dyke was also noted. It seems that construction of the monument did not require or attract major ground preparation. The absence of substantially disturbed soils and lack of infilled tree root channels also supports the view that all that was required was the removal of a light brush vegetation from the line of the construction.

The interpretation of soil pollen is notoriously difficult. Bearing in mind the caveats expressed by Edwards and Whittington (2.5 above) we can consider the evidence presented. The results seem to suggest that the vegetational landscape which confronted the builders of Cleaven Dyke would have consisted of an intermixture
of light birch-hazel woodland, perhaps of a secondary nature, heath and grassland. At face value, this seems to have been achieved through the simple progression from birch-hazel woodland to heath, as might be expected to result from human interference with woodland for pastoral purposes in an area of sandy soils.

Taking the three strands of evidence together then, the picture that emerges is as follows:

1. Much of the major woodland cover in the immediate area of the Dyke, and possibly in the area around, had been removed some time prior to the construction of the Dyke.

2. The area was in use at a low enough intensity to allow birch and hazel secondary woodland to develop, but at a high enough intensity to continue the process of change towards a grass/heathland vegetation. However, parts of the landscape in the area of the Dyke were still dominated by woodland.

3. No significant ground preparation was necessary for the construction of the Dyke, and the area had not been cultivated. However, the soil micromorphology indicated some light burning, perhaps indicating the removal of scrub immediately prior to construction of the Dyke.

It may be suggested that the Dyke was constructed on the fringes of a settlement area largely in use for cattle or sheep herding. Cereal pollen was not noted in the Rae Loch column until after the period proposed for the construction of the Dyke. However, cereal-type pollen is both low in quantity and disperses only a short distance; therefore its absence from the pollen diagrams before this period may tell us little about the extent of arable activity in the area. Indeed, many herbaceous plants found as weeds in arable and pastoral habitats become consistently present within zone RAE-5a, contemporary with the building of the Dyke, and there is evidence elsewhere in lowland Scotland for cereal cultivation at this time. All that can be said is that cereals were not being grown in the immediate vicinity of the Dyke.

7.2 THE CLEAVEN DYKE IN ITS CONTEXT OF CURSUS MONUMENTS AND BANK BARROWS

Cursus monuments and bank barrows have traditionally been assigned to the mid or even the late Neolithic; in the latter period they have been equated to henges in the analyses of distributions (Bradley 1984, 43; Barnatt 1996, 52). What seems certain is that construction began in the earlier part of the Neolithic—there is a convincing series of dates in the range 4000-3300 cal BC. What is not clear is whether the evidence of construction carrying on into the later Neolithic in southern Britain is paralleled in the north.

Brophy (6.1 above) deals in detail with the cursus monuments of Tayside and Fife. Here we consider the place of the Cleaven Dyke in the wider context. The only detailed consideration of the British cursus monuments was produced over a decade ago by Roy Loveday as a PhD thesis (1985). When completed, his study proved an immensely useful document, both for its detailed consideration of individual features of cursus monuments and related sites, and its genuinely original approaches to interpretation; the passing years have not reduced its value, and it is to be regretted that circumstances beyond the author’s control prevented the planned publication.

Loveday, in being required to discriminate between real cursus monuments and misinterpreted roads, pillow mounds, etc, applied a very critical eye to the evidence. He considered but dismissed the Cleaven Dyke as a classic cursus, accepting the interpretation as a Roman monument. His reasons were: that the monument was too well-preserved; that there was no evidence of turf construction in the comparable site at Scorton; that there were gaps in the mound (unlike most other bank barrows); and that there were no terminals (Loveday pers comm). Of these supposed contra-indications, the first is a function of the subsequent land-use of the site, combined with the method of construction (turf revetting holding the gravel core in place). Given the frequent occurrence of turf in Neolithic mound construction in the Neolithic and Bronze Age in Scotland, the second objection no longer has validity. The third is perhaps more a reflection of the poor preservation (because of subsequent agriculture) of other bank barrows and cursus monuments. The fourth appears to be a consequence of the Dyke being neither classic cursus nor classic bank barrow, although the terminal at the SE end may originally have been closed, but subsequently lost to erosion. No criticism of Loveday’s interpretation is implied, particularly as he was working only from, and was misled by, published sources; the present authors believe that the dense tree-cover concealed the true nature of the Cleaven Dyke and it could only become apparent through prolonged and repeated inspection on the ground and from the air.

We agree with Loveday, who also noted (1985, 180) that there are certain discrepancies in the cursus classification. For example, if we propose a new
definition of a bank barrow—length greater than normal, sides of mound broadly parallel, ditches closely flanking the bank—we might better interpret the monuments at North Stoke A (200m long, 9-12m wide (Case 1982)) and Llandegai (200m+/ long, c 12-13m wide (Hodder 1968)) as ploughed down bank barrows rather than cursus monuments; what evidence there is suggests that at both sites the bank material was on the inner side of the ditches, and there was probably insufficient room at both sites for separate banks running along the edge of both ditches. It is certainly possible to interpret as a bank barrow the excavated site at Scorton, where evidence survives of a bank midway between ditches which are 35m apart (Topping 1982). Since Loveday’s consideration of the material, a further site has been excavated, at Sarn-y-bryn-Caled (Gibson 1994) which the excavator has compared to the other narrow sites; the cursus at Sarn-y-bryn-Caled measures 380m long but only 10-13m wide. There is evidence of external banks. Radiocarbon dating of material from just above the primary silts gives a calibrated range of 3960-3550 cal BC (OxA-3997).

Loveday (1985) subdivided cursus monuments and their related structures into three categories according to size.

1 ‘Long mortuary enclosures’—known examples are up to 140m long and less than 25m wide.
2 ‘Minor cursuses’—known examples are 180-420m long and 25-50m wide. Upper limit 500m.
3 ‘Major cursuses’—known examples are between 800m and 5,640m long and 40-100m wide.

He further distinguished five types of cursus monument in terms of plan form: straight, irregular, curved, sinuous

and angular. The Cleaven Dyke can be described as ‘straight’ in overall classification, but sectors, notably Sections C and D, are notably sinuous in appearance. It is evident that categorisation of this kind may not be the best way to approach the problem.

Moving away from the monuments themselves and looking at their immediate environs, cursus monuments often display complex relationships with other monument types, and these may differ from one region to another (Loveday 1989). For example, long barrows and related sites such as long mortuary enclosures occur repeatedly in the vicinity of cursus monuments, and may occasionally intersect, as in the case of the Dorset cursus. Nearby long barrows and long mortuary enclosures tend to be on the same alignment as cursus monuments, or at right angles to them, while more distantly placed examples tend to be aligned in common, or to point at a cursus terminal, as appears to be the case with the Herald Hill barrow.

It is their sheer size in extreme cases, however, that requires explanation. Loveday (1989) writes of there being some stimulus to gigantism, from long mortuary enclosures to cursus monuments. He suggests that the same pattern can also be seen in the relationship between long barrows and bank barrows, but the stimulus may subsist as much in the landscape which these gigantic monuments traverse. The available evidence points to the landscape of the Cleaven Dyke being on the fringes of settled land: perhaps the builders’ perception of the scale of their enterprise in extending the limits of the domestic landscape found concrete form in the great scale of the structural statement made by the construction of the monument—the transformation of the natural landscape through massive, direct cultural intervention (Hodder 1990, 239).

FUNCTION AND PURPOSE

One of Loveday’s comments on previous studies of cursus monuments, from the 18th century to the present day, was that too much emphasis had been given to ‘the linearity and extended proportions of the monuments at the expense of their enclosures form’, placing undue stress on their role as ‘processional ways’ and ‘avenues’. He noted that the rather inaccurate description of the first recognised cursus (Amesbury, by Stakely on 6 August 1723) has continued to determine perceptions of other possible sites (Loveday 1985, 12). That this interpretation continues to hold sway is clear from recent accounts (eg Tilley 1994). Indeed it is fair to say that since Tilley’s account was published, work on the interpretation of cursus monuments has taken the ‘pathway’ model as an accepted fact rather than one of a number of alternatives (cf papers in Barclay & Harding forthcoming).

Although the Cleaven Dyke as a whole appears to relate to features in the surrounding landscape (it appears to terminate on a hill at the SE), we cannot assume either that this alignment is significant or that the monument was planned from the first to be its final length and to have its final form. Indeed, it is possible that the process of construction of the cursus/bank barrow element of the monument may have had a significance as great as the final product, for example, the periodic (annual?) construction of the individual segments having a ceremonial function, related to the continuance of tradition or social relationships; the possibility of
modular relationships in the lengths of the different bank Sections makes regular augmentation more likely. Burl (1993, 136) has suggested that the complex stone rows of Brittany may have been produced by a similar long-term repetition of small-scale effort, rather than the erection of a complete structure as a single event. Bradley has also noted instances in which the building of a major alignment seems to have been re-enacted. By continuing the construction of an existing alignment the population expressed its continued commitment to the ideas that lay behind it—or at least to their own interpretation of them (Bradley 1993, 57). In the case of the Maxey cursus, likewise the aggregate product of separate construction episodes, he suggests it was essentially an idea, a project, the monument being both medium and outcome of successive actions (Kirk 1997) and Relph has postulated (1976, 32) that places can only be kept 'alive' by involving them in practice. Whittle (1992) considered that the three different alignments of the Dorchester-on-Thames cursus might indicate phased construction—the 'repetition of costly but important ritual'—or changing meaning over time.

Although we have argued that the Cleaven Dyke’s present length is the result of gradual extension and that it was not intended from the first to operate as a long linear ‘processional route’ in the way the Dorset cursus has been interpreted, we must still consider the possibility that such a use developed. Barrett has suggested that, in the case of multi-chambered cairns there were ‘perhaps processional rituals where each element of the monument was visited in turn’ (Barrett 1988, 34), and we cannot discount the possibility that prominent parts of the Dyke were visited in this way.

Barrett (1994, 19) has discussed how ‘a certain architecture could ... have guided particular forms of discourse’; that is, what is done in and around a ceremonial monument is determined to a great extent by the nature of that monument. Could we suggest that the construction of the Cleaven Dyke presents an architecture which has been guided by a ‘form of discourse’, involving a ‘lengthy and piecemeal programme of construction’, a theory advanced by Barrett (ibid, 23), referring to the construction of the Durrington Walls south circle? Barrett’s consideration of cursus monuments, however, stresses their role as formalised pathways, again echoing the 18th-century view criticised by Loveday (1985, above). However, if we consider cursus monuments in their wider landscape, we can examine their role in separation. Hodder (1990) has discussed the importance of the concepts of domus (the home and ideas associated with it), agrarius (the wild) and foris (the ‘outside’ but used by Hodder to express the emphasis on boundaries and entrances in the Neolithic). It has been suggested that the Dorset cursus passed between open ground on one side and forested land on the other (Barrett 1994, 139); the Cleaven Dyke was built on cleared but not intensively used land, perhaps also on the fringes of the settled area. Could it be that some monuments were constructed across paths between these areas, their locations reflected in the pairs of causeways across the two ditches, as on the Cleaven Dyke? That is, the axis of use of the monument is 90° away from that implied by the ‘pathway’ model. Brophy (pers comm) has noted that the Holywood 2 cursus appears to align on the Twelve Apostles stone circle: precisely where the projected line crosses the Holywood 1 cursus there are causeways across both of its defining ditches, as though a ‘path’ projected from the end of one cursus was crossing the other. On the Cleaven Dyke there are six (or seven) pairs of causeways; three of which (or four, if Section boundary Z is included) are at the formal breaks in the monument, while three are not (at segment boundaries A11, A13 and B3). It cannot be determined if these are designed to offer formal access to, or through, parts of the monument.

Pryor (1985, 301), in discussing the cursus at Maxey, described it as ‘a chronologically extended series of quite separate, short-lived sites, events or episodes’ and such monuments as ‘episodic sites of significant alignment’. He suggested that there were three types of cursus monument:

1 ‘Monumental’ or continuously used sites: cursuses as originally understood, eg Dorset.
2 Short-lived, single-period sites: small, eg Barnack, or large, eg Springfield?
3 Long-lived episodic ditched alignment sites: eg Maxey; Fornam All Saints.

Unfortunately, the identification of differences between these types may to some extent depend upon the scale and intensity of archaeological investigation (ground or aerial survey, or excavation). On the basis of the results from the Cleaven Dyke we may suggest six overlapping explanations or roles for linear cursiform monuments, where one role does not necessarily exclude others:

1 Structures for formal processions or for orchestrated journeys of experience (cf Tilley);
2 structures linking pre-existing monuments or significant places;
3 structures demarcating an alignment on a place, object or astronomical event, rather than linking anything;
4 symbolic or physical barriers between areas of different significance (eg wild and domestic land),...
may involve symbolic control of access between the two; in this respect the possible meaning of the word 'Cleaven' signifying 'dividing' (Simon Taylor pers comm) is particularly interesting;

5 symbolic 'project': the physical expression of a social or ideological need;

6 a temenos: an area of land marked off and devoted to the gods (Loveday 1985).

Whittle's (1992) observation that cursus monuments might work to harness and control existing sites may have particular resonance for the Cleaven Dyke, given the presence of a 'founding' monument at its NW end. However, the meaning of monuments changes though time—the meaning and purpose intended at the commencement of construction might well, decades or even hundreds of years later, have changed considerably.

Brophy (above) explores some of the possibly related monuments in Scotland and we do not duplicate his work here. It is clear, however, that the Cleaven Dyke is associated with the local traditions of burial in the Neolithic, as well as with the cursus tradition; Pitnacree-type round barrows, of the kind we believe forms the NW terminal of the Dyke, may be a common feature of the landscape of Perthshire and Angus and a number of long barrows are known in eastern Scotland. The Dyke may itself incorporate three or more burial mounds, both long and oval, or features meant to mimic them—at the NW terminal and at the SE end of Section C. Moreover, the tail of the only long barrow known in the area, at Herald Hill, appears to be aligned on the presumed SE terminal of the Dyke.

7.3 OTHER NEOLITHIC MONUMENTS RELATING TO THE CLEAVEN DYKE

ROUND AND OVAL MOUNDS

Two round or oval mounds on the same scale as the Cleaven Dyke terminal mound have been excavated and published in the area, and a third was still under excavation at the time of writing (illus 86). The excavations at Pitnacree (Coles & Simpson 1965) revealed an early Neolithic mortuary structure of the familiar 'linear zone' type, followed by a complex sequence of mound construction, dated to c 4300-2900 cal BC (GaK-601). The excavation of the larger mound at North Mains (Barclay 1983) revealed a circular central burial enclosure, followed by an even more complex sequence of mound development, dated to the early Bronze Age. The mound at Fordhouse has revealed yet another, even more complex, variation on similar themes (1.1 above; Peterson pers comm).

The most overall consideration of round barrows in the Neolithic of Britain is that of Kinnes (1979). In common with more recent regional studies of these sites (eg RCAHMS 1994a) the implications of Pitnacree are not adequately highlighted; in an area containing many mounds on the same scale as Pitnacree, to publish distribution maps which show Pitnacree as the sole Neolithic round barrow in Tayside (Kinnes 1979, fig 4.1) is perhaps misleading. The Royal Commission specifically resisted the temptation to assume that many of the large lowland round barrows [were] of Neolithic date' (RCAHMS 1994a, 38); however, to give the clear impression, as their fig. 37a does, that none were, and then to base interpretations on the supposed limited distribution of Neolithic burial mounds in the area, is surely even less appropriate.

The radiocarbon dates from the Dyke place its construction closer to Pitnacree than to North Mains. However, the comparison of the two excavated sites allows us to consider the clearly strong and long-lived tradition of massive round mound building in the area.

The Pitnacree mound was 27.5m by 23.5m across and c.2m high (a height to diameter ratio of (using the average diameter) c 12.7:1). Another excavated and published round barrow of the period, at Fochabers in Moray, measured c.14m in diameter by 1m high (Burl 1984). Both were low, flattish mounds. North Mains, in contrast, was 40m in diameter and 5.5m high, and had the traditional pudding-bowl shape of a Bronze Age mound. In the field, one of the authors (GJB) has observed that individual round barrows in Perthshire, Angus and Fife seem to fall into one class or the other—broad and low, like Pitnacree, or bowl-shaped, like North Mains. We have tried to establish if this observation could be tested more objectively, by taking the measurement data in the NMRS records and trying to separate the two possible types. We are grateful to Patrick Ashmore for his careful analysis of the figures; his doubts about the reliability of many measurements, particularly of height (which seems to have been ‘rounded’ to an unacceptable degree), are such that any statistical approach would be misleading until better data is available. It is hoped that if consistently reliable measurements can be gathered in future, further work may be possible. However, as an interim measure we have prepared a distribution of ‘low flat’ mounds which have a diameter of 20m or more and a diameter to height ratio of 12:1 or more (Pitnacree has a
The distribution of certain classes of Neolithic burial and ceremonial monuments in Tayside. The distribution of round mounds must be treated with caution, for reasons discussed in the text.

Illus 86
The distribution of certain classes of Neolithic burial and ceremonial monuments in Tayside. The distribution of round mounds must be treated with caution, for reasons discussed in the text.

ratio of c 12.7:1; North Mains 7.3:1), which we feel is a fairly conservative ratio—the sites are indicated on illustration 86. We accept that to attempt this separation on crude morphological grounds is risky, but we feel that the attempt is itself informative and the result of the experiment is no more misleading than previous minimalist approaches. We believe that further research on the round barrows of the area is necessary and would be well worthwhile to test our hypothesis.

Kinnes (1979) placed Pitnacree in his Stage A (early), group ‘d’ (‘linear zone’ mortuary structure). The ‘linear zone’ as defined by Kinnes (ibid, 58) is the archetypal early Neolithic mortuary structure, comprising an area usually c 1m wide and up to 10m long, defined at both ends, and often subdivided, by posts. Scott (1992) has recently published a survey of the known sites, giving emphasis to the Scottish examples.

Kinnes comments that the circular mound is ‘... the most economical way of achieving maximum visual impact from any direction, although it lacks the focal emphasis of the long mound’ (Kinnes 1979, 48). Although round mounds are ‘... the normal type of burial mound in lowland Britain’, and are ‘... integral to Early Neolithic practice in all areas’ (Kinnes 1979, 48), long barrows are the normal burial structures of the Neolithic in most of lowland Britain.

**LONG MOUNDS**

Kinnes (1979, 48) notes, in contrast to round barrows, that the long mound is ‘... sanctioned by an ancestry leading back to the Bandkeramik longhouse [of continental Europe], its trapezoidal variant being either of comparable derivation or a natural outcome of attention focused at one end’.
Henshall (1963) listed ten apparently unchambered long cairns and barrows in north-east Scotland (approximately the area of the new Aberdeen Area Council). By the early 1970s two further earthen long barrows had been identified at the southern edge of the area, near Dalladies, and one had been excavated (Piggott 1971). There are now 21 long mounds known (extant and destroyed) in Aberdeenshire, Banffshire and Kincardineshire (information culled from NMRS records), in none of which is any chamber visible.

In the old counties of Angus and Perthshire there are both chambered and apparently unchambered long mounds; their distribution was recently mapped by RCAHMS (1994a, 37, fig. B). At first sight there appears to be a pronounced gap, some 80km across, between the mapped distributions of the Aberdeenshire group and the monuments in the hills to the west of Perth; the Cleaven Dyke lies in the middle of this gap. However, there are three reasons for suggesting that the gap may be illusory. First, several examples of long-mounds may exist there unnoticed (eg the Herald Hill barrow, below). Second, the gap may be filled by round mounds of the period (cf Pitnacree), as noted above. And finally, the role of long barrows may have been served by different types of monuments now visible only as cropmarks (eg RCAHMS 1994a, 38). The current distribution of long barrows and cairns, low round mounds and cropmark 'long mortuary enclosures' is shown in illustration 86. Table 17 summarises information on the dimensions of comparative mounds.

### Table 17
Dimensions of some of the mounds mentioned in discussion; none of the Caithness cairns below 60m in length have been included. All dimensions to nearest metre.

<table>
<thead>
<tr>
<th>Name</th>
<th>Cairn/ Barrow/ Mixed</th>
<th>Overall length (m)</th>
<th>Size of proximal mound</th>
<th>Height of proximal mound</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cleaven Dyke phase 1</td>
<td>B</td>
<td>c.62 m</td>
<td>25 mx22 m</td>
<td>2 m</td>
</tr>
<tr>
<td>Cleaven Dyke phase 2</td>
<td>B</td>
<td>c.105 m</td>
<td>25 mx22 m</td>
<td>2 m</td>
</tr>
<tr>
<td>(including phase 1)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Herald Hill</td>
<td>B</td>
<td>60-70 m</td>
<td>20 m?</td>
<td>3.5 m</td>
</tr>
<tr>
<td>Longmanhill</td>
<td>B</td>
<td>62 m</td>
<td>20 mx18 m</td>
<td>3.4 m</td>
</tr>
<tr>
<td>Stirling Farm</td>
<td>M</td>
<td>64 m</td>
<td>19 m</td>
<td>1.2 m</td>
</tr>
<tr>
<td>Croc Freiceadain</td>
<td>C</td>
<td>67 m</td>
<td>18 mx14 m</td>
<td>1.6 m</td>
</tr>
<tr>
<td>Tulach Bunile Assery</td>
<td>C</td>
<td>63 m</td>
<td>20 m</td>
<td>1.6 m</td>
</tr>
<tr>
<td>Brawlin Long</td>
<td>C</td>
<td>62 m</td>
<td>22 mx23 m</td>
<td>2 m</td>
</tr>
<tr>
<td>Na Tri Shean</td>
<td>C</td>
<td>71.5 m</td>
<td>19 m</td>
<td>2.2 m</td>
</tr>
<tr>
<td>Tulach an 'Sionnaich'</td>
<td>C</td>
<td>62 m</td>
<td>17 m</td>
<td>1.8 m</td>
</tr>
</tbody>
</table>

*3 phase heel-shaped cairn with long tail.

There are three reasons why the description and interpretation can be doubted. First, the use and adaptation of pre-existing natural features in the construction of Neolithic mounds is too well-documented for the inclusion of a natural feature to be any objection to the interpretation of the mound as a long barrow. For example, the Capo long barrow, the nearest mound to the NE, is constructed on the raised edge of a river terrace, which gives an enhanced impression of its height and bulk when viewed from the south. Second, the mound, in its shape and orientation, seems a very odd and unaccountable geomorphological feature. The Herald Hill does indeed seem to sit on a very slight fluvo-glacial feature, but the trend of the major features of the topography in the area is different—for example, while the Herald Hill has a bearing of 111° magnetic, the adjacent fluvo-glacial hillock mentioned by RCAHMS has a bearing of 30° magnetic as does the nearest large moraine (c 700m to the SSE). Finally, in 1997 the authors of this report dug a trial trench into the mound c 16m from its summit and 4m to the north of the mound's axis. At this point, the topmost 0.9m of the mound was certainly artificial.

If it is accepted, therefore, that the mound is substantially artificial, although taking advantage of a pre-existing natural feature, certain observations can be made. Perhaps most significantly the west end of the mound aligns on the low hill on which the Cleaven Dyke's SE terminal appears to lie.
Illus 87
The Herald Hill long barrow: a) three-dimensional view of Herald Hill prepared by RCAHMS. The vertical dimension is multiplied by 2. (Crown Copyright: RCAHMS); b) contour survey undertaken by RCAHMS; the contours are at intervals of 0.25m. The impression of regularity is perhaps exaggerated by the modern fence line. (Crown Copyright: RCAHMS)

Illus 88
View of the Herald Hill long barrow: from the north.
THE PROXIMAL MOUND AND LONG TAIL

Herald Hill has a relatively simple shape: a raised, slightly rounded eastern terminal and a long tail. Three of the Aberdeenshire mounds also have swollen proximal mounds and long narrow tails, a feature shared by the NW terminal of the Cleaven Dyke. Longmanhill Cairn (actually an earthen barrow) in Banffshire is the second longest in the area, at c 62m (illus 89). Its now mutilated NE end has been interpreted as an oval mound c 19.8m by 18.3m and c 3.4m high (Richardson, unpublished plan of 1924 in NMRS) and as a mound with a flat façade (Henshall 1972, 222, fig. 27); field inspection of the damaged remains suggests that the latter interpretation may be more accurate, but neither plan is entirely satisfactory. The terminal mound is separated from its c 40m-long tail by a distinct dip, which is clearly visible on illustration 89. The tail tapers from 11.5m wide and 2.1m high to 8.5m broad and 1.9m high near its SW terminal. There is a further slight dip near the SW end which may mark the edge of a small distal mound. The measurements and the plan in illustration 90 are taken from Henshall’s survey. Unauthorised quarrying near the SW end in 1956 revealed that the mound was predominantly of soil or turf. The mound has the distinct appearance of, and has long been interpreted as, a round or oval mound with a later long mound attached. The Blue Cairn of Balnagown (Henshall 1963, 392) has a similar dip between a proximal mound and a tail (illus 90).

The mound (possibly of mixed soil and stone) at Stirling Farm (also in Aberdeenshire) is now severely mutilated and, in part, ploughed down. It is c 64m long, oriented N-S, tapering to a minimum of 7m at its northern end. The southern terminal mound is c 19m in diameter and 1.2m high. Once again it is interpreted as a round mound with a long mound attached.
At Glenshee the grass-grown cairn c 49m in overall length tapers from 5m to 2.7m. RCAHMS surveyors interpreted it as possibly a long cairn with a round cairn built on its west end, although it was felt that the shape of the mound could be the result of what was described as 'the devastating pattern of robbing'.

This relationship between round mounds and long tails has been observed also in cairns, particularly in Caithness, and has been discussed at length by Henshall (1972) and Davidson & Henshall (1991), who have noted seven cairns with proximal round cairns (1991, 48); they also notes a further four which exhibit traces of both proximal and distal mounds. The latter group (Cnoc Freiceadain, Tulach Buaile Assery, Brawlin Long and Na Tri Shean) are distinguished by their greater length (62m to 71.5m excluding horns) comparable to two of the Aberdeenshire sites; furthermore, in these sites the proximal round mound seems more clearly-defined than in the other group. In discussing the Caithness material Henshall (1972, 236) notes the examples of composite construction in English long barrows and cairns; she suggests that 'excessive length' (over c 60 m) indicated likely multi-period construction in the Scottish cairns, and that a single-period mound of over c 45m was unusual. Whether Herald Hill is also a two-period monument could now only be determined by extensive excavation.

Mercer has suggested that the sequence in the Caithness cairns was the reverse of that argued by Henshall, and that in all the round-long mound combinations the long cairn was constructed first and the round mound was subsequently built over its end (Mercer 1992). Although Kinnes suggested that 'while such classic sites as Dyffryn Ardudwy, Mid Gleniron I-II and Tuluch an 'Sionnach have a round-long succession, this is not enough to impose the same on other sites where limited excavation or field observation suggests internal complexity' (Kinnes 1992a), he has also seen the round/long succession as 'difficult to resist' (Kinnes 1992b, 67).

However, in the light of the parallels from elsewhere in Scotland and our own observation of the evidence of the long barrows, the suggestion that the NW terminal of the Cleaven Dyke is an oval mound c 25m x 22m, with a tail some 80m long, seems likely (pace Mercer). The evidence of Adamson's excavation on the Cleaven Dyke now seems to provide ample confirmation of the sequence: the southern defining ditch of the long mound cuts the oval mound. As has been noted above, there are at least six other multi-period long mounds of greater than average length in northern and north-eastern Scotland. The Dyke terminal mound may be of even more complex construction; at c 38m along the length of the tail, the mound changes angle; it may be that the tail was itself built in two stages (fold-out illus 98).

Looking beyond Scotland, apparently similar relationships between proximal mounds and long tails have been noted at a number of sites, such as Long Low and Great Ayton Moor (Hayes 1967). The former monument is interpreted as a mound linking two pre-existing sites; the latter seems to be a round mound with an added long mound.

**'LONG MORTUARY ENCLOSURES'**

The very existence of the class of monument known as 'Long Mortuary Enclosures' in Scotland has been brought into doubt (Kinnes 1985, 40). However, the name is still a useful shorthand for rectilinear ditched enclosures, on a scale similar to a long barrow, but with closed-off ends and no trace of a mound. The similarities in scale and construction between many of these sites and long barrows suggest a role in the same burial tradition. Loveday (1985) has argued that these enclosures are the lower end of a continuum of sites which include, at the other extreme of size, the major cursus monuments. Bradley (1984, 31) explicitly saw cursus monuments as developing from long mortuary enclosures. The distribution of possible examples of these sites is shown on Illustration 86. Only one example in Scotland has been excavated, at Inchtuthil (Barclay & Maxwell 1991). Inchtuthil, and some of the other examples, show the characteristic wobbly, segmented nature of ditches in the Neolithic of this area, and the radiocarbon determinations from that site suggest that it was constructed and in use at much the same time as the Dyke (4230-3780 cal BC (GU-2760); 3990-3780 cal BC (GU-2761)). A substantial fence was erected in the ditch; it had been burned and, while burning, had fallen or been pushed over.

**7.4 COMPARANDA FOR LITTLEOUR: THE BALFARG STRUCTURES**

When the two timber structures at Balfarg Riding School were published the Littleour structure, then just discovered, was cited as a possible parallel (Barclay & Russell-White 1993, 175-6). In the Balfarg report the nature of the structures excavated was addressed by the excavator (GJB) and by Hogg (1993, 169-175).
Although constructed of posts of slighter size and twice as closely set, Balfarg Riding School (BRS) structures 1 and 2 are both straight-sided, round-ended enclosures. Care has manifestly been taken with their design: BRS 1 is twice as long as it is broad, a proportion that recurs in Neolithic monuments of this or related classes (cf Balbridie, Raigmore, and Northton), while BRS 2 exhibits an obvious pairing of its side-wall pits; BRS 1, which displays greater spatial irregularity, nevertheless probably had an equal number of posts to each side (14), with eight or nine posts at each end (cf Littleour with seven side-posts and four end-posts). In BRS 2 only the southern portion is available for comparison, but it incorporates an interesting feature: the post-pits forming either end of the gently curving end-wall, roughly twice as large as their neighbours, both lie off the alignment of their respective side-walls, being displaced towards the interior, the western pit most obviously so. The implication is that they were intended to act as terminal supports for the more tightly packed posts of the end-wall rather than as corner-posts of the more slightly built sides. Thus, although in general BRS 2 differed from Littleour in appearance, providing a relatively light framework for screening-panels, its builders seem to have been similarly concerned with the architectural geometry of the end-walls (cf Hogg 1993).

The radiocarbon determinations from Structure 2 at Balfarg Riding School indicated a range of dates for the charcoal of 3030 to 2880 cal BC, close to the dates for the Littleour structure. The Balfarg dates overlapped with those for the Grooved Ware deposits on the site.

The two structures were identified as unroofed palisaded enclosures surrounding settings of two posts. Pollard (in press) has suggested that the platforms were of both two- and four-post construction, and this is accepted. There were three points that underpinned the interpretation presented in the Balfarg report:

1. There is no explanation, if the structures were roofed, for the contrast between the neat parallel layout of the boundary posts and the ragged and irregular layout of the interior posts; this considerable contrast in layout would pose entirely unnecessary problems in roofed construction; a roof could be achieved with far less effort.

2. There is no explanation, if the structures were roofed, for the considerable amount of post replacement in the interior of Structure 2 (where the posts would be protected to a considerable degree from the wet/dry cycle, weathering and bacterial attack) in contrast to the absence of post replacement in the boundary posts, which in a roofed building would be far more exposed; we must therefore seek an explanation of the pattern of use of the boundary feature and the posts in its interior, unrelated to the normal processes of decay and replacement.

3. The relationship between the width of the building and the spacing between the two rough lines of posts in the inner group was very different from the normal spacing of excavated prehistoric rectangular roofed buildings; that is, the two rough lines in the middle of the structure were too close together, and too far from the walls of the hypothetical building.

Barber (1997, 128-9) has suggested that aspects of the analysis of the Balfarg structures were flawed. In particular, he has suggested that Hogg (1993) should not have used parallels with medieval structures to suggest that roofing timbers would have had to have been of a large girth. Barber argues that there are Early Historic structures that relied on lighter superstructures and that roofing the Balfarg structures cannot be ruled out. However, Barber only addresses the nature and analysis of one of the structures (Structure 2) and has not really addressed all the arguments set out above, in particular the patterns of post-replacement in the interior and on the boundary. It can now also be noted that other excavated rectilinear Neolithic buildings in the British Isles do not display such apparently unnecessary complexity in the arrangement of their internal post-settings as the Balfarg structures (Barclay 1996; Darvill 1996; Grogan 1996). A range of comparanda is presented in illustration 91. It has never been our argument that it is impossible to roof the Balfarg structures, only that the balance of evidence is still very much against it.

Whatever the argument about the structures being roofed, there can be little doubt that neither of the Balfarg Riding School structures was domestic. Structure 1 had a ring-ditch/ring-cairn complex built on its axis, over its northern end and had attracted a cremation burial; Structure 2 was sealed under a stony mound containing Grooved Ware.

In summary we believe that the balance of evidence is still very much for an interpretation along the lines set out in the excavation report: that is, unroofed enclosures containing free-standing post-settings, with a ceremonial/funerary function (Barclay & Russell-White 1993).

One aspect of Balfarg Riding School Structure 2 was not given particular prominence in the original report— an axial feature (F030). At the end of its use the structure was sealed under a mound of soil and stone. The Grooved Ware associated with the structure was found not in primary contexts, but only in the final postholes in its sequence of construction, and in the mound (Barclay & Russell-White 1993, 84-5). All the postholes in the area where the mound survived were buried by the mound, except for one—F030 (Barclay & Russell-White 1993,
Comparative plans, all at the same scale, of Neolithic timber structures in Britain and Ireland. (1) & (2) the unroofed timber structures, probably of mortuary function, at Balfarg, Fife; (3) the Littleour structure; (4) the house at Ballyglass, Co Mayo (after O’Nuallain); (5) the Balbridie, Kincardineshire building (after Ralston); (6) two buildings end-to-end at Lismore Fields, Derbyshire (after Garton).

83-5), a possible post-setting. The feature lies on the axis of the structure (it is marked by an arrow on illus 91, 2). Its relationship with the boundary of Structure 2 is not clear. Although the mound material also covered the boundary postholes, it is possible that the mound was placed while these features still contained their relatively slight posts, and that the mound later slumped over them. If F030 did hold a post, did it therefore stand within the enclosure, or did it stand alone on the axis of the mound? The similarity between Structure 2/F030 at Balfarg, and the boundary posts and the axial post L9 at Littleour is therefore even more striking than was suggested at the time of the Balfarg publication (Barclay & Russell-White 1993, 180).
7.5 OTHER TIMBER STRUCTURES RELATING TO LITTLEOUR

The report on the excavation at Littleour provides the occasion for a review of a small group of analogous cropmark enclosures, most of which are situated in eastern Scotland, some only a short distance from Littleour itself; the results of the excavation may also serve to cast light on a number of other sites belonging to different categories, but displaying comparable design features.

Littleour appears to be the most complex example of its own group, the individual site-remains of which typically comprise, as their main element, pairs of widely-spaced upright timbers set in relatively massive pits, defining an oblong or subrectangular area. The example at Fortingall is illustrated here (illus 92). Each side of the enclosure consists of from three to six pits, occasionally displaying a slight medial change of alignment, while the ends are, with the exception of one site (Ardmuir), closed by a single pit or a setting of up to four pits. Apart from the roughly square six-pit setting at Ardmuir, the enclosures vary in length from a maximum of c 22.5m (Littleour) to c 15m at Carsie Mains; in width they show much less variation, between 7m and 9m. All the plans exhibit a degree of dimensional regularity that suggests careful planning, while the size and proportions invite comparison with structures that have been identified as domestic buildings. However, the absence of internal post-pits, apart from the occasional axial example, as at Littleour and Fortingall, strongly suggests that these were not roofed structures; there is thus no close comparison to be made with such sites as Balbridie (Fairweather & Ralston 1993), the smaller examples of contemporary continental houses, or the possible building at The Clash (Foster & Stevenson, forthcoming). Another significant difference is the spacing of the individual posts of each side: at Littleour the posts are disposed at average intervals of c 2.7m, a spacing that appears typical of the group as a whole and perhaps wider than the separation that might be expected in a domestic building. Moreover, the pairing of the post-pits mentioned above was at first presumed to be the product of bilateral symmetry in design, with the object of ensuring structural stability; on closer inspection it may be more significant.

An interesting comparison may be drawn with another pit-defined structure of Neolithic date, the much larger enclosure at Douglasmuir. Although apparently of less regular construction than either Littleour or the Balfarg Riding School enclosures, its sides rarely exhibiting straight alignment, even spacing of posts, or equal length, Douglasmuir appears to have been designed and built with great care. Its even division into a northern and a southern half has already been mentioned, but not the precision with which this was accomplished: the total perimeter numbers exactly 150 posts, including the septal line which comprises 15 posts, or exactly one tenth of the total (a line also extending to a tenth of the peripheral measurement). At first sight, the proportional division of this perimeter seems wholly haphazard: the west side comprises 58 pits, the east only 53, while the width increases from 14 pits at the south end to 15 at the septum, and 16 on the north. However, if we treat the cross-members and sides of each half as independent elements, a distinct pattern emerges. Starting from the south end of 14 pits, the first half is completed with the addition of 68 pits, and precisely the same number has been employed to complete the second. There is, moreover, an internal pattern: the east side of the southern half is built on exactly twice the scale of the adjacent end (28 pits:14 pits; 34m:17m), whereas the west side of the northern half is twice the septal division (30 pits:15 pits). It seems improbable that this closeness of numerical and spatial interrelationship could have resulted without planning.

Such a conclusion is given support by the disposition of possible entrance-gaps in the ends and medial septum. It has been observed (Kendrick 1995) that in each of the ends and the medial division there is a hiatus, represented by a gap or misalignment of the respective row of pits. These gaps fall on the same straight alignment, as if providing a direct, although slightly oblique, means of progress from end to end across the interior of the monument (and passing close by the axial pit that contained the large timber upright). Such an interpretation raises the possibility not only that the

Illus 92
Aerial photograph of the 'Littleour type' structure at Fortingall. (Crown Copyright: RCAHMS)
cross-members of the monument were more important than the sides, but even that they could have originally been free-standing— it might be suggested that these ‘façades’ were similar in appearance to standing stone alignments on the same scale (e.g. Ballymeanoch in Mid Argyll) and may have been intended to reflect aspects of the façades of long cairns and barrows.

It is only when these details attract the observer’s attention—at linear sites in general, as well as at Douglasmuir—that the focus shifts from the fact of linearity to the structural element at which that linearity is directed. The idea of progression from point to point, towards or by way of portals set in ‘façades’ (which may be obliquely aligned to the main axis of either the monument or the progression) has clear roots in Neolithic ritual and funerary practices, and reflects a more general concern with entrances and access points in contemporary domestic structures (cf Hodder 1990).

Littleour, as also Cleaven Dyke and some of the other monuments described here, may likewise adhere to certain general principles—of design, if not also of ideology.

### 7.6 The Littleour Grooved Ware: A Contribution to the Scottish Picture

Despite recent statements to the contrary (MacKie 1997), the distribution of Grooved Ware is no longer restricted to the far south of England and the far north of Scotland (MacSween 1995a). The discovery of the cache of Grooved Ware at Littleour (illus 93) extends the distribution in Fife/Tayside only a little to the north, from Beech Hill House (Stevenson 1995), leaving a considerable gap in the known distribution before the next, isolated, findspot to the north at Raigmore, Inverness (Simpson 1996). However, this gap may represent nothing more than the very restricted amount of archaeological excavation done in eastern Scotland; on the other hand, it may reflect real differences in social structure or ritual practice, perhaps reflecting the almost exclusive distribution of, on the one hand, Recumbent Stone Circles in north-east Scotland and, on the other, henges to the south and north-west of them. Grooved Ware, like henges, may not have developed any sort of significant role in that area (Barclay 1997a). Saville’s caution (4.6 above) in interpreting the presence of the flint in L23 as being the result a ‘ritual’ structured deposition, in the absence of surviving surface deposits, is understandable. However, the circumstances of the deposition of portions of Grooved Ware vessels, and unused high-quality flint in pit L23, apparently within or on the site of an earlier structure, probably of ceremonial function, seems to give us little option but to see them as confirming the very clear pattern (albeit from few excavated sites) that Grooved Ware is (in this part of Scotland) a phenomenon associated with ceremonial sites (Mercer 1981; Barclay & Russell-White 1993).

Birch charcoal from the homogenous fill of pit L23 seems likely to reflect fairly accurately the date of deposition of that material in the range 2350-2030 cal BC. The relatively near, but stylistically unrelated, material from Balfarg Riding School (Barclay and Russell-White 1993) produced a significantly earlier range of dates—from 3300-2920 cal BC (GU-1670/1904 combined) in the ditch to 3100-2550 cal BC in pit F1002 (GU-1902); on the henge at Balfarg excavated by Mercer (1981) the combined calibration of the dates from posthole A11 was 2930-2660 cal BC (GU-1161-3, using amended errors as suggested by Ashmore 1997). The Littleour date is substantially later; however, given the sparse dating evidence for Grooved Ware in southern Scotland we cannot say whether this date is anomalous. As noted above (4.4): ‘a better way to understand Grooved Ware in north Britain is to regard it as a long-lived ceramic tradition with a basic “vocabulary” of design elements, with chronological, regional, local, and site-specific variations on a few basic themes’ (MacSween 1995a). Littleour perhaps begins to provide a little of the chronological depth so far missing in the consideration of Grooved Ware in Scotland south of Orkney.
The results of Long’s thorough analysis of the residues on the Grooved Ware (4.5 above) were relatively disappointing, compared to Moffat’s analysis of the material from Balfarg Riding School (Moffat 1983), where pollen and seeds of black henbane were reported. It has not been possible to replicate Moffat’s findings on the Balfarg Riding School material, however. (Long et al forthcoming) and until similar results are obtained from other Grooved Ware assemblages, it would be unwise to interpret all Grooved Ware from ceremonial sites in eastern Scotland as having a function related to the consumption of hallucinogens.
The Cleaven Dyke illustrates a number of conservation problems faced in the past and in the present by earthwork monuments in woodland and in arable land.

LEGAL PROTECTION

The preservation of ancient monuments was to a great extent problematic before the implementation (in 1981) of the Ancient Monuments and Archaeological Areas Act 1979. Protection was applied under the Ancient Monuments Consolidation and Amendment Act 1913, as amended by the Ancient Monuments Act 1931, and the Historic Buildings and Ancient Monuments Act 1953 (MacIvor & Fawcett 1983).

Parts of the Cleaven Dyke were first given legal protection in 1960, under the terms of the 1953 Act. However, the limitations of pre-1979 ancient monuments legislation, and the lack (until relatively recently) of means to avert damage to ancient monuments by state-supported forestry and agricultural improvements, meant that little protection could be applied in reality. There was certainly no automatic presumption that scheduled monuments would be protected—the Dyke was therefore replanted with trees in the late 1960s.

In 1981 the Ancient Monuments and Archaeological Areas Act 1979 came into effect. This significantly strengthened the protection of scheduled monuments, introducing the requirement for the prior written consent of the Secretary of State for a range of works, including the planting of trees and other woodland operations. Additionally, in the late 1970s and 1980s an increasing body of evidence was gathered to demonstrate the damage being done to archaeological sites by forestry (Jackson 1978; Proudfoot 1989) and since 1988 important archaeological monuments have been protected through arrangements agreed between the Forestry Commission and the three state heritage agencies (Barclay 1992c). With the protection of the 1979 Act and the clearly expressed policy of the Forestry Commission, it is almost unthinkable that the Dyke could now suffer further forestry damage. In 1991 the Meikleour Estate Trust responded positively to an offer from Historic Scotland of a management agreement under the 1979 Act to arrange for the trees in an area near the middle of the Dyke to be removed. As the block adjoined a ride left for a power line, the total length now left clear was 350m. In 1996 a length of c 280m at the NW end of the Dyke was cleared; the Scots pine in the area had reached maturity. It, like the area felled earlier, was felled under a Scheduled Monument Consent issued under the terms of the 1979 Act.

TREE ROOT DAMAGE

It is widely accepted that the afforestation of archaeological features causes damage, through deep cultivation (fortunately avoided on the Dyke), the development of root systems, and the effects of windthrow (Barclay 1992c), although in the 1992 paper the effect of roots was not discussed in detail. However, it is still occasionally suggested that so-called 'shallow-rooting' species will not damage sites, the implication being that some species, including Scots pine, which until recently covered parts of the Dyke, might be acceptable as a tree crop on archaeological features.

The effect of the development and penetrative power of roots has been considered in some detail (Dobson & Moffat 1993, 15-28); although the purpose of this research was to assess the vulnerability to trees of thick polyethylene membranes sealing landfill sites, the data and their interpretation are of considerable use in discussing archaeological features.

The conclusions of the paper of relevance to archaeological conservation are as follows (with observations by GJB in italics):

1 Mature trees have 99% of their root biomass in the top metre of soil (80-90% in the top 0.6m) and the majority of roots are no deeper than 0.3m. The root mat of common trees in Britain is typically 0.5m to 1.5m deep.
2 Even in waterlogged soils root systems will penetrate to c 0.4m.

It should be noted that many archaeological deposits at risk from trees lie within 0.3m of the surface. Most lie within the range 0.3m to 1m.

3 Tap roots are not the predominant root form. Illustration 94a (after Dobson 1995) shows what is described as a ‘mythical’ representation of a tree root system, illustration 94b showing the more normal structure. While the normal tree root system is that shown as (b), the supposedly ‘mythical’ representation of a mature tree’s system does appear on some archaeological sites, where growing conditions can be ideal (cf the North Mains mound (Barclay 1983)). Both major root patterns on illus 94b would cause damage to archaeological features.

4 Although roots are small, they are numerous and exert axial and radial force. Only very compact soil layers and pans will prevent penetration; penetrative force increases exponentially as soil strength decreases. When roots hit an obstruction, they can stop moving forward and start ‘spiralling’ behind the tip, increasing turbation. They are deflected along the surface of impenetrable layers. Archaeological features are often made up of or are filled with relatively loose, well-aerated soils, often lying over harder natural deposits and have less strength than these natural deposits, and observation has shown that soil-filled pits dug into subsoil are more heavily ‘colonised’ by roots than the surrounding subsoil with consequent loss of meaningful structure in archaeological deposits.

Therefore, in the range of dry land archaeological sites in Scotland every mature tree regardless of species (including the main trees of regeneration in Scotland—birch and Scots pine) will normally have a root system which will penetrate sufficiently far, cover a large enough area, and have enough penetrative force to cause severe damage to buried archaeological features not protected by very dense layers of soil (eg dense re-deposited gravel).

**DAMAGE BY AGRICULTURAL PLOUGHING**

Although the damage caused to archaeological features in arable land has been appreciated for many years (various papers in Hinchliffe & Schadla-Hall 1980), little has been done to tackle the problem. Government rescue archaeology funding was for many years concentrated on sites threatened by commercial development, and on other, more visible and dramatic, threats (eg coastal erosion). It is clear, however, that much of the archaeology of the arable lowlands of Scotland, mainly from Inverness-shire round the east coast to the border with England, and in the south-west of the country, has been severely damaged by ploughing and other agricultural operations, and that much of the rest is being eroded, at varying rates from site to site (cf Tyler et al above).

Damage to sites in arable land arises from a number of processes.

1 The insertion of drains.

2 Subsoiling, undertaken to disrupt the subsoil to a greater depth than achieved during normal cultivation.
to improve drainage and root penetration, by breaking up natural or man-made restricting layers (eg plough pans).

3 Erosion, leading to thinning of the topsoil layer; if this is followed by normal ploughing to the accustomed depth, it is inevitable that the plough will cut into the subsoil and any archaeological features at the same depth.

Illus 95
The effects of subsoiling using (a) a normal and (b) a winged tine subsoiler, at c 1m intervals and 0.4m depth. The topsoil is c 25cm deep. After Spoor 1980.

The effects of the use of a subsoiler and a particular type of subsoiler with ‘wings’ fitted to the bottom of the blade in relation to buried archaeological features are illustrated below (illus 95) (after Spoor 1980).

The area of the Cleaven Dyke ditch excavated in an arable field near the SE end of the monument produced clear evidence of the effect of repeated episodes of subsoiling prior to the scheduling of the monument. Illustration 96 shows the parallel tracks of two episodes of subsoiling - the combined effect has been to remove all coherent archaeological information in an area up to 0.25m below the subsoil surface (that is, 0.55m below the topsoil surface) and 0.5m across. These pairs of tracks were repeated at c 1.8m intervals across the site. Sites are at risk of being severely damaged by a handful of episodes of subsoiling, perhaps over a decade or two; where a site is made up of relatively shallow features subsoiling may completely remove its archaeological content.

Just as damaging in the longer term, but even more difficult to control, is the erosion of topsoil; if a farmer ploughs to the same depth every year, but the topsoil depth is reducing, it is inevitable that the plough will cut deeper and deeper into the subsoil, and into archaeological features cut into it. Soil erosion in Scotland has been exacerbated by poor soil management and autumn ploughing (cf Tyler et al above). Sites like Littleour may be at risk over a longer period—30 to 50 years—from unacceptable levels of erosion.

Illus 96
The side of the ditch of the Cleaven Dyke in this section in excavation area I/1 has been removed by channels cut by two parallel episodes of subsoiling. The two channels run away from the viewer, under the scale, which lies on the subsoil surface.
Although subsoiling and the deepening of ploughing are operations that specifically require consent under the Ancient Monuments and Archaeological Areas Act 1979, this provision is very difficult to police, particularly where land is let on short-term contracts. It is possible to take scheduled cropmark sites out of cultivation, although the owner or tenant of land would have a valid claim for compensation for the losses incurred. It is clear, however, that if that part of Scotland's archaeological heritage represented by the cropmarks of the lowlands is to be protected effectively, more sites will have to be withdrawn from cultivation. This could be undertaken either through the powers available under the Act, or, more positively, the schemes available from The Scottish Office to promote environmentally sensitive farming (SOAEFD 1997).

... AND FINALLY

The survey and excavation of the Cleaven Dyke has proved conclusively that it is not a Roman monument. It can now be seen to be an extraordinarily well-preserved linear monument of the early to mid Neolithic, related to the cursus monument and bank barrow traditions of the late 5th to mid/late 4th millennia cal BC. As such it takes its place as one of the foremost monuments of its kind and date in mainland Britain.

Excavation of the Littleour structure has given us a further Neolithic rectilinear structure of probably ceremonial function, and apparent confirmation of the ceremonial context of Grooved Ware in eastern Scotland. It has extended the date range of this pottery type. Equally useful, the results of the dating programme confirm the dangers of assuming that superficially simple structures have a simple building history.

The projects involved ground-breaking research into soil-loss from lowland archaeological sites, the development of contour survey methodologies to deal with the largest survey of this kind yet undertaken in Scotland, and a detailed consideration of the problems faced by geophysical survey on the fluvio-glacial gravels covering much of lowland Scotland.

The results of the detailed contour survey of the Cleaven Dyke suggest that some other major monuments might benefit from our approach. The Maiden Castle bank barrow and the Stonehenge cursus (both of which appear from field inspection to have a segmented character, and both of which suffer from publication of their surveys at too small a scale) perhaps deserve more detailed survey of the kind undertaken on the Dyke, to bring out its subtleties, and it may be that a contour plan (Burgess 5.1,
above) would be more productive of information. In the case of the Stonehenge cursus, the monument is being actively eroded by cattle and the information that could be recovered using a microtopographical survey is being degraded. Likewise, while the larger scale irregularities of the enormously elongated Dorset cursus (which is visible largely as a cropmark) have been noted, lesser irregularities, hinted at in small-scale published plans, have been relatively neglected. Detailed cropmark plotting might reveal more details of the sequence of construction of that monument.

We would not suggest for a moment that all linear monuments were built in the way we have suggested for the Cleaven Dyke, but perhaps more were than we have so far realised. It might also be suggested that more detailed recording and interpretation of linear monuments could reveal information of equally complex, if not comparable, sequences or patterns in construction.

**FUTURE WORK**

The investigation of the Cleaven Dyke and its surroundings could keep the two main authors and any number of collaborators busy for many more years. However, we both feel that to spend the rest of our active fieldworking years teasing out more detail on the constructional sequence of the Dyke would be relatively unproductive. One of us was asked how we could possibly abandon the Dyke before we had answered every question we felt we could answer, and how we dared to publish without clearing up all areas of doubt that were in reach of ‘just a few more seasons of work’. The answer is two-fold: first, the Dyke is a scheduled monument, and we should not lightly destroy further portions in one episode of investigation; Second, is the cliché ‘one can obtain 80% of the information for 20% of the effort’; in this case we could claim perhaps to have got 40% of the information for 5% of the work, a fair return? Scottish archaeology has perhaps seen too much detailed (perhaps even obsessive) dissection of a small number of sites, while the broad picture remains even to be sketched in for much of the country (Barclay 1997b). Let what we have done suffice; other generations can have the challenge of proving us wrong.

What is needed now is further investigation of the rich landscapes of lowland Scotland. The story told in this volume concerned the recovery of a previously lost Neolithic landscape which has been hidden, not so much physically, as through lack of recognition. Much work remains to be done.

‘Scotland should be able to afford data for the solution of several most fascinating problems in British...prehistory’

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Cet ouvrage décrit l'étude et les fouilles réalisées sur un long monument linéaire datant du début de l'époque néolithique, le 'Cleaven Dyke', ainsi que les fouilles effectuées sur un autre site voisin, à savoir l'enceinte de bois de Littleour datant de la fin du néolithique.

L'historique de l'étude du 'Cleaven Dyke' depuis le 18e siècle jusqu'à nos jours est exposé ici et les deux monuments sont placés dans leur contexte régional et national.

**LE 'CLEAVEN DYKE'**

Le 'Cleaven Dyke' se compose de deux fossés parallèles, largement espacés de part et d'autre d'un talus central qui s'étend du nord-ouest au sud-est sur environ 2 kilomètres à travers une zone boisée et des terres arables, au nord du village de Meikleour, près de Blairgowrie dans le Perthshire, en Ecosse. Pendant 200 ans, on a cru que le monument était d'origine romaine comme la forteresse de légionnaires située non loin de là, à Inchture. L'un des auteurs (Gordon Maxwell) avait remis en question l'interprétation romaine et, dans les années 80, la version qui associe le monument aux 'cursus' du néolithique a commencé à se répandre. Les auteurs ont étudié le site entre 1993 et 1997 et y ont effectué des fouilles en 1993 et en 1995 dans le but de définir le monument.

L'interprétation de leur étude des courbes de niveau et des fossés effectuées dans le passé laisse supposer que la première partie du monument était un tumulus ovale construit à l'endroit qui allait devenir l'extrémité nord-ouest du 'Dyke', aujourd'hui près de l'orée du bois à travers lequel s'étend le monument. Un long tumulus était relié à celui-ci. Le 'Cleaven Dyke' proprement dit, avec ses fossés largement espacés, ne commence qu'après environ 90m. L'extrémité du monument au sud-est semble se situer sur la colline basse où les dernières marques des fossés se distinguent encore.

Les études réalisées en 1993-1997 montrent que le monument n'est pas aussi uniforme et régulier qu'on ne l'avait estimé auparavant mais qu'il est extrêmement varié, complexe et de nature segmentaire. Il comporte clairement quatre clivages principaux (W X Y et Z) qui divisent le monument en cinq 'Sections' (A-E). Le talus ainsi que les fossés présentent des changements de direction non seulement subtils mais aussi relativement soudains et prononcés. Le sommet du talus présente des élévations et des baisses de niveau et sa largeur varie, ce qui donne l'impression que les sections du talus sont construites en segments formés d'amas de terre joints. Les sections A à D du talus se composent de 28 segments (on a pu voir lors des fouilles qu'ils ont été construits du nord-ouest au sud-est). Le talus s'élève et atteint une largeur exceptionnelle en des points apparemment significatifs à l'extrémité nord-ouest ainsi qu'aux clivages principaux. Sur une grande partie de sa longueur, mais particulièrement dans les sections A et B, le talus est fortement asymétrique en coupe transversale.

L'étude du paléoenvironnement suggère que la zone où se situe le 'Dyke' et peut-être les alentours ont été largement déboisés quelques temps avant la construction du 'Dyke' et que le degré d'activité dans la zone était assez faible pour qu'une seconde pousse de bouleaux et de noisetiers se développe, mais tout de même assez intense pour permettre la poursuite du processus de transformation en une végétation constituée d'herbe/de lande.

La datation au carbone 14 d'un foyer situé sous le talus ajoutée à l'interprétation de la micro-morphologie du sol semble indiquer que, dans ce secteur, le talus a été construit entre la fin du 5e et le milieu ou la fin du 4e millénaire avant Jésus-Christ.

**LITTLEOUR**

La structure de Littleour, qui se situe à environ 250m au nord-est du 'Cleaven Dyke' en son point le plus proche (section limite Z), a été découverte lors d'une prise de vue aérienne. Elle constitue l'une des structures aux caractéristiques apparemment similaires qui ont été repérées au moyen de photographies aériennes dans le Perthshire ces dernières années. Elle présente une ressemblance superficielle avec les structures probablement mortuaires du néolithique et, du point de vue des dimensions, avec un édifice couvert d'une toiture datant de la même période et situé à Balbridie dans l'Aberdeenshire. Les fouilles de Littleour laissent supposer que l'édifice avait des fonctions cérémoniales plutôt que domestiques.
La structure (qui a 22m de long) consistait en deux rangées plus ou moins parallèles de huit excavations destinées à recevoir des poteaux, écartées de 7 à 8m. Les deux extrémités étaient formées d’une paire d’excavations. Des matières brûlées en quantités diverses ont été retrouvées dans toutes les conduites formées par les poteaux, ce qui implique la présence de matières brûlées à la surface pendant le processus de pourriture des poteaux. Une excavation massive était située dans l’axe de la structure près de son extrémité est. Un gros poteau était planté dans la cavité. Il est possible que le poteau soit tombé ou bien qu’il ait été extrait et qu’alors des matières brûlées ou en feu y aient été placées. À l’intérieur de l’enceinte, il y avait une petite cavité circulaire, L23, qui contenait un tas homogène de terre brune riche en terreau. Dans ce tas se trouvaient, sans qu’ils ne touchent le fond ni les côtés, les tessons de huit ou neuf récipients (‘Grooved Ware’: poterie de la fin du néolithique décorée de cannelures et d’applications) ainsi que dix pièces de silex (dont trois grandes pièces travaillées en silex translucide gris foncé de haute qualité).

La datation au carbone 14 place la construction et l’utilisation de la structure de Littleour entre la fin du quatrième et le début du troisième millénaire avant Jésus-Christ: le dépôt des récipients et du silex dans la cavité L23 semble s’être produit environ mille ans plus tard.

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**KURZE ZUSAMMENFASSUNG**

Dieser Band beschreibt die Untersuchung und Ausgrabung eines langen, geradlinigen Denkmals aus dem frühen neolithischen Zeitalter, dem Cleaven Dyke, und der Ausgrabung einer anderen Stelle in dessen Nähe, der spätneolithischen Holzeinzählung bei Littleour.

**DER CLEAVEN DYKE**


Die Interpretation ihrer Konturenuntersuchung und früherer Ausgrabungen deutet darauf hin, daß der erste Teil des Denkmals ein ovaler Hügel war, errichtet wo später das NW Endstück des Dykes geformt wurde. An diesen angeschlossen war ein langer Hügel. Erst nach etwa 90m fängt der richtige Cleaven Dyke, mit seinen weit auseinander angeordneten Gräben, an. Das Ende des Denkmals im SO scheint an dem niedrigen Hügel zu liegen, wo zuletzt die Umrisse im Feld sichtbar sind.


LITTLEOUR


Radiocarbon-Datierungen setzen die Konstruktion und den Nutz der Littleour-Struktur in das späte vierte bis frühe dritte Jahrtausend v. Chr.; die Ablagerung der Grooved Ware und Feuersteine in Grube L23 scheint etwa eintausend Jahre später stattgefunden zu haben.

RESUMEN DEL CLEAVEN DYKE Y LITTLEOUR

Este tomo describe el estudio y la excavación de un monumento largo y lineal del Neolítico Inicial, el ‘Cleaven Dyke’ (el Terraplén de Cleaven), y la excavación de otro emplazamiento cercano, una empalizada de madera del Neolítico Final en Littleour. Se presenta la historia de las investigaciones del ‘Cleaven Dyke’ desde el siglo 18 hasta la actualidad, y se definen a ambos yacimientos en un contexto regional y nacional.

EL ‘CLEAVEN DYKE’

El ‘Cleaven Dyke’ está compuesto de un par de zanjas paralelas y bien espaciadas, que flanquean un terraplén central, recorriendo 2 km en dirección noroeste a sudeste, atravesando bosque y campo sembrado, al norte del pueblo de Meikleour, cerca de Blairgowrie en Perthshire, Escocia. Durante 200 años se lo clasificó con confianza, como un emplazamiento de la época romana, relacionado con la cercana fortaleza de legionarios en Inchuchil. Uno de los autores (Gordon Maxwell) cuestionó la versión aceptada, y en los años ’80 ganó vigencia la interpretación que sugiere un vínculo con las ‘avenidas’ Neolíticas. Los autores llevaron a cabo investigaciones en 1993 y 1997, y excavaron en 1993 y 1995 con el propósito de poder definir al monumento.

El estudio topográfico y las excavaciones pasadas sugieren que la primera porción del monumento habría sido un tumulo ovalado construido en lo que vendría a ser la terminal noroeste del terraplén, actualmente al lado del bosque que el emplazamiento atraviesa. Acoplado a éste habría un túmulo alargado. Solo después de unos 90 metros comienza el terraplén de Cleaven propiamente dicho, con sus zanjas espaciadas. La terminal sudeste del emplazamiento parece situarse sobre un pequeño montículo donde se disciernen por última vez las huellas de las zanjas.

Las investigaciones de los años 1993 al ’97 han demostrado que el monumento arqueológico no es ni tan uniforme ni tan regular como lo habría parecido anteriormente, y que al contrario, tiene un carácter mucho más variado, complejo y segmentado. Tiene cuatro cortes formales (W, X, Y y Z) que dividen al monumento en cuatro ‘Secciones’ (A-E). Las zanjas y el terraplén muestran cambios en dirección, a veces imperceptibles y otras bruscas y grandes. El nivel del terraplén sube y baja, y varía de ancho, dando la impresión de que las Secciones se construyeron con depósitos de tierra vertidos en tramos empalmados. El terraplén se eleva y llega tener un ancho excepcional en lo que aparentan ser puntos claves como la terminal noroeste y los cortes formales. Por la mayor parte de su largo, pero especialmente en las Secciones A y B, el terraplén es notablemente asimétrico en corte transversal.
El trabajo paleoambiental sugiere que la principal aforestación en la zona inmediata al ‘Dyke’, y posiblemente en los alrededores, se habría quitado un tiempo antes de la construcción del terraplén, y que la zona estaba bajo uso poco intensivo como para permitir el desarrollo de un bosque secundario de abedules y avellanos, pero a la vez suficientemente intensivo como para que continuara el proceso de cambio hacia una situación de praderas y brezales.

Datación por radiocarbono de un foco de fuego encontrado debajo del terraplén, combinado con la interpretación de la micromorfología del suelo indican que en este sector, el terraplén se construyó entre finales del 5to. milenio a.C., y mediados o fines del 4to. milenio a.C (calibrado).

LITTLEOUR

La estructura en Littleour, a 250 metros aproximadamente al noreste del Cleaven Dyke en el punto más cercano (límite de la Sección Z), se halló de forma aérea. Es parte de un grupo de emplazamientos aparentemente similares descubiertos en los últimos años a través de aérotografos en Perthshire. Superficialmente se asemeja a un emplazamiento funerario del Neolítico, y en tamaños se parece a un edificio con techo de la misma época en Balbridie, Aberdeenshire. La excavación de la empalizada de Littleour sugiere que tuvo una función ceremonial más que doméstica.

La estructura (de unos 22 metros de largo) consistió de dos líneas casi paralelas, a siete o ocho metros de distancia, con ocho hoyos para postes cada una. Ambas puntas estaban compuestas por un par de hoyos. Se hallaron cantidades variables de residuos quemados en los ductos vacíos para los postes dentro de los hoyos, insinuando que habría depósitos calcinados sobre la superficie durante la pudrición de los postes. Cerca de la punta este de la estructura y sobre su eje se encontró un hoyo grande. En él habría un poste de madera enorme. Es posible que el poste se cayó o se sacó, permitiendo que el agujero se llenara con depósitos ya calcinados o en el proceso de quemarse. Dentro de la empalizada se halló un pequeño pozo circular, L23, relleno de un solo depósito homogéneo de tierra marrón. Dentro de este relleno, pero sin tocar el fondo ni los costados, se encontraron fragmentos de ocho o nueve vasijas del estilo Grooved Ware (cerámica con acanaladura), y diez piezas de silex (tres grandes, con retoque, en silex gris oscuro translúcido de alta calidad).

La construcción y el uso de la estructura de Littleour se datan por medio del radiocarbono entre finales del 4to. milenio a.C. y comienzos del 3er. milenio a.C. (calibrado). Parece que la cerámica Grooved Ware y el silex se depositaron en el pozo L23 aproximadamente mil años más tarde.
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The NW portion of the contour survey of the Cleaven Dyke, prepared from Christopher Burgess' original survey drawings. Sections and segments are overlain in red.
The SE portion of the contour survey of the Cleaven Dyke, prepared from Christopher Burgess' original survey drawings. The south-easternmost portion of the monument is drawn from Ordnance Survey (1884) information (bank and gravel quarry) and recent aerial photographs (ditch). Sections and segments are overlain in red.
On the frontier? Recumbent stone circles in Kincardineshire and Angus

Gordon J Barclay and Clive L N Ruggles

Introduction

The recumbent stone circles (RSCs) of the north-east of Scotland are an enigma. While they have been widely discussed as a class, no modern excavation has been published, the dating of the sites is not resolved, and in some surveys of their period they receive barely a mention (Parker Pearson 1993). It has been argued that they originate in the later Neolithic (Shepherd 1987). If they are of this period then their restricted distribution, when compared to that for the broadly contemporary henge monuments, may be significant: it has been suggested (Barclay 1997) that this almost exclusive distribution, which is paralleled by that of carved stone balls (Edmonds 1992), reflects at least a different ceremonial practice, if not a different social organisation in the north-east from that developing to the south, in Angus and Perthshire. Further, it has been noted (Cowie and MacSween 1999) that no Grooved Ware has been found in the north-east. If there is indeed a difference, then the 'frontier' between the two distributions may be worthy of detailed examination.

To that end the authors have re-examined the supposed RSCs at the southern edge of the distribution (Illus 1), confirming the presence of a local variant (noted first by RCAHMS (1982)), and dismissing some sites that have gained currency as RSCs. We have also made other observations about the relationship between these sites and their landscape, and their potential astronomical significance.

In considering the reality of a boundary between different traditions in the later Neolithic in this area, we also consider monument distributions in the earlier Neolithic.

The sites

The supposed Perthshire sites

Two possible recumbent stone circles are thrown up by a search of the National Monuments Record for Scotland – Moncrieffe (NO11NW 11) and Fortingall Church 'C' (NN74NW 3). Both have been excavated: Moncrieffe by Stewart (Stewart 1985). Fortingall by Simpson (unpublished, but see Burl 1988, 168–175).

Moncrieffe's only possible RSC connection is the presence of stones graded in height. Burl (1995, 160) views the three stones at Fortingall as reminiscent of a recumbent stone and flankers, and notes that they could have stood on the south-western side of a circle in line with the direction of major southern moonset. However, their dimensions and spacing (see Burl 1988, 173, top photograph) are very unlike those of a recumbent stone and flankers and they seem more likely to be a stone row similar to others in Perthshire (cf Ruggles 1999, 188, 266 n 27). A stone hole discovered to the NW (Burl 1995, 160) may mark the site of another stone in this row rather than necessarily being part of a circle.

Burl also considers the circle at Croft Moraig (Piggott and Simpson 1971) to have RSC associations in its later phases of construction, largely because of the existence of a cup-marked slab at the SSW (Thom, Thom and Burl 1980, 349) aligning with major southern moonset (Burl 1995, 158). However, the slab in question lies outside the circle, within the kerb of the stone bank (Piggott and Simpson 1971, 9–10; Thom, Thom and Burl 1980, 349), and although there is a height gradation of the circle stones towards the SW, it is only slight (Barnatt 1989, 318). A number of interpretations are certainly possible of this complex monument (ibid).

In sum, none of these monuments seems to us to have any characteristics providing compelling evidence that they were related to the RSC tradition.

The Angus site

Colmeallie – NMRS number NO57NE 3: NGR NO 5655 7812.

There are two possible sites in Angus, of which only one, at Colmeallie, now survives. This
Recumbent stone circles in Kincardineshire and Angus

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1882. It has been placed on a turf-covered mound, measuring about 15.5 m in diameter and 0.6 m high. Only three stones (A, B and C) of the outer circle are in situ, giving a probable overall diameter of 14.5 m. Four small stones of the inner circle survive in the E about 2.0 m inside the outer circle, and another (D) 2.1 m tall in the S which, although perfectly erect, may not be in situ. To the W of this stone are three recumbent stones, one (E) measuring 3.0 m x 2.2 m x 0.5 m. The shape and size of 'E' and its position on the SSW arc of the circle suggests a tentative identification as a recumbent stone circle. However, this classification can only be upheld if 'D' has been erected at a later date and this cannot be positively determined.

On the date of our visit in August 1998 we could see only two stones of the circle, and 'D' which appears to be the eastern flanker, set inside the circumference of the circle (a characteristic of a number of RSCs (Burl 1976, 172) and in no way counting against the identification). The recumbent is in two large pieces and the western flanker and a further stone of the circle lie beyond them. The inner kerb, perhaps of a ring cairn, is indeed represented by four stones. There are further earthfast stones in the area, but no sense could be made of them. The plan (Illus 2) was made by a rapid theodolite survey by the two authors. Our conclusion is that the site is a classic, if rather mauled, recumbent stone circle.

This conclusion is strengthened by the archaeoastronomical evidence. Because of the delapidated state of the monument it is impossible to obtain a reliable estimate of the original orientation, either along a line through the centre of the circle and the centre of the recumbent stone ('centre line') or along a line perpendicular to the alignment of recumbent and flankers ('perpendicular line') (cf Ruggles 1984, S63-72; 1999, 92-94). However, the evidence is clearly compatible with the general trend of orientation between SSE and WSW found consistently at other RSCs (ibid). The
axial orientation is probably between about 190° and 205°, and this range includes the prominent hill summit of Craig of Shanno, 2.3 km away. The hill aligns generally with the setting midsummer full moon. Both the alignment upon a prominent hill and the lunar alignment are common at other RSCs (Ruggles and Burl 1985; Ruggles 1999, 98).

The south-westernmost circle (Illus 1) at Newbigging (NO56NE 3) does not now survive (cf Burl 1976, 10), and we must rely on the written description (Original Name Book 60 (1861), 61). According to this, this is the site of a cairn, some 12 m in diameter, surrounded by a 'double circle' between about 15 m and 18 m in diameter composed of 20 or 30 large stones of which only one remained in 1843. While this might well have been an RSC, there is no direct evidence of a recumbent stone, so this is not certain.

The south Kincardineshire sites

The Cloch – NO76NE 1; NO 7812 6794

The monument. The RCAHMS description of the monument (1982, 9, no 25) is:

This cairn is situated on the summit of Cloch Hill (152 m OD) 380 m WNW of Boghead farmhouse. It measures 18 m in diameter over the remains of a boulder kerb and has been reduced by robbing to a height of 0.5 m. The cairn takes its name from a prominent conglomerate slab (2.3 m by 1.7 m by 0.6 m) set on edge which forms one of the kerbstones on the SSE; it is flanked by two upright kerbstones, leading to the suggestion that the site is a Recumbent Stone Circle. The cairn is, however, one of a group in the area which have well-built kerbs and an associated large stone. (See also NO87NW 1, 6 and 12.)

While the monument certainly seems to have been disturbed, there is no evidence that its height has been to any great extent reduced (Colour Illus 4 and 5). The plan (Illus 4) is redrawn from that made by RCAHMS in 1984.

The site in its landscape. The situation of the Cloch atop a low, rounded hill means that it commands wide views all round. One of us (GJB), when visit-
ing the Cloch and the nearby Bridgeton Hill cairn (NO76NE 8), noted that the two sites had an unusual relationship. The cairn is set slightly to the east of the summit of Bridgeton Hill and from the Cloch the cairn is invisible. On the cairn one can appreciate that its summit lies only 25 cm below the horizon as seen from the Cloch (Illus 5). The relationship seems too neatly calculated to be easily dismissed as a coincidence, and we would suggest that the cairn was constructed deliberately to be kept out of the view of the, presumably earlier, RSC. The section illustrated on Illus 5 was drawn from a theodolite survey made by GJB and Ann Miles. The contours overlain on the upper part are derived from OS mapping and, as can be seen from the measured section, are rather generalised.

Alignment and astronomy. If this monument does represent a variant form of RSC, then it is of interest to know whether its orientation and any referents to points in the landscape or celestial phenomena are similar in nature to the trends ob-
served amongst the RSCs, or whether it seems to be variant in these respects also. It is clear from the plan in Illus 4 that the recumbent stone is placed on the SSE side of the cairn. It is questionable whether the 'centre line' and 'perpendicular line' orientations that have been studied in the context of the core RSCs have any meaning at this type of monument, but for comparative purposes we have attempted to define them using estimates of the position of the centre of the cairn and the orientation of the longer axis of the recumbent stone respectively, judged from the RCAHMS plan. While subject to considerable uncertainty, the azimuth estimates obtained - 157° for the centre line and 140° for the perpendicular line - do not necessarily force us to conclude that the orientation here was inconsistent with the overall pattern at the core RSCs, although they do suggest it was an extreme case: the lowest perpendicular line azimuth obtained elsewhere is 147° at Ardlair (Ruggles 1999, table 5.1) but centre line azimuths of 165° and below (down to 157°.5) are found at this and four other sites (ibid). The sea forms the horizon between east and south at the Cloch, so that there is nothing here to contradict what seems to be an absolute rule amongst RSCs, that there should not be a nearby horizon in the direction of the recumbent stone (Ruggles 1984, S76). The horizon altitude over the sea is approximately -0°.3, and the declinations in the estimated centre and perpendicular line directions are -31° and -26° respectively. In terms of astronomical potential, the low altitude compensates for azimuths unusually far round towards the south-east, and these declinations - albeit towards one edge of the overall distribution - are not exceptional (see Ruggles 1999, fig 5.5).

Millplough - NO87NW 6; NO 8191 7544. The monument may be described as follows (adapted from the NMRS record). This recumbent stone (450 m NNE of Millplough farmhouse) meas-

Illus 5. Profile of Cloch and Bridgeton Hill. The vertical axis is at a different scale from the horizontal. A = summit, B = lynchet, C = dead ground.
uring 2.9 m by 0.6 m and 1.7 m high, situated in an arable field, was interpreted as the sole remnant of a circle shown as two stones on the OS maps. As these stones are approximately 200 m apart, and have apparently not been moved since 1868, their association as parts of the same circle is doubtful. The stone is oriented E-W and lies immediately S of a false crest.

Landscape. The stone is extraordinarily impressive (Illus 6) and is visible from a considerable area around (including in the distant view from Montgoldrum). From the stone there are fine views to the south and west but a generally rather more restricted view to the north and east.

Alignment and astronomy. Although nothing but the recumbent stone is visible at this site, its orientation (which is almost exactly east-west) suggests a perpendicular line azimuth of 181°. There is a slight hilltop in this direction, whose summit at an altitude of just over 0.5° yields a declination of around -33°. All these things are fully consistent with the patterns found at many RSCs (Ruggles 1999, ch 5). So also is the orientation of visibility (variation of horizon distance with azimuth) relative to the 'perpendicular line' orientation of the monument (ibid, 94 and fig 5.4).

Montgoldrum, NO87NW 5; NO 8166 7719.

The site known as 'The Camp', Montgoldrum measures 17.8 m in diameter over a kerb and now appears as a ring of cairn material up to 0.8 m high, with a pronounced depression in the interior. A rapid tachometric survey by the authors in August 1998 produced the plan shown in Illus 7. The bottom of the slope of the inner 'face' is marked by a dotted line. On the SSW, immediately outside the kerb, lie the fragments of a large boulder, shattered by drilling and explosives, which was probably a recumbent stone (Illus 8). Only one piece now seems to be in situ. Only the largest fragment of the many lying around is illustrated on the plan.

Landscape. As at Millplough, there are fine views to the south and west but a generally rather more restricted view to the north and east.

Alignment and astronomy. Here it is possible to estimate the centre of the kerb ring and to obtain from this an estimate of the centre line orientation. The latter estimate is also dependent upon what one assumes about the original size and position of
the recumbent stone. Certainly the orientation was close to due south. A survey by one of the authors (CR) in 1981 obtained a centre line azimuth of 179°. The horizon altitude here is close to 0° and the declination a little above -34°. The orientation of the monument and the overall orientation of visibility are once again fully consistent with the patterns found at many RSCs, a conclusion which the uncertainties in the exact original position of the recumbent stone will not affect in broad terms.

Discussion
The sites at 'The Camp', Montgoldrum, the Cloch and Millplough share the characteristic that there is not now, and never seems to have been, any trace of an accompanying stone circle at any of them. Furthermore, at the two former sites there
are cairns on the north side of the recumbent, both with sunken centres (taken in the past to reflect robbing, but perhaps reflecting, at least in part, the shape of ring cairns).

Sites comprising just a recumbent stone are not unknown amongst the main concentration of RSCs to the north. The main examples are Clochforbie, Pitglassie, Arnhill, Dunnideer, and Braehead (RSC3, 19, 24, 42, and 44 in Ruggles 1999). Ruggles and Burl (1985, S29-31) have suggested that these - and a number of further cases comprising just a recumbent stone and one or both flankers - may reflect a practice of erecting the recumbent and flankers first, with the intention (not always fulfilled) of adding the circle stones later. However, none of the examples named above seems convincing as an example of a category of monument consisting of just a recumbent stone with or without an adjacent cairn. At all of them there is at least circumstantial evidence of further stones (flankers, at least) having existed, and at some the evidence seems clear.

An alternative reading of the evidence is that monuments consisting of a single recumbent stone formed a regionally restricted group to the south of the main concentration of RSCs, in which characteristics of the 'classic' RSCs were utilised, but no need was perceived for features felt to be unnecessary - in this case the accompanying circle of stones. With the possible exception of Blue Cairn (RSC78 in Ruggles 1999), which does appear to be a cairn with a single recumbent stone on the SSW side, giving a centre line orientation of about 207°, there are no sites of this character further north. Although the RSCs to the north, such as Aquhorthies, seem more 'normal', as is the example to the west at Colmeallie, they can still be seen to vary from 'classical' forms (Burl 1995, 136), although Burl originally (1972, 172-3) saw the differences as having a chronological origin. The differences between the sites north and south of the Mounth - the high ground that cuts off the north-east from Angus and the Mearns - perhaps suggest that they do indeed represent a distinctive local group, with those considered here, at the southern edge of the distribution, showing the greatest variation.

The earlier Neolithic

Although our main interest was in later Neolithic distributions, the sites we were visiting fell within
a relatively dense distribution (for eastern Scotland) of long barrows and long cairns. One of the authors (in Barclay and Maxwell 1998) had suggested that the apparent gap noted by RCAHMS (1994) in the distribution of long burial monuments between southern Kincardineshire and western Perthshire might be illusory. It was suggested that this gap was filled by (1) long monuments of similar form (eg ditched 'long mortuary enclosures'), (2) unrecognised long barrows (Herald Hill, and the NW part of the Cleaven Dyke), and, mainly (3), by low, disk-shaped round barrows of the kind investigated at Pitnacree (Coles and Simpson 1965). It can be remarked (Illus 9) that the distribution of long barrows gives over to mainly low disk-shaped round mounds (with a diameter to height ratio of 12:1 or more) at approximately the same point at which the distribution of RSCs finally ends. It may be that further work will determine whether different regional traditions were already becoming established in this part of eastern Scotland in the earlier Neolithic.

Notes

1 On a previous visit in 1981 one of the authors (CR) obtained an estimate of 202° for the centre line azimuth by assuming that stones A, B and C were indeed in situ outer circle stones, and that the ring was indeed precisely circular, in order to obtain an estimated centre point. Burl (1980) had earlier obtained 190° for the axial orientation.

2 This could be claimed of any point on the southwesterly horizon yielding a declination (Ruggles 1999, 18) between about -30° and -20°, and it is the fact that over thirty prominent hilltops in the general direction of the axis at various RSCs cluster strongly in this range that provides the evidence that this was intentional. As viewed from the circle, the summit of Craig of Shanno has an azimuth of 193°.2 and an altitude of 6°.9, yielding a declination of -25°.4. The foot of the left-hand slope has azimuth 181°.9, altitude 2°.3 and declination -31°.1. This indicates that the midsummer full moon would have set into the left-hand side of the hill during several years around a 'major standstill' (ibid, 36). During the remainder of the 19-year lunar node cycle the moon (and at all times the midwinter sun) would have passed over the hill before setting.

3 Even here there is some suggestion of a stone circle: the NMRS quotes 1831 and 1866 accounts describing the presence of '27 other stones up to 5 or 6ft long... fallen and displaced' while confirming that the recumbent stone was the only large or upright
stone remaining by 1866. However, twenty-seven stones is an exceptional number for an RSC and the stones described may well have been kerbstones.

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Abstract

The paper considers the nature of a group of possible variant recumbent stone circles at the southern edge of the distribution, in Kincardineshire and Angus. The conclusion is that there is a variant group. The identification of some sites as RSCs is challenged. Mention is made of possible regional differences between north-east Scotland on the one hand and Angus and the Mearns on the other in the earlier and the later Neolithic.

Keywords: stone circle, recumbent, archaeoastronomy, Neolithic
Colour Illus 4 and 5. Two views of the recumbent stone circle known as 'The Cloch', Kincardineshire (copyright G Barclay).
Colour Illus 6 and 7. Two views of the remains of the grandstand at Cupar old racecourse (copyright P Martin).

Cairnpapple Revisited: 1948–1998

By Gordon J. Barclay

It is 50 years since Stuart Piggott excavated the prehistoric complex at Cairnpapple. At that time there were few excavated parallels in Scotland, and interpretation inevitably relied heavily on sites excavated in southern Britain. Much more locally relevant data are now available and the sequence at Cairnpapple can now be reassessed in its regional context.

Piggott identified five Periods, commencing with a stone setting, ‘cove’ and cremation cemetery of ‘Late Neolithic date’ around c. 2500 B.C.’. Period II was a henge monument, consisting of a ‘circle’ of standing stones with ceremonial burials in association, and an encircling ditch with external bank – ‘Of Beaker date, probably c. 1700 B.C.’. Period III comprised the primary cairn, containing two cist-burials ‘Of Middle Bronze Age date, probably c. 1500 B.C.’. Period IV involved the doubling of the size of the cairn, with two cremated burials in inverted cinerary urns. ‘Of final Middle Bronze Age or native Late Bronze Age date, probably c. 1000 B.C.’. Period V comprised four graves ‘possibly Early Iron Age within the first couple of centuries A.D.’

The present paper, using comparable material from elsewhere in Scotland, argues for a revised phasing: Phase 1, comprises the deposition of earlier Neolithic plain bowl sherds and axehead fragments with a series of beehives. This is comparable to ‘structured deposition’ noted on other sites of this period. Phase 2 involved the construction of the henge – a setting of 24 uprights – probably of timber rather than stone, probably followed by the encircling henge ditch and bank. The ‘cove’ is discussed in the context of comparable features in Scotland. Phase 3 saw the construction of a series of graves, including the monumental ‘North Grave’, which was probably encased in a cairn. Piggott’s ‘Period III’ cairn was then built, followed by the ‘Period IV’ cairn. The urn burials seem likely to have been inserted into the surface of this mound, which may have covered a burial (since disturbed) on the top of the Period III mound, or may have been a deliberate monumentalising of it. The four graves identified as Iron Age by Piggott seem more likely to be from the early Christian period.

The reassessment of Piggott’s report emphasises the value of the writing of a clear, and sufficiently detailed account. While no report can be wholly objective it can be seen that Piggott’s striving for objectivity led him to write a paper that is of lasting value.

Introduction

The excavation at Cairnpapple undertaken by Stuart Piggott in 1947 and 1948, and promptly published (Piggott 1949; 1950) was ground-breaking. It was the first modern excavation of a henge monument in Scotland and the first Neolithic to Bronze Age complex of this kind to be investigated using modern methods in northern Britain (Fig. 1). The excavation revealed a long and complex history; the monument was then taken into state care and, as the only manned prehistoric monument on the Scottish mainland, has become the best known prehistoric site in eastern Scotland.

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Fig. 1
Location map

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print, with only minor changes, until the second edition of 1985 (Piggott 1985); although there was significant input of new material by Historic Scotland staff, the pre-occupations of 1940s archaeology still survived to a significant extent in the 1985 edition.

In the Antiquity article the interpretative framework assumes that changes in the use of the site, and the types of pottery in use, reflected successive invasions or changes of dominance by different ‘folks’ – for example: the Food Vessel people were seen as establishing themselves after a relatively short period of Beaker domination had come to an end – ‘Like the early Christian missionaries they destroyed the *fana idolorum*, but re-consecrated the site to their own ends, and, pulling down the old temple, used its stones to wall the tomb of a chieftain built over the dedicatory burial of the earlier and alien shrine’ (Piggott 1949). Bradley’s (1998, 140–3) interpretation of the meaning of the sequence, although couched in less dramatic language, is not dissimilar: ‘... Cairnpapple, where the last traces of the stone circle were erased and buried with the dead themselves’ (ibid., 146).

Piggott’s original interpretation of the sequence of events stood substantially unchallenged until the mid-1970s when minor amendments to the sequence were suggested (Burl 1976; Ritchie 1976). In the 1980s further comments on aspects of the sequence were made (Harding 1981; Mercer 1981), although in these publications there was no opportunity to go into detail.

Barnatt (1989), in an extended catalogue entry in his corpus of stone circles made the first substantial attempt to reconsider the whole sequence. Fifty years on from the excavation, it can be seen even more clearly that Piggott’s interpretation was based on a number of ‘givens’ that no longer hold; the interpretation as a whole has never been the subject of detailed re-examination but the revision of the Historic Scotland guidebook to the site (Barclay & Grove 1998, to replace Piggott 1985) and the on-site interpretation provided an opportunity for this. Much of the revised sequence suggested below has been proposed by the authors already mentioned, but no comprehensive or detailed re-assessment based on a re-examination of the report has hitherto been presented.

The Study of Henges since 1949

When Piggott excavated he had no local parallels to draw on – the nearest comparable site was the henge at Arbor Low in Derbyshire, situated, like Cairnpapple, on a hilltop (an unusual setting for a henge), and closely resembling Cairnpapple in several ways. Both Cairnpapple and Arbor Low are class II henges of similar size and shape; both contain oval settings of uprights; Arbor Low has a possible ‘cove’, and Piggott thought that Cairnpapple had one too; both have Food Vessel associated burial after the main phase of use. The contemporary excavation of the Dorchester-on-Thames complex also exercised a powerful influence on the interpretation of Cairnpapple (Atkinson et al. 1951). Piggott was also working not only without the benefit of radiocarbon dating, but within the tight constraints of the pre-radiocarbon compressed chronology for the Neolithic and Bronze Age, and without any coherent local pottery chronologies and sequences (Piggott 1954).

Since 1949 six or seven henges (depending on definition) have been wholly or substantially excavated in Scotland (in order of date of excavation): Stenness (Ritchie 1976), Moncrieffe (Stewart 1985), Balfarg (Mercer 1981), North Mains (Barclay 1983), Balfarg Riding School (Barclay & Russell-White 1993), Balneaves Cottages (Russell-White et al. 1992) – interpreted by its excavator as a cremation cemetery but, it can be argued, a hengiform monument reused as a cremation cemetery (see below)
(Thomas 1994); a campaign of excavation was also undertaken on three henges not far away in the Milfield Basin in Northumberland (Harding 1981). Further excavations have also taken place in England and Wales (Harding 1987).

Many class II henges have now been identified closer to hand than Arbor Low and the example, very similar in appearance, at North Mains, Perthshire (Barclay 1983) now offers better comparisons (Fig. 3). It too had pre-henge activity, a ditched enclosure of similar design, a setting of 24 uprights and a complex sequence of later burial. However, none of these burials involved the construction of burial mounds of the kind built at Cairnpapple (at least none that survived); rather, the vast North Mains barrow was built 200 m to the west-south-west, and itself attracted a number of ‘secondary’ burials.

There have been several published attempts to list and categorise the henge monuments and related sites of Scotland, mostly, but not exclusively, in the context of studies of British distributions (Atkinson et al. 1951; Atkinson 1952; Woodham 1955; Burl 1969; Wainwright 1969; Catherall 1971; 1974; 1976; Burl 1976a). The history of the study of henges to the mid 1980s has been summarised by Harding (1987, data collection to 1982/83), in what is still the most complete and useful survey of the nature, constituents, and meaning of the class, including a catalogue created through an exhaustive trawl through regional and national sites and monuments records. Harding developed Wainwright’s tripartite division of the class, with the divisions between ‘mini-henges’ and ‘classic’ henges being set at 14 m. Harding felt sufficiently sure of identifications only to map a total of 26 ‘classic’ and ‘mini’ henges in Scotland.

**Developments since 1987**

Over the last decade Harding’s volume has remained a valuable source of information and its interpretative approaches have generally stood the test of time, with the exception of a consideration of the supposed origins of the class in causewayed camps (Clare 1987; Barclay 1989); the main argument against such an origin is that radiocarbon dating suggests that henge construction occurred earlier in the north of Britain, where there is no known causewayed camp tradition (Parker-Pearson 1993). Soon after the Harding survey appeared, Clare produced a two-part paper (Clare 1986; 1987) in which he attempted to bring order to a great range of ceremonial and funerary monuments of the later Neolithic and earlier Bronze Age, including henges. He tried to draw together many aspects of the form and function of these monuments through the identification of hengiform features in sites, or in individual phases or groups of phases in sites, and thus to draw them into a hengiform class. In a critical review of the paper this author (Barclay 1989) noted weaknesses in the approach – for example, data were oversimplified, insufficient weight was given to the effects of vigorous local traditions and, in particular, to the way in which individual sites developed in complex ways over time, and too great a weight was given to the presence or absence of individual features.

Since 1987 substantial excavation has been undertaken at two further sites in Scotland – Balneaves (Russell-White et al. 1992) and Picts Knowe (Thomas 1994). Balneaves, a small hengiform enclosure, was published as a single phase Bronze Age enclosed cemetery. However, an alternative interpretation is possible: while the suite of radiocarbon dates obtained from the pits within the enclosure and the ditch appeared to show a single phase of activity in the first half of the second millennium cal BC, the three samples from ditch material were from charcoal layers above the deep primary silts. Given that the ditches were not steep-sided, there might well be a considerable gap between the digging of the ditches and the deposition of charcoal associated with the urn burials. At the Picts Knowe henge the whole interior had been destroyed.

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Fig. 3
The henge at North Mains, Strathallan during excavation
(Crown copyright: Historic Scotland)
by rabbits, and the henge ditches were more interesting for their reuse in the Iron Age; there was evidence of early Neolithic activity within the enclosure.

The most significant development since Harding's survey has been the continued expansion of the number of known sites, particularly through aerial photography. The subtitle of Harding's book 'Air photographic evidence and catalogue' gave due weight to the role of aerial photography in expanding the number of known sites between the 1969 surveys of Wainwright and Burl and the end of his data collection in 1983. Harding was considering only eight years of the RCAHMS aerial photography programme, which had begun in 1976, and the rate of discovery by RCAHMS and their sponsored fliers has not slowed in the years since. This late development of aerial photography in Scotland has made the growth in the number of sites of all periods in the last 20 years particularly dramatic (Barclay 1992; 1993).

The continued rate of recovery was driven home to this author when, in 1993, I prepared a distribution map of henges and possible henges for a general survey of the Neolithic in Scotland (Barclay 1997). The material available was that accessioned to the National Monuments Record of Scotland (NMRS) to 1993–94 – which was cover flown, approximately, to 1990–91 (RCAHMS 1993; 1994).

The map (Fig. 4) shows the distribution of henges and hengiform enclosures, taking a fairly cautious approach to identification of sites (similar to Harding 1987), and of recumbent stone circles (inf. Ruggles). The basis of the distribution is the map mentioned above, but with some sites culled, where identification as a henge now seems less likely and some sites since added to the NMRS collection with a ‘henge’ classification.

While the sheer number of possible sites in Tayside is interesting, the most striking feature of the map is the almost mutually exclusive distribution of henges and recumbent stone circles. Whereas over 20 years of aerial photography has considerably expanded the distribution of hengiforms in Tayside, the number in the new local authority area of Aberdeenshire (incorporating Kincardineshire and Banffshire), to the north, has remained consistently low despite considerable aerial survey activity. There is only a handful of known sites in this large region, and those all unusual in one way or another, and all small, for example Wormy Hillock (Fig. 5) measures only 6 m in internal diameter and 21 m overall. A further possible site at Hill of Tuack (Harding 1987, 357–9) seems an unlikely candidate for a henge, because of its general morphology and its position on a fairly steep hillside – the site lies immediately adjacent to flatter land that would provide a more normal henge location.

In contrast the north-east of Scotland contains at least 100 recumbent stone circles; the type's geographically restricted distribution is shared by that peculiar artefact type, the carved stone ball (Edmonds 1992) – although no ball has yet been found on a recumbent stone circle, or in any other secure context. Further, no Grooved Ware has been found in the north-east of Scotland, although this may be a reflection of the limited amount of modern excavation in the area. If recumbent stone circles and carved stone balls are, as they are believed to be (Shepherd 1987), of the same period as the henges to the south, what do the contrasting distributions indicate? Henges have been interpreted as being one of the indicators of increasingly hierarchical social organisation in the later Neolithic. Whether the smaller hengiforms had similar meaning or function is a matter of doubt. However, it may be suggested that the recumbents, being generally smaller monuments, far more closely packed in their area (many are intervisible) may, if in use contemporaneously, mark different ritual or religious needs from 'classic' henges; it is possible that they were used by communities organised on a different basis from those elsewhere. It might be suggested that in the north-east of Scotland the social organisation had remained on the same, possibly more family-oriented, footing as has been suggested for the early Neolithic. Are the carved stone balls a uniquely local prestige or exchange good associated with this social organisation?

In the decade since Clare's attempt to deconstruct the class, its edges have become even more blurred as the complexities of the circular monument tradition of the later Neolithic have become better known. However, that the broad classification still has interpretative value is perhaps demonstrated by the regional difference in distribution discussed above.

Most importantly, since 1949, these monuments are now interpreted within a completely different theoretical framework, in which changes in architecture and practice are explained by processes operating within societies, rather than by 'invasion' of different cultures.
The distribution of certain and possible henges, small hengiform enclosures and recumbent stone circles

Fig. 4
The distribution of certain and possible henges, small hengiform enclosures and recumbent stone circles
CAIRNPATTLE

Therefore, after 50 years, the interpretative structure erected by Piggott at Cairnpapple can be seen to be in need of reconsideration. Parts of the sequence are based on conclusions drawn from a far smaller data-set, and, necessarily, from distant data-sets. However, Piggott himself at various places in his text flagged up points of interpretation where a different view might prevail and much of what follows here picks up a loose end left by the excavator. Many of the other changes have been suggested by the other authors noted above. What is clear from reading the report in detail and comparing the published information with the archive, is that the published text reflects the excavated observations well. It is a measure of Piggott’s skill in preparing a report in which description of what he observed and interpretation are well balanced, that the task of reconsidering the sequence can be undertaken largely using the published account alone; only some of the unpublished photographs in the archive added any new information.

This paper is structured as follows. The separate elements of the monument are described briefly within Piggott’s ‘Period’ framework; after each element there is a commentary, reconsidering the nature of the remains in the context of relevant information recovered since 1949. There is then a general consideration of the place of the various burials in the sequence, and on the basis of the element-by-element review a revised sequence is proposed.

Location

However, before looking at the sequence, the location of Cairnpapple also needs further consideration. Most known henges are on low-lying sites and it has been noted that while many henges have views of a pronounced horizon, the monuments themselves are often not easily seen from other places. Cairnpapple,
on its high hilltop, may at first sight seem anomalous (Bradley 1998, 143). However, the anomaly is not as great as all that. Cairnpapple Hill is indeed c. 305 m high, but there are hills almost as high to the north and south. While the site has very extensive views, a large part of the near landscape (within a few kilometres) is not visible from the hill; likewise, the site is not visible from the same area (while the radio mast at the end of the hill is often visible, the hilltop and the site are not). Therefore, Cairnpapple shares one characteristic - it is not easily seen from other places. Indeed, considering the area within which Cairnpapple lies, the builders may have gone to considerable trouble to make the site conform as much as possible to a desirable norm.

Piggott's Sequence
Piggott identified five Periods (Piggott 1950, 76), to quote (my annotations in italics):

'Period I. A stone setting and cremation-cemetery of Late Neolithic date, c. 2000 B.C. (including an arc of pits and the 'cove')

Period II. The Henge Monument, consisting of a 'circle' of standing stones with ceremonial burials in association, and an encircling ditch with external bank, having two entrances. Of Beaker date, probably c. 1700 B.C. (includes the Pit complex)

Period III. The primary cairn, containing two cist-burials, one an inhumation with a Food-vessel, and the other a cremation. Of Middle Bronze Age date, probably c. 1500 B.C.

Period IV. The secondary cairn enlargement, with two cremated burials in inverted cinerary urns. Of final Middle Bronze Age or native Late Bronze Age date, probably c. 1000 B.C.

Period V. Four graves for extended inhumations, grouped together within the Henge area to the east. Undated, but possibly Early Iron Age within the first couple of centuries A.D.'

He also noted the presence of a series of hearths, which he assigned to Period II. The relationships between features is shown in Figure 6.
Piggott's Period I

DESCRIPTION

The elements of this Period were seen to be (Figs 7 & 8): I.1 seven holes with six cremation burials, I.2 five further cremation burials, I.3 'cove'.

I.1. Seven holes (A–G) dug in the rock near the centre of the henge, and a further possible hole (X). A–G were arranged in an 'arc', with C–F in an almost straight line. The holes were between 0.18 m (7 in) and 0.53 m (1ft 9in) deep below the rock surface. In or beside every hole except A and X were deposits of cremated human bone, either in the fill, or in separate scoops beside them. Piggott suggested that the holes were 'similar in appearance to sockets for small standing-stones' with '... close similarity to the undoubted stone holes of Period II'. They contained freshly broken fragments of stone 'suggesting the breaking-up of a stone in situ.' All the pits were under the Period IV cairn. Piggott argued (see I.2 below) that the cremation deposits were pre-Period III. That in pit C was accompanied by a bone pin, parallels for which were noted at Stonehenge, Dorchesteron-Thames, and in Yorkshire, placing the cairn burial at a 'pre-Beaker date', and therefore, in the context of Cairnpapple, pre-Period II (the henge).

I.2. Five further cremation deposits (C1–C5), most of which lay on or near the same 'arc' as the pits. Two lay under the kerb of the Period III cairn; two lay under the Period IV cairn, and one (C4) lay outside the kerb of the Period IV cairn. Piggott suggested that 'it seemed reasonable to assume that the five detached cremations are to be taken with the holes as a single cremation cemetery.' He also noted that the two cremations lying under the kerb of the Period III cairn '... should be earlier than the Food-vessel burial in that cairn.'

I.3. Three very large holes beneath the Period III cairn '... probably explicable as stone-holes'. They average 0.6 m in depth and the northern was up to 2.44 m (8 ft) long by up to 0.6–0.9 m (2–3 ft) across. A standing stone filled the east end of the southern hole. At the foot of this stone was the Beaker North Grave - the stone and grave were assigned to Period II and the stone was seen as a secondary insertion after the first stones had been removed. This feature was seen as earlier than Period II, and therefore likely to be contemporary with the holes A–G and the cremation cemetery of Period I. Parallels were drawn with 'coves' - three-sided stone monuments found at the Avebury enclosure (Wiltshire), the Stanton Drew stone circles (Somerset) and 'probably at the henge monument at Arbor Low in Derbyshire'.

Piggott also noted certain small finds: two fragments of polished stone axes (one of Group VI from Great Langdale; the other of Group VII from Penmaennor), and two shreds of undecorated pottery (one from a bowl, the other lugged), seen as have affiliations to the 'Western' Neolithic tradition. Both could be fitted comfortably into the later Neolithic use of the site and therefore part of Period I.

COMMENTARY

I.1. & I.2 The seven holes are not in an 'arc' - from the plan it seems that holes A–C, as well as C–F are in a straight line (as noted by Barnatt 1989). Hole F is actually two holes (which I shall call Fa – the southern, and Fb, the northern, which held the cremation burial). If cremation burial C5 (which is the only one with seems to be inserted within a structure - it lay on a stone slab and had a single side slab) is taken with this group, then C5–G–F (either a or b) are also in a straight line. The considerable variety in the style of deposition of the cremation deposits is worth noting - C1 was a large spread, while C2 and C5 had greater proportions of the original skeleton present in the burial; the burials were found sometimes beside a hole (suggesting an upright might still have been in place), sometimes within the hole (suggesting any upright may have rotted or been removed prior to the insertion of the burial). There is therefore no evidence that the additional cremation burials are all of one period, let alone that they are of the same period as those in the holes. They may, therefore, have been deposited over a longer period. Barnatt notes that the 'arc' seems to be 'centred' more on the Period II North Gravis than on the Period I cove'.

There is no evidence that the holes contained stones; they could have held posts. Piggott suggested that the presence of stone fragments in some of the pits suggested the breaking up of stones in situ. However, on a site where much of the digging took place through rock, this is not conclusive evidence.

The burial sequence as a whole is discussed below.

Dating: the Skewer pins

Piggott used a part of a bone pin from a cremation deposit in hole C and a smaller fragment (30 mm long) from cremation burial C1 to support a date for the 'arc' of pits and the cremation burials early in the sequence (Late Neolithic as defined in the 1940s). The dating is no longer secure. In his finds report, Piggott has taken a fragment of pin 80 mm long and has reconstructed it as a skewer pin 190 mm long (Fig. 9). Given that there is less than half the pin extant, and that it may have been distorted by the cremation process, the reconstruction of this pin, and its identification as a 'Stonehenge-type' is not certain. The dating of Scottish parallels to the later Neolithic still depends wholly on material from one site (Skara Brae) and recent reconsideration of other parallels (Cleal et al. 1995) suggests that the date range for such pins can now be seen as longer, into the earlier Bronze Age.
Fig. 7
The features placed by Piggott in his periods I, II and III
Fig. 8
Piggott’s plan of the central area at Cairnpapple
(courtesy of the Society of Antiquaries of Scotland)
Kinnas (1979) reviewed the evidence then available for cremation burials in the Neolithic. The ‘arc’ of pits at Cairnpapple was included in his ‘Stage F’ – enclosed cemeteries (the ‘arc’ being seen as a partial enclosure). Eleven sites, including Cairnpapple, were discussed; once again the reliance on material from a limited number of distant sites (Stonehenge and Stanton Drew, and suggested at Arbor Low. There is no proof of the use of the holes at Cairnpapple for the erection of stones. Harding (1987) has suggested that they might have been graves, in which the bone has not survived – no evidence for or against this suggestion can be brought forward. Barnatt has suggested that the standing stone at the eastern end of the southern hole (ie, the one at the end of the North Grave) is not secondary, but is a surviving, reused, part of the ‘cove’.

However, another feature at the Stenness henge in Orkney (Ritchie 1976: the ‘dolmen’) provides a possible parallel for the setting of stones postulated at Cairnpapple (Fig. 10); this setting of three stones is, like that at Cairnpapple, off-centre. There is a broadly similar stone setting in the centre of the heavily robbed cairn at White Cow Wood in Aberdeenshire (Fig. 11); although this is taken to be a disturbed burial feature, a product of the almost complete robbing, it does not resemble a cist. Stenness and a stone circle closer by, at Balbirnie in Fife, also provide possible alternative explanations. At both sites there were central rectangular settings; that at Stenness was formed by four massive slabs set in trenches, creating a feature very like the hearths found in contemporary houses in Orkney. At Balbirnie a similar effect was created by setting lines of smaller stones on edge. Such a feature at Cairnpapple might have left traces not dissimilar to the ‘cove’ pits.

Clare (Clare 1986) has noted that there are five types of central feature within henges – stone or post; pit or pits; rectangular structures or coves; mound or grave; circle. Unfortunately some of the ‘coves’ like Cairnpapple are only pits – their interpretation as supporting uprights being unprovable.

Finds
The two axe-head fragments and the pottery sherds described by Piggott could now be seen as likely to be of Early Neolithic date, from at least as early as c. 3500-3000 BC (Sheridan pers comm).

Harding (1987) noted various finds of Neolithic pottery on henges describing them as ‘... residual and presumably relating to a pre-henge period of activity ...’. The excavation of the complex at Balfarg (Barclay & Russell-White 1993) demonstrated that this early Neolithic activity could take more substantial form – for example, pits lined with broken vessels then sealed by layers of boulders. Indeed it can be noted that many sites that subsequently saw Late Neolithic ceremonial structures often have clear evidence of earlier activity. It might be suggested that the development of later Neolithic ceremonial complexes on sites where earlier material was deposited is entirely coincidental. However, this author would argue that the consistency of the occurrence, as well as its character (ibid.), make deliberate choice more likely. The question may be asked, how did later generations know that there had been activity, or that a place had a special meaning? First, our own experience tends to show that places can be venerated, or foci for activity or visiting, long after any physical construction or deposition had ceased. Second, even quite intense use, perpetuating the significance of an area, might leave no recoverable physical traces. Third, vegetation differences or even scatters of artefacts might have continued to mark places.

Piggott’s Period II

Piggott’s Period II (Fig. 7) comprised: II.1 a setting of 24 holes and two possibly related holes (interpreted as stone holes); II.2 the bank and ditch of the henge; II.3 two graves; II.4 a large irregular pit, referred to here as the ‘pit-complex’. Piggott also suggested that six hearths were likely to belong to this Period.

II.1 Stone holes. An oval setting 35 m (115 ft) by 28 m (92 ft) of 24 holes (1-24) with two inliers 1a and 13a on the
Fig. 10
A selection of 'cove' like features in Scotland, from Ritchie 1976
(courtesy of the Society of Antiquaries of Scotland and the author)

south and north respectively. The average spacing between holes was 4 m (13 ft). The gap between holes 1 and 2 was 7.6 m (25 ft), almost, but not exactly, opposite the southern entrance through the ditch and bank.

Piggott reported the general character of these holes as being like the 'stone holes' A-G of Period I. The long axes of the holes were tangential to the circumference of the ring. The longest was 1.2 m (4 ft), the normal ones were 0.9 m (3 ft) by 0.75 m (2 ft 6 in). Their depth was between 0.2 m (8 in) and 0.9 m (3 ft); the normal depth was between 0.3 m (1 ft) and 0.45 m (1 ft 6 in). There were packing stones in 14 of the 24. Numbers 20 and 21 were sealed under the Period II cairn, 17–19 and 22–24 lay under the Period IV cairn. Piggott states that the stone holes were '... precisely similar in type to undoubted stone-holes' comparable to those at Avebury.

II.2 Bank & Ditch. A ditch 3.6 m (12 ft) wide and 0.9 m (3 ft) to 1.2 m (4 ft) deep, accompanied by a much spread bank up to 1.2 m high, enclosed an area 44.2 m (145 ft) by 38.1 m (125 ft). There was a berm about 3.6 m across. There was a clearly defined primary silt - fine clayey silt grading into coarser silt. A Beaker sherd was found on top of the primary silts (illustrated on fig. 6 'section X' in Piggott 1950).
Grave; his suggestion of a cairn over the North Grave seems sound to this author.

Piggott suggested that the Beaker grave beside hole 8 had 'every claim to be regarded as contemporary with the stone circle', but noted that the North Grave 'need not be strictly contemporary'.

II.4 The Pit-complex. Roughly central to the henge enclosure is a complex of irregular pits linked by a shallow rectilinear scooping measuring c. 10.4 m by 6.7 m (c. 34 ft by 22 ft). The eastern pit measured c. 7 m by 2.4 m (23 ft by 8 ft), with a maximum depth of 0.75 m (2 ft 6 in). On the western side there were two pits with dimensions totalling much the same as the single eastern one - the northern 3.7 m (12 ft) by 2.1 m (7 ft) and 0.7 m (2 ft 4 in) deep; the southern 4.3 m (14 ft) by 2.1 m (7 ft) and 0.5 m (1 ft 8 in) deep.

The area between and to the north of these pits was dug down to a depth of 0.2 m (8 in) to 0.25 m (10 in) below the rock surface. The greater part of the filling was of earth and small stones. Piggott observed that the western pits (but not the hollow (Piggott 1950)) lay under the Period III cairn but the other pit and the hollow lay under Period IV cairn. Piggott noted that the fill of the hollow was very disturbed and suggested that it had been deliberately backfilled.

Piggott and other authors since (eg Harding 1987) have suggested that the pit complex was 'respected' by the Period I cremation burials and holes; unfortunately, no such relationship can be demonstrated - we only know that they did not appear to intersect. Piggott suggested, however, that scattered cremated bone through the fill might suggest that some cremation deposits had been disturbed by the digging of the complex. Two sherds of undecorated Beaker pottery were found near the bottom of the north-west pit.

Piggott wrote of the pit-complex (1950, 88) 'Its character is that of a quarry or borrow-pit, but no obvious use can be suggested for the material excavated from the pits'.

The Hearth: There were five burnt areas within the henge enclosure; they contained no artefacts and the woods used were oak and hazel. Two of them lay below the Period IV cairn at south, one was partly under the Period IV kerb at north, and the others were unstratified. A sixth 'hearth' was found under the henge bank (Fig. 7, 20). Piggott suggested that they were likely to belong to Period II.

COMMENTARY
The complex of features grouped together in Period II needs to be disaggregated. Burl (1976) was the first to suggest that the Beaker graves could be much later than the henge. The evidence available from this part of Scotland is that Beaker-associated activity would not be primary to the construction and use of the henge. At North Mains (Barclay 1983) and Balfarg Riding School (Barclay & Russell-White 1993), Beaker pottery was found, respectively, in the topmost fills of the main ring of posts (after the rotting of the posts) and in the mid-to upper fills of the ditch. At Cairnpappel we can see that the single Beaker sherd in the ditch was likewise found above the primary silts. I would agree therefore with earlier commentators that the Beaker graves should be seen as later than the henge.

In reporting on his own henge excavation at Balfarg, Mercer noted (1981) that much of the information used by Piggott to justify an interpretation of the ring as of stones was essentially circumstantial, and suggested the steep-sided form of some of the sockets and a possible truncated ramp in socket 16 might allow a reinterpretation as a timber circle. Mercer accepted that the shallowness of some of the sockets might be an objection but noted that up to 0.75 m of old land surface (OLS) may have been lost; the shallowest socket would, in these circumstances, have been up to 1 m deep. Barnatt, in his more extensive reconsideration of the sequence (1989), accepted the 'demolished Cove' without argument, but proposed that the stone of the Period II North Grave was one of the original cove stones. He points out that the other holes of the 'Cove' are oval, and therefore likely to have been slabs rather than timber posts. While he suggests that the steepness and depth of the holes are comparable to those of the ring of uprights, thus, at first sight, seeming to weaken Mercer's argument, this does not take account of the shape of the holes of the ring, nor the ratio of depth to diameter.

It has been suggested by Burl (1976), and noted by subsequent commentators, that the ring of uprights at Cairnpappel (and at Arbor Low) does not fit well with the shape of the ditched and banked henge enclosure, and that the two elements might have been built at different times. Support for this argument may be taken from North Mains (Fig. 13; Barclay 1983). While Ring A at this site seems to have been the setting of posts which relates directly to the henge bank and ditch, there is a further ring - Ring B - which is strikingly similar to Cairnpappel. The setting comprises 18 posts in an oval measuring 22.5 m by 18.5 m. The posts were spaced 2.6-4.8 m apart. The post-holes are broadly similar in size and proportion to the 'stone-holes' at Cairnpappel (Fig. 14) (Barclay 1983). There is no stratigraphic evidence to suggest whether this North Mains Ring B pre-dates or post-dates the henge and Ring A. However, the ring bears so little relationship to the henge bank and ditch that it seems likelier to predate them (contra Barclay 1983). It has been suggested that the Cairnpappel ring also pre-dates the henge enclosure, the misalignment of the entrance to the Cairnpappel henge and the larger gap at the southern side of the setting of uprights being cited in support.

This author prefers to see the uprights as the first element, followed by the bank and ditch, while the uprights (or at least their holes) were still visible.
Comparative plans of (B) Cairnpapple, (C) Arbor Low (after Burl 1976), and (A) North Mains

Fig. 13
At both Arbor Low and Cairnpapple it has been noted that a line drawn through the centres of the two entrances does not pass through the centre of the monument; however, (Harding 1987) has pointed out that this is a feature of many Class II henges (cf North Mains).

In considering the nature of the rectangular stone settings at Balbirnie and Stenness (the latter being the first excavation of any scale on a henge in Scotland since Cairnpapple), Ritchie (1976) suggested that at Cairnpapple ‘... it might be permissible to associate the henge and circle with a central feature represented by the Pits (either a dismantled three-stone setting with very large stone holes or perhaps a dismantled rectilinear feature) with the ‘Cove’ and (as their holes respect the pits) the ‘arc’ of cremation deposits.’ It could be suggested that the ‘pit complex’, which is roughly central to the enclosure, is the feature associated with the ditch and bank, and that the ring of uprights was earlier, although still in existence when the henge was built. There is ample evidence of the construction of free-standing timber circles in Britain (Tolan 1988; Gibson 1994). Ritchie (pers. comm.) has suggested that the ‘cove’ could have held upright timbers, perhaps linked by screening, and that the ‘cove’ and the pit complex could have held horizontal beams, forming the basis of some sort of timber structure.

Harding (1987) noted: ‘... on the analogy of other sites a different sequence is possible’ – he suggested that the Period I and II features could come in reverse order. He noted, as others have done, that the arc of seven pits ‘respects’ this central feature – but as Piggott himself noted (1950, 88) the area was heavily disturbed and cremated bone was found in its fill, suggesting that cremation deposits there could have been disturbed by the digging of the pits. The pit complex has no stratigraphical relationship to the ‘arc’.

Barnatt (1989) notes that Piggott suggested that the pit complex acted as a quarry, and he speculated that it might be for the possible mound over the Period II North Grave; this is discussed below. He also suggested that the ‘arc’ of Period I pits was built while the Period II Beaker Grave was visible. These suggestions seem to offer important keys to the reinterpretation.

The hearths could be of any date, and not necessarily from the same period. The nature of other early Neolithic deposits on such sites might reasonably suggest that they were likely to be of more than ‘utilitarian’ purpose. That one lies under the bank might suggest that some or all form part of the pre-henge earlier Neolithic activity.

**Piggott’s Period III**

**BURIALS**

Piggott associated two burials with the cairn of Period III (Fig. 7). Cist A lies below the centre of the Period III cairn. A Food Vessel, apparently perched on a ledge in the cist, accompanied a fragmentary burial. Cist B lay 4 m to the east. It was unaccompanied.
CAIRN AND INNER KERB

The cairn which overlay the cists was 15.2 m (50 ft) across and up to 1.5 m (5 ft) high. The Period II North Grave was incorporated within the cairn, in its northern part. It had a substantial kerb, which was buried and hidden by the subsequent Period IV cairn; Piggott suggested that the stones of the kerb were those which had formed the Period II stone setting; such kerbs are, however, a feature of comparable cairns in the area, as at Kippenross House near Dunblane (NN70SE 35). The cairn was built on a layer of natural clay, which Piggott noted was not present in other parts of the site. This observation may be of considerable importance in the interpretation of the sequence. The cairn was made up of stones (mainly without soil) and in other parts yellow clay. In part of the mound there was a thick layer of redeposited blue clay with panning (a gleyed soil). As already noted this layer stopped at the possible outer kerb of the Period II North Grave, supporting the interpretation that there was a cairn built over it. Piggott did not speculate on the source of the clayey materials.

The kerb of the cairn overlay cremation burials 1 and 2 of Period I.

Piggott suggested that the Period II monument had been ‘plundered of its standing stones’ to build the Period III cairn and consideration of the apparent contradiction presented, on the one hand, by the ‘continuity’ represented by the inclusion of the North Grave under the cairn, and, on the other hand, ‘desecration’ reflected by removal of the Period II stones, became a dominant issue in the discussion. It has entered the folk-memory that the kerb of this cairn contained exactly the same number of stones (24) as the circle of uprights. In fact Piggott recorded clearly that there were 20 or 21 (depending on the interpretation of a statement about a broken stone). Piggott suggested (1950, fig. 8; Fig. 15 here) that the shape of the bottom of one of the stones could be matched in the shape of the fill of one of the Period II holes. Such an occurrence would imply no disturbance of fills during the removal of the stone – unless the stone was plucked vertically out the ground – and none by any subsequent post-depositional processes; neither circumstance seems likely.

COMMENTARY

Piggott saw the change from Period II to Period III as ‘... a change in the primary intention ...’ from ceremonial to burial between Periods II and III. This perception seems to arise out of the supposed linkage between the henge and the North Grave. If the Beaker North Grave is separated from the henge, to define the Period II burials as ‘ritual or ceremonial’ and the Period III and IV ones as reflecting a ‘change in the primary intention’ is surely now unsustainable.

The sequence proposed by Piggott is open to reinterpretation. The two cists have precisely the same stratigraphic relationship to the cairn as do the supposed Period I cremation burials – they lie under it. It is only the fact that Cist A lies beneath the centre of the cairn that allows us to speculate that the cairn was built for this burial. Cist B is unaccompanied and its precise relationship with Cist A and the Period III cairn (beyond the simple stratigraphic one) is therefore unclear.

The burial sequence as a whole is reconsidered further below.

Piggott’s Period IV

The Period IV cairn (Fig. 16) was concentric with the Period III cairn and doubled its diameter (to c. 30 m (100 ft)). The cairn included more soil in its makeup – nowhere was there pure clay or loose stones. The western part of the cairn overlay the partly-filled ditch of the henge and covered all the Period I holes and all but one of the Period I cremation burials. It also covered hole 1a (possibly related to the main oval of uprights of Period II).

As already noted, Piggott observed that a layer of natural clay, present under the Period III cairn, was not to be found anywhere else in the excavated area. It appeared that the hilltop was denuded of clay for a distance of over 35 m from the monument though how thoroughly this was established.
is not made clear. He suggested that the denudation had occurred after the Period III cairn was built, but before the Period IV cairn, as a result of climatic factors. It may be possible to interpret the loss of clay, at least from within the site, more simply - that it was quarried to provide material for the Period III mound.

URNS
Piggott associated two burials in Collared urns with the Period IV cairn (Fig. 17). The first was in a shallow pit - the top of the urn had collapsed but it seems likely that it would have protruded above the old land surface (OLS). It was accompanied by a calcined pin. In the second, also in a shallow pit, more than half of the height of the urn lay above the OLS. The urn was surrounded by black soil containing charcoal and burnt chips of flint interpreted by Piggott as ‘occupation site or hut floor material’, perhaps pyre residues. The burial was accompanied by an antler pin. In both cases, although the urns protruded above the OLS, we must presume that they lay below the surface of the Period IV cairn.

COMMENTARY
Collared urns are most frequently found placed upside down in pits deep enough for the bases to be invisible below the ground surface. They are frequently found when modern
The location of the Collared urns within the later cairn (courtesy of the Society of Antiquaries of Scotland)

Fig. 17

The place of the burials within the sequence

There are now many more burial sites in the area with which to compare Cairnpapple than were available to Piggott 50 years ago. In particular these sites have allowed us better to appreciate the range of Early Bronze Age burial practice that might be found on a single site: not only inhumation burials in cists, but also in pits and wooden coffins, and not only cremation burials in urns, but in pits and cists.

Seven sites in eastern Scotland, excavated since Cairnpapple, are worthy of attention. At Barns Farm in Fife Watkins (Watkins 1982) investigated a complex cemetery of five cist burials and three graves (a mixture of cremation and inhumation burials) accompanied by Food Vessels and a Beaker. In addition there were 12 pits, at least three of which seemed to have had some sort of burial function, although only parts of bodies – human heads – were deposited. There were also two hearths, one of which included a sherd of earlier Neolithic pottery, reminiscent of those noted at Cairnpapple. In all there were four sherds of Early Neolithic pottery, the others being from a grave and from two pits. It seems likely that these were the residue of earlier activity on the site, during which, perhaps, some of the undated pits were dug.

However, the most important feature of the Barns Farm site was that after a period of use as a flat cemetery, the various burials were themselves buried under an earthen barrow. It is possible that this sequence is also visible at Cairnpapple.

At North Mains, Perthshire (Barclay 1983), there were two foci for earlier Bronze Age burials: one in the area of the henge, the other on or near the surface of the vast Early Bronze Age mound. Within the henge there were two very deep cists (both inhumation burials, one with a Food Vessel), a more normal cist (inhumation and cremation burial with a Food vessel), a cist containing a cremation deposit and Beaker, an inhumation burial in a shallow pit with a Food Vessel,
an unaccompanied cremation burial in a deep pit, and three cremation burials in, respectively, a Collared urn, a Bipartite urn and an enlarged Food Vessel urn. On the mound there were eight cremation deposits, non-urned (six of them in cists of various sizes, some multiple burials) and two inhumation burials (one cisted, the other not, both with Food Vessels). Figure 18 (after Barclay 1982) summarises this considerable range.

At Balbirnie, Fife (Ritchie 1974) there were four cists and a possible further Beaker-accompanied grave under a cairn within a stone circle; parts of the cremated remains of about 16 people were subsequently dug into the surface of the cairn. Further small cremation deposits of this kind were dug into the cairn at Balfarg Riding School a few metres away (Barclay & Russell-White 1993).

At Ratho, Midlothian (Smith 1995) there were two foci of activity; one contained two cremation burials in Cordoned urns and one un-urned cremation deposits within a small ditched enclosure. The second, unenclosed, focus contained cists and possible cremation pits.

At the nearby site of Kinneil Mil, Stirlingshire (Marriott 1968) there were four urned (Collared urns) and five unurned cremation burials within the ditched enclosure, and four further urned cremation burials (Collared and Cordoned) outside it. It is clear from this case that burials could occur beyond what seems to the modern observer to be a formally defined cemetery boundary. This has implications for the interpretation of the Cairnpapple sequence - in particular the placing of the cremated remains associated with the 'arc' of post-holes.

While the evidence for the variety of Bronze Age burials has grown, so too, although in a far more limited way, has that for Neolithic cremation burials. At North Mains (Barclay 1983) a small cremation

![Fig. 18](attachment:image.png)

The range of Late Neolithic/Early Bronze Age burial types from one Scottish site—the henge at North Mains, Strathallan

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deposit in a pit was found under the henge bank. A short distance to the east, at the North Mains ring-ditches, one of the ditches cut an earlier pit, which contained 6 g of cremated bone and four sherds of early Neolithic pottery; charcoal from the pit was radiocarbon dated to 4640±65 BP (GU-1546: 3650–3100 cal BC).

As noted above, the evidence for Late Neolithic cremation is fragmentary and inconsistent. The presence of an Early Neolithic cremation pit at North Mains does not support the existence of a Late Neolithic cemetery at Cairnpapple. However, Sheridan and Kinnes (pers. comm.) have commented that, while recognising the argument for reassigning Piggott’s Period I cremation deposits to the Early Bronze Age, a Late Neolithic date cannot be ruled out.

THE PROPOSED REVISED SEQUENCE

Phase 1
This Phase comprises the earlier Neolithic plain bowl sherds and axe-head fragments, with some or all of the hearths (Figs 19 & 20). The presence of this sort of material on sites that would subsequently be occupied by later Neolithic ceremonial complexes is now too widespread to permit it to be dismissed as a mere accidental residue (Barclay & Russell-White 1993). This author does not find convincing the argument that this earlier material, which often has a markedly non-utilitarian character, is located on these later sites by coincidence. Given the persistence of oral traditions, the possibility that markers of some sort have not survived, or the possibility that the area continued to be used (although in ways that have little trace) it is possible that the ‘special’ nature of some places, established in the Early Neolithic, was understood for many centuries thereafter.

Phase 2
The construction of the following features – not necessarily at the same time or in any particular order (Figs 19 & 21):
- the setting of 24 uprights – probably of timber (this may precede the ditch and bank)
- the henge ditch and bank
- the ‘cove’ pits
- the pit-complex

There is no evidence that the ‘Cove’ or ‘pit-complex’ originally held upright stones and the interpretation of the ‘Cove’ as an Avebury-type structure must been seen as doubtful. There may be less-monumental stone structures in use in northern Britain that might have left such traces – such as the ‘hearth’ at Stenness mentioned above or the setting at White Cow Wood. The ‘pit-complex’ may be of more than one phase – the pits being one, the scooping another. While the pits seem likely to have been related to the henge, the scooping may have been related to quarrying for the material of mixed origin used to build the cairn around the North Grave (Cairn 1) or for parts of the first large cairn (Cairn 2).

Additional information was recovered in 1964/65 during work on the monument. A vertical-sided pit was revealed on the berm between the bank of the henge and the south-east ditch terminal. There are no extant site drawings but the sequence of photographs taken during excavation seems to show a substantial post-hole with massive stone packing, with the post-pipe clear in the lower and mid parts, but choked with stone in its upper part (Fig. 22). It is possible that this post, standing as it does, on the edge of the southern entrance, is related to the henge enclosure.

Phase 3
Over a period of several hundred years burials of various kinds were deposited in something like this order (Figs 19 & 24):

a) the smaller Beaker grave was inserted (it may be suggested that after this burial the focus of the site moved to the ‘North Grave’ area).

b) the burial focus of the monument was changed when the monumental North Grave was built (Fig. 23); a cairn was almost certainly built over it (Cairn 1), perhaps with material quarried from the ‘pit-complex’. The ‘arc’ (actually three lines of pits), possibly holding posts, was erected along the north-east–south-east face. Most of these holes attracted cremation burials at that time or later (if the sites of the posts were marked).

c) Cists A and B were placed around the North Grave. It is possible that some of the cremation burials not associated with post-holes of Phase 3b may belong to this phase.

d) very soon after, a cairn (Cairn 2: Piggott’s Period III cairn) was built over Cists A and B, and this seems to change the focus of the burial area again. The
Fig. 19
The features now assigned to Phases 1, 2, and 3a–b. The Pit-complex appears in Phases 2 and 3, as its position in the sequence is not clear.
cairn was built with stone and with ‘clay’ removed from the immediate area; this clay layer was preserved under the cairn. It is possible that the scoop element of the ‘pit-complex’ was used for some of the material. One of the pits of the ‘pit-complex’, which lay under Cairn 2, was backfilled with clay at this time. Some of the cremation burials noted under Phase 2 might have been placed around the Phase 3d cairn and the ‘arc’ of pits.

e) the larger (‘Period IV’) cairn – Cairn 3 – was built; it covered (but may not have been primarily intended to cover) the extended flat cemetery that had developed. It is possible that a burial higher in the Phase 3d mound, and lost to the massive disturbance caused by later stone-robbing, provided a focus and reason for this enlargement (cf the possible cist on top of the North Mains mound (Barclay 1983)). The mound may, however, have been intended only to enlarge or monumentalise the Phase 3d cairn. The two urn burials associated with the Phase 3e cairn seem more likely to have been dug into the surface of Cairn 3.

**Phase 4**
The long graves were inserted (Fig. 24). These seem more likely to be of the Christian period than of the Iron Age.
Fig. 21
Reconstruction drawing by David Hogg of the henge in use (Crown copyright: Historic Scotland)

Fig. 22
The stone-packed post-hole found near the southern entrance in 1964 (Crown copyright: Historic Scotland)
CONCLUSION

The reinterpretation of the sequence at Cairnpapple not only places events there in a valid regional context for the first time, but also allows us to reconsider more recently excavated sites (for example the sequence of timber rings at North Mains). It confirms that the monuments known as class II henges are usually only a single prominent manifestation of the significance of sites whose importance can routinely be seen to begin much earlier in the Neolithic. It also shows the value, indeed the necessity, of keeping the interpretation of famous sites, especially those in state care, that are presented to the public, under review.

The excavation at Cairnpapple and the report of the work stand as a memorial to the skill and honesty of Stuart Piggott as an archaeologist. His conclusions can now be reconsidered with hindsight and with a far better local data-set, but he set out his observations and the reasoning behind his conclusions clearly for those who might wish to follow, highlighting the areas where he knew that other interpretations might be more appropriate. Piggott's work at Cairnpapple shows the value of striving for objectivity, even if we know that, as in all things, the absolute is not achievable.

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Fig. 24
The features now assigned to Phases 3c, 3d, 3e and 4
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Cosmology, calendars and society in Neolithic Orkney: a rejoinder to Euan MacKie

CLIVE RUGGLES & GORDON BARCLAY*

The authors examine critically MacKie's long-standing contentious concerning Neolithic Britain — theocratic control of society, the relationships between monuments and sunrise or sunset on significant days of the year, the use of an 'elaborate and accurate' solar calendar and its survival into the Iron Age and into modern times.

Key-words: Neolithic, Britain, Archaeoastronomy, Maes Howe, Orkney

You can't measure time in days the way you can money in dollars because every day is different.

Jorge Luis Borges

In a recent article in *Antiquity* Euan MacKie (1997) has presented new material to support a modified version of his long-standing contention (MacKie 1977a; 1977b) that there existed in later Neolithic Britain and Ireland theocratic élites who possessed what seems astonishingly precise and sophisticated astronomical and mathematical knowledge. He uses new archaeoastronomical data obtained at Maes Howe passage tomb in Orkney, combined with archaeological evidence from the nearby Neolithic settlement of Barnhouse, to reaffirm a number of earlier ideas (e.g. MacKie 1969; 1976; 1977a; 1977b; 1981; 1982; 1983; 1986; 1994). In particular, he suggests that certain pre-Christian calendrical festivals, some of which survive into modern times, could derive from a 'Neolithic solar calendar' in widespread use in later Neolithic Britain and Ireland in which the solar year was divided into 8 or even 16 parts of equal length measured to the nearest day, starting from one of the solstices. Further arguments in support of these ideas, extending the origin of the 'calendar' back to the earlier Neolithic, are also presented in a subsequent article on Neolithic and later structures at Howe, Orkney (MacKie 1998).

Some of these ideas are important because of their clear, and radical, implications for our understanding of aspects of prehistoric cognition and cosmology, social organization and the factors determining patterns of continuity and change. In considering the new evidence, it is helpful to separate three overlapping, although not necessarily mutually dependent, fundamental ideas. The first is that the theocracies occupied a powerful and influential place in a strongly hierarchical social structure present throughout Britain, using 'national' forms of monument and pottery (MacKie 1997: 339). The second is that precise relationships existed between monuments, points of reference on the distant horizon, and sunrise or sunset on significant days in the calendar year. The third is that an 'elaborate and accurate' ceremonial calendar was in widespread use from Orkney to southern England and even Brittany (cf. MacKie 1997: 340, 358).

MacKie refers back repeatedly to the 1977 proposition of his ideas in the book *Science and society in prehistoric Britain* (MacKie 1977a — hereafter S&S). He dismisses critical reviews and commentaries (e.g. Hawkes 1977; Piggott 1978; Daniel 1980; Ritchie 1982) as 'not finding favour' and accuses others of lacking the courage to deal head-on with his views (MacKie 1994). The propensity of this topic to generate more heat than light is undeniable, but in view of the continued propagation of these ideas the present authors felt it necessary to attempt to provide — if not the detailed refutation that MacKie (1983) has demanded — at least the main threads of such a case, both from an ar-

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embellishment of [a] locale' through a 'lengthy and piecemeal programme of construction', rather than two phases of massive roofed building. The subsequent discovery of vast complexes of concentric rings of posts clearly far too large to roof (as recently at Stanton Drew, where nine concentric rings between 23 m and 95 m in diameter have been located (David 1998)), must cast further doubt on MacKie's assertions. In Scotland Mercer (1981: 159) proposed a convincing interpretation of the concentric circles of posts within the henge at Balfarg (Fife) as a series of barriers.

Social theory
There is surely irony in MacKie's (1977a) criticism of archaeologists for avoiding social theory before that time, as it is the subsequent development of a complex body of social theory by archaeologists (e.g. in the context of archaeoastronomy, Thorpe 1983) that exposes the weaknesses of his own cultural-historical approach to the later Neolithic. In the main body of S&S, and more recently (1997: 339) MacKie always offers a limited choice to the reader: either his preferred Maya-style hierarchy or a 'barbarian' or 'simple peasant' society that only undertook construction for utilitarian purposes. For example, the interpretative choices for henges are either

1 the site of 'barbarian rituals concerned with economic needs' or
2 (as MacKie would wish) 'ceremonial centres of skilled learned orders'.

Or again: society is either 'predominantly homogeneous, segmented and rural' or a 'complex, highly stratified hierarchical organisation with advanced political structure and many specialised groups, almost a proto-urban society in fact'. In contrast to the offering of 'barbarian peasants', Richards and others (Richards 1990a; 1991; 1993; Parker Pearson & Richards 1994) have demonstrated the complexity of the society that built and used the later Neolithic settlements, perhaps even involving 'ritual specialists', without resorting to MacKie's model.

Regional archaeologies
But there are broader problems. The 1977 study is a product of its period: there were very limited amounts of reliable excavated data in most parts of the country, and the creation of a coherent 'story' required the pulling together of material widely separated geographically. This process tended to create homogenous, broad brush prehistories that underemphasized regional variation and promoted a diffusionist approach. It is possible to see now that the sites drawn together to create a 'British Neolithic' are probably parts of different regional 'Neolithics' throughout Britain and Ireland (Kinnes 1985; Harding et al. 1996; Cooney 1997; Barclay 1997a; in press). We must also consider the extent to which Orkney's supposed prominence in the Neolithic (e.g. as a destination for pilgrimage — MacKie 1994) is an accurate reflection of prehistory, or whether it is, to some extent, a product of the recent history of investigation (Barclay in press).

We therefore believe that MacKie's 1977 consideration of Neolithic society has not stood the test of time. The excavations at Durrington Walls cannot be interpreted now as directly applicable to material many hundreds of kilometres away, as it was believed they could 20 years ago; there is a far greater understanding of regional diversity in the Neolithic in Britain. It is significant, for example, that MacKie draws such diverse monuments as the henges and recumbent stone circles into his homogenous cultural, astronomical and geometrical structure; it can be seen that the distribution of henges and RSCs is almost mutually exclusive (FIGURE 1), and it has been suggested that, if the monument types are broadly contemporary, their very different nature and the ways that members of the classes inter-relate may indicate considerable differences in ceremonial practice and indeed in social structure (Barnatt 1989; Barclay 1997a). MacKie's reliance on the evidence of Wessex to interpret material in the rest of Britain, and the identification of Stonehenge and Silbury Hill as drawing on resources from a British-wide base, rests on a view of British prehistory that few would now find acceptable.

A further fundamental weakness of MacKie's approach, both in 1977 and 20 years later, is the assumption that the data he has to work with is complete (cf. Barclay 1997b). For example, his assumption that the three later Neolithic settlements known in Orkney at that time — Skara Brae, Rinyo and Links of Noltland — were all there ever were of their kind, and could therefore be seen as rare, elite, settlements, has been shown to be erroneous by later work. We can see that other excavated settlements
display broadly similar characteristics, and further discoveries continue to come to light (Barclay 1996 and references).

Problems with MacKie’s interpretation

In summary, the problems with MacKie’s hypothesized social structure are as follows:

1. the Megalithic Yard is not supported by the statistical evidence, and simple ‘by eye’ construction can explain the shapes of stone rings just as well as complex ‘laying out geometries’;
2. as will be discussed below, the precise astronomy proposed by Thom can be seen as a modern scientific imposition upon an intense, but different, interest in the sky;
3. the contemporaneity of events suggested by MacKie (1977a) based on a common 1970s
view of 14C calibration is no longer demonstrable;
4 it is no longer believed possible to make up deficiencies in evidence in one area by drawing on material from another, that may have different meanings;
5 there is no evidence that the ‘roofed buildings’ at Durrington Walls and other sites were in fact roofed; it seems very unlikely that they were the elite dwelling places claimed by MacKie;
6 the societies of later Neolithic Orkney need not necessarily lie at one of the two extremes (‘barbarous peasant’ and ‘wise man’) offered by MacKie.

Solar alignments, cosmologies and calendars

Solstitial alignments and cosmology
The tendency to measure prehistoric astronomy — along with mensuration and geometry — against the yardstick of modern science has, it seems, finally been laid to rest (Ruggles 1999: 80–81; Ruggles in press and references). However, there is no doubt that architectural alignments with celestial bodies and events are potentially of considerable importance within broader investigations of ways in which the location and form of monuments served to express meaningful cosmological relationships, and the ways in which such relationships were exploited (Ruggles & Saunders 1993; Ruggles 1999: chapter 9). A variety of local groups of similar monuments in Britain and Ireland from the early Neolithic through to the middle Bronze Age show striking consistencies in orientation (Ruggles 1998; 1999: chapter 8), which suggest that celestial referents were used in the broadest sense to determine direction. Furthermore, many of these are confined to sectors of the horizon roughly demarcated by the cardinal directions or the directions of sunrise or sunset at the solstices (which from here onwards, we shall refer to simply as the ‘solstitial directions’). In specific cases, such as the recumbent stone circles of northeast Scotland and the short stone rows of the Irish southwest, there is apparently a strong relationship to the moon (Ruggles 1999: chapters 5, 6). What these studies show perhaps most importantly is there is no overall pattern of development but rather various regional patterns of continuity and change.

In this context, the suggestion that the great passage tomb at Maes Howe may have been engineered in relation to the midwinter sunset is certainly not surprising in itself; there are other specific cases of the orientation of public monuments upon solstitial sunrise or sunset, examples now well known in the archaeological literature ranging from the Dorchester and Dorset cursus monuments (Bradley & Chambers 1988; Barrett et al. 1991: 56–7) to Wessex henges (Ruggles 1999: 138 and references), Newgrange (O’Kelly 1982) and Balnuaran of Clava (Bradley 1998). Some argue that harmonizing a monument with the cosmos in this way helped to affirm its place at the centre of things (e.g. Renfrew 1984: 178–90; others that this helped to place its operation above challenge and thereby reinforced political control (e.g. Barrett et al. 1991: 56). Yet others point out that astronomical alignments served to place a monument in time, empowering it perhaps with special meanings on certain regular occasions (cf. Bradley 1993: 68; Darvill 1996: 177–8; Ruggles 1999: 154). There is also much evidence from historical and modern indigenous communities of the widespread importance of the solstitial directions in schemes of sacred geography (Ruggles 1999: 148 and references).

In fact, there has been considerable confusion in the literature as to whether the passage at Maes Howe is in fact oriented such that the light from the setting sun at midwinter does illuminate the rear wall of the chamber (e.g. Ritchie 1985: 127; Parker Pearson 1993: 59) or whether this actually occurs a few weeks earlier and later (Burl 1981: 251). One must also consider the shift in the position of midwinter sunset since the time of construction (about half a degree). MacKie’s discussion of the bent shape of the passage (MacKie 1997: 345–56) and clear presentation of the horizon profile information do a great deal to clarify the basic data. MacKie shows that the outer straight section (‘axis B’) is more or less aligned upon the setting point of the solstitial sun in the early 3rd millennium BC whereas the inner straight section (‘axis A’) is aligned more than 5° further round to the west.

But such matters should be interpreted in context. We cannot ignore the fact that the orientations of central hearths in Orkadian houses fall into four clearly separate, although wide, bands centred roughly upon the four solstitial directions (Richards 1990a: figure 5.5; Parker Pearson & Richards 1994: figure 2.3). This is strongly suggestive that they were con-
Ward Hill, left slope, junction with nearby ground 217°.1 1°.3 23°.4
Ward Hill, right slope, junction with nearby ground 222°.9 1°.0 −21°.6
Cuilags, left slope, junction with nearby ground 225°.7 0°.9 −20°.7

Table 1. A comparison of horizon data from independent surveys at Maes Howe by Ruggles (1979, previously unpublished) and MacKie (as reported in MacKie 1997). MacKie’s data are shown in square brackets.

strained according to quadripartite cosmological principles associated with the solstices. The structural similarity between Maes Howe and the principal building at Barnhouse, and the approximate orientation of the latter upon midwinter sunrise (Richards 1990b: 312–13), is suggestive of a dichotomy between houses for the living and monuments for the dead which is reflected in a symbolic dichotomy between the rising and the setting sun. These modest interpretations are consistent with the wider archaeoastronomical evidence concerning houses for the living as well as those for the dead, but are suggestive of broad cosmologies rather than exact calendars. Furthermore, they are not affected by the subtleties of the exact play of sunlight in the Maes Howe passage at or close to midwinter.

Using video evidence and three-dimensional computer models, Victor Reijs has recently demonstrated that sunlight strikes the back of the chamber shortly before sunset for some 35 days on either side of the solstice, and did so for perhaps 40 days either side 5000 years ago (http://www.geniet.demon.nl/maeshowe/ see also Ashmore in press). This in itself also suggests that the orientation of that tomb was designed without great precision of alignment in mind.

The horizon at Maes Howe
MacKie, however, goes considerably further in insisting that Maes Howe was an ‘observing instrument’. Even though he now distances himself from claims of ‘scientific’ astronomy, he continues strongly to endorse Thom’s claim that prehistoric people set up alignments of high precision, using features on the distant natural horizon as foresights (MacKie 1997: 340–41). He also maintains that they provide evidence of ‘scientific capability’, Maes Howe functioning as a ‘solar temple/observatory’ (1997: 343).

On a factual level, the data relating to certain points on the southwestern horizon are in almost complete agreement with an unpublished theodolite survey of Maes Howe undertaken by one of the present authors (CR) in August 1979 (from a point 10 m from the present entrance on axis B). The results for three common points are shown in Table 1.

There are therefore no reasonable grounds for doubting the azimuth, altitude and declination figures quoted by MacKie for these and other points in the southwestern horizon as viewed from Maes Howe.

It is in the interpretation of these data that we are in strong disagreement with MacKie. His claim is that Maes Howe is a ‘multiple calendar site’ incorporating two precise alignments upon horizon features marking sunset at two epoch dates in Alexander Thom’s 16-month solar calendar. Before examining these specific conclusions it is necessary to review the wider interpretative context in which they have been formulated.

Calendars and continuity
MacKie (1997: 340) states that ‘the reality of . . . solar calendar alignments is shown by independent archaeological and historical evidence which supports also the existence of the sixteen “month” calendar inferred statistically by Thom’. He also strongly contends that this solar calendar was not only widespread in Britain in Neolithic times but that the solstices, equinoxes and mid-quarter days continued to be important through to the Iron Age, where they were incorporated in the ancient Celtic calendar as festivals such as Beltane and Samhain, and hence survived through to modern times (MacKie 1997: 355).

Despite the support for this idea that has been shown by some other archaeologists (e.g. Burl 1986: 197) and archaeoastronomers (e.g. Krupp 1994: xi), it rests upon the assumption that dividing the year into 8 or 16 precisely equal parts was likely to have been important to prehistoric people. This may seem natural from a modern European perspective where time is seen as an abstract ‘axis’, but is unconvincing in the context of a non-Western world-view where notions of (space and) time are likely to have been highly contextualized (Shanks &
Tilley 1987: chapter 5; McCluskey 1998: 4–5). In any case, the evidence to support it is slight.

1 The evidence for Thom's solar calendar derives from accumulations of declinations corresponding to the upper limb of the sun rising or setting at dates at intervals of one-eighth (and possibly one-sixteenth) of a year measured from either solstice (the 'epoch' dates). It is important to realize that the evidence — from Thom's (1967) large-scale analyses of 145 'megalithic sites' — comes from a variety of 'indications' from many different types of megalithic structures scattered throughout Britain (cf. Ruggles 1999: 52). This wide variety is worrying if there really was uniformity of astronomical and calendrical practice throughout Britain (Fleming 1975). It is also important to realize that the declination targets are 'fuzzy' because the number of days in a year is neither integral nor divisible by 16 (Ruggles 1999: 54–5). This increases the flexibility of being able to interpret any particular alignment as calendrical. Thom's data were thoroughly re-examined and reassessed by one of the present authors (CR) in the course of a major survey project between 1975 and 1981. Thom's results could not be reproduced once strict attention was paid to the demonstrably fair selection of data, and the inescapable conclusion was that the apparent accumulations of declinations at the calendrical epochs can easily be accounted for as data selection effects (Ruggles 1984; 1999: 70, figure 3.3).

2 Once Thom's own data are discounted, no evidence from coherent local groups of monuments supports the idea of an 8- or 16-part calendar; there are only isolated and scattered examples of putative alignments upon 'calendrical' epoch dates (Ruggles 1999: 142).

3 The geometric designs on the Bush Barrow gold lozenge have been interpreted by A.S. Thom and colleagues as a device for implementing Thom's solar calendar (Thom et al. 1988) and are cited by MacKie (1997: 340) as further evidence in support of the idea of the Neolithic solar calendar. By holding the lozenge horizontally and in a certain orientation, Thom et al. argue that the directions of sunrise and sunset at the calendrical epoch dates are marked on the lozenge. However, the regularity of the decorative design, the fact that only a small and apparently arbitrary subset of the lines actually appear to correlate with epoch directions, and the fact that the majority of the directions do not fit with lines on the artefact at all (cf. Ruggles 1999: figure 8.10) all argue strongly against this. The arbitrary nature of the theory is highlighted by North's (1996: 508–9) criticisms of it and the fact that he manages to impose an equally complex but completely different interpretation of his own (1996: 511–8). There is also the problem, acknowledged by North, that other lozenges exist, similar in form and decoration but with different angles, which do not appear susceptible to his own arguments or those of Thom et al. The Bush Barrow lozenge, like the others, is certainly a very fine decorative artefact, representing a high order of technological achievement, but its interpretation as a calendrical device is speculative.

4 The evidence to support the idea of a ubiquitous 'Celtic' calendar existing in later Iron Age times, with its seasonal festivals dividing the year into eight precisely equal parts, is itself very much weaker than is generally assumed (for detailed arguments see Ruggles 1999: 141–2 and references). Attractive as it may be to envisage threads of continuity from early Neolithic through to Iron Age and even modern times, there is however a great deal of evidence that contradicts this conclusion, and we cannot agree with MacKie (1997: 340) that the existing evidence provides any support, let alone strong support, for the idea of 'calendrical' alignments.

**High-precision alignments**

Thom's 1967 analysis was followed by a succession of publications in which he argued the case for the existence of astronomical alignments of ever greater precision, finally claiming the existence of some which were precise to a single minute of arc (cf. Ruggles 1999: chapter 2). These claims were subjected to detailed reassessments by one of the present authors (CR) during the early 1980s (Ruggles 1981; 1982; 1983; 1999: chapter 2). It is misleading for MacKie to assert (1997: 340) that the statistical arguments against alleged high-precision align-
ments ‘have been shown to be circular’. The article quoted in support of this (MacKie 1986) states that high-precision alignments were not found in a large independent survey of evidence from western Scotland by CR (Ruggles 1984) because they were not looked for. In claiming this MacKie himself ignored, and continues to ignore, an existing body of earlier published work directly addressing the very question of high-precision alignments and re-assessing Thom’s data in detail (Ruggles 1981; 1982; 1983). The earlier publications by Ruggles show beyond any reasonable doubt that all Thom’s putative astronomical sightlines of a precision greater than about half a degree can be quite adequately accounted for as chance occurrences. Even the existence of deliberate high-precision solstitial foresights at ‘classic’ sites such as Ballochroy and Kintraw (cf. MacKie 1997: 342) is questionable (Ruggles 1999: 19–29 and references therein).

In sum, the case in favour of high-precision astronomy is completely unproven. And to say that ‘there is increasing evidence . . . that . . . the sixteen “month” Neolithic solar calendar was a reality’ (MacKie 1997: 355) ignores an overwhelming range of evidence to the contrary.

The alignment evidence from Maes Howe

Returning to the alignment evidence from Maes Howe, we must bear in mind the definition of the calendrical alignments set out by MacKie (1997: 340):

To be plausible the structure must have some built-in direction indicator which points to [a] . . . distant natural mark on the horizon like a notch or hill slope which is the foresight.

To achieve adequate precision, we should expect to find alignments upon places on the horizon where the upper limb of the sun rises or sets on dates at some multiple of 1/16-year from either solstice. These should be marked by conspicuous horizon features such as notches between distant hills, and ‘indicated’ by archaeologically evident structures.

We can now examine the specific alignments listed in MacKie 1997: table 1.

1 Axis B, as already discussed, was approximately aligned upon the upper limb of the solstitial setting sun. There is no horizon foresight at this point; the horizon is relatively close and featureless, a little over 1° to the left of the point where the left slope of Ward Hill disappears behind the closer ground.

2 Axis A is aligned on a point some 1°-5 to the left of where the right slope of Ward Hill disappears behind closer ground. It is thus a plausible, though not precise, indicator of the latter point, whose declination, –21°-6, does correspond (within the margins of uncertainty mentioned above) to the upper limb of the setting sun at a time 1/16 of a year before or after the winter solstice. The upper limb of the sun would actually reappear at this point, so this is a classic Thomian foresight.

3 The right-hand end of Cuilags is not indicated. According to MacKie it yields a declination –17°-0, corresponding to a centre disc declination of –17°-3. The declination of centre of the sun on the appropriate mid-quarter days would be between –16°-8 and –16°-0 (Ruggles 1999: 55). MacKie proposes that a bump at the top of the slope, rather than the extreme right-hand end, might have been the foresight, but its declination –16°-6, corresponding to a centre disc declination of –16°-9, is still marginal if it is to be interpreted as a precise mid-quarter day alignment. Only (2) fits MacKie’s own criteria for a calendrical alignment, and only then if an indication 1°-5 to the left of the target is thought to be acceptable. (1) has no foresight. (3) has no indication, and is also only marginal as an indicator of the appropriate calendar date, and then if one makes the assumption that a secondary feature, rather than the right-hand end of the slope itself, was the intended foresight.

In view of the fact that there is no convincing background evidence for calendrical alignments, we would be inclined to put down the precise calendrical alignments proposed at Maes Howe to chance. On the other hand, we would be inclined to accept the idea that the outer axis (Axis B) was aligned upon midwinter sunset, to ‘good’ but not to ‘calendrical’ precision. The argument that the solstitial sun itself may originally have shone down the passage after passing through a light-slit above the door (MacKie 1997: 356) has been published before (Welfare & Fairley 1980: 93, quoted in Ritchie 1982) and certainly seems plausible and worthy of further investigation. We would also be inclined to accept that the general alignment
of the tomb passage upon ‘the most conspicuous natural forset on the southern mainland of Orkney’ (MacKie 1997: 357) might also have been deliberate, and meaningful, in itself.

The general alignment upon the standing stone at Barnhouse and the Hills of Hoy, as well as roughly with the midwinter sunset, accords with other instances where monuments are aligned upon conspicuous features in the landscape, man-made and natural, and/or celestial bodies and events, all as part of organizing the landscape according to the principles of a cosmology that does not separate people, land and sky into separate categories but in which they are intimately tied together. This is very different from the sort of view of time as abstraction, strongly redolent of a modern Western world-view, which encourages thoughts of dividing the solar year into exactly equal parts.

**The alignment evidence from Howe**

In a separate paper, MacKie (1998) has examined a sequence of structures from Neolithic times through to the Iron Age at Howe, some 4.5 km west-southwest of Maes Howe and 3 km southwest of the Ring of Brodgar across the Loch of Stenness. Unfortunately he has not referred to Hingley’s more wide-ranging survey of the re-use of Neolithic monuments in Scotland in the Iron Age, in which the relationship between the features at Howe is placed in a broader context (Hingley 1996).

On a factual level, MacKie is to be congratulated on determining the correct orientation of the passage of the Neolithic tomb at Howe from confused earlier reports and on his clear presentation of the orientation and horizon profile data (MacKie 1998: table 1 & figure 3). The problem is once again in the interpretation. The reader should recall that the nature of the evidence invoked to support a precise Thomian calendar is supposed repeated alignments upon precise epoch dates at 1/8 or 1/16-year intervals from either solstice, marked by the upper limb of the sun rising or setting behind conspicuous horizon features such as notches between distant hills, ‘indicated’ by archaeologically evident structures (cf. MacKie 1998: 10, 12).

In fact, none of the potential alignments listed and illustrated by MacKie (1998: table 1 & figure 3) fulfills these criteria.

1 To judge from MacKie 1998: figure 2, the axis of the stalled cairn or rectangular house S seems to be somewhat (perhaps as much as 4°) to the right of the azimuth (123°) marked. The chosen orientation appears to have been selected because it corresponds approximately to the azimuth of the upper limb of the Quarter Day rising sun. However, this event occurs on a featureless stretch of horizon, so there is no horizon foresight to mark it.

2 The orientation of the passage tomb points at a saddle between the conspicuous hills of Mid Hill and Ward Hill, but the declination (−10°6) has no obvious astronomical interpretation — and certainly none in terms of Thom’s 16-month calendar, for which the closest epoch declination is around −8°5 (Ruggles 1999: 55).

3 What is interpreted as an open-ended cross-passage between the ‘stalled cairn’ and mortuary house aligns in the southwest upon a dramatic cleft between the distant hills of Hoy. For a few days around midwinter, the disc of the setting sun would have passed across this cleft (whose lowest point has a declination −25°0). But note that the whole sun appeared here — this was a dramatic affirmation of the relationship between the setting sun on days close to midwinter, and the visible horizon at that place. The top limb of the midwinter setting sun did not appear in a notch or twinkle down a hillslope, so there is no evidence of the use of the horizon as an observing ‘instrument’ to pinpoint the solstice. A similar argument applies to the appearance of this same cleft from the nearby Ring of Brodgar (MacKie 1998: figure 3d), from which the declination of the base of the cleft is only slightly greater (−24°9).

Additionally, no information is given regarding the northeasterly alignment of the cross-passage, and there is no apparent reason (other than the astronomical potential of the southwesterly alignment) for selecting this direction in preference as the one that was meaningful to the builders.

4 The Keelylang Hill profile (MacKie 1998: table 1 & figure 3b) is not indicated. A shallow dip in the horizon at this point, whose declination according to MacKie is −0°1, corresponds roughly to equinoctial sunrise, although the upper limb of
the equinoctial sun would actually appear approximately 1° (two solar diameters) to the left. There is no reason other than its astronomical potential to mark it out for special attention from a large number of possible horizon features of equal prominence in other directions.

These data provide no compelling evidence for an interest in Thom’s calendar in Neolithic times. This is not to say, however, that certain alignments upon conspicuous features in the landscape, and important celestial events, might not have been significant. Indeed, the general orientation of the passage tomb upon a conspicuous set of hills, as at Maes Howe, may well have been intentional. Furthermore, the apparent alignment of a cross-passage both upon a dramatic cleft between the distant hills of Hoy, and approximately upon midwinter sunset, does suggest that there was a deliberate encapsulation of a dramatic relationship between a spectacular terrestrial feature and the setting sun on days close to midwinter, which would have passed directly through the cleft, appearing to stand in it shortly before starting to disappear below the horizon.

Plausible as these relationships are, it is impossible to agree that the evidence from Howe gives any support to MacKie’s contention (1998: 37) that ‘concern with … Quarter Day festivals now seems likely to go back into the earlier part of the Neolithic period in Orkney’. The calendrical explanation derives from a reading of the evidence that falls into all the methodological traps identified by one of the present authors (CR) many years ago (cf. Ruggles 1999: chapters 1–3) — criticisms that are ignored, and are certainly not addressed, in these new papers.

Conclusions
As questions of landscape cognition and cosmology take their proper place in archaeological thought it becomes important to look for astronomical referents, since meaningful associations between celestial bodies and events and objects and actions in other parts of the perceived world are an important feature of non-Western world-views. Astronomical associations encapsulated in architecture, serving perhaps as metaphors for perceived properties of the cosmos, may give important insights into such perceptions in the past. Well-established archaeoastronomical approaches, seeking to correlate the locations of monuments or houses in the landscape with celestial objects or events, are relevant as part of broader investigations. So also are novel approaches such as Bradley’s (1998) exploration, at the passage tombs at Balmunran of Clava, of apparent conflicts between the requirements of sound structural design and the desire to conform to certain cosmological requirements, in this case a broad solstitial alignment.

There remains considerable confusion in the archaeological literature about matters astronomical. A relevant example is the erroneous claim that the latitude of Orkney is especially favoured because only here do the four directions of the rising and setting solstitial sun fall at right-angles to one another (Parker Pearson 1993: 59; Souden 1997: 122). In fact, the azimuths of solstitial sunrise and sunset are dependent upon the horizon altitude, and the most favourable latitude is in fact around 55°. Certainly it is impossible to achieve at the latitude of Orkney (59°) (Ruggles 1999: 250).

Archaeoastronomy has the potential to clarify such confusions, and has an important role to play in broader studies of sacred geography and cosmology. The practice of presenting reliable and quantitative orientation and horizon profile data, as MacKie has done at both Maes Howe and Howe, is thus to be applauded and encouraged. It is crucial, though, to ensure that the interpretation of such data is in tune with wider developments in archaeological thought relating to the relevant social and cognitive issues.

This means abandoning a vision of a Mayan-type late Neolithic which rests upon Wessex-oriented diffusionist prehistories and which ignores so much that has been written about the period and about some of its most significant monuments in the last decade. It also means moving beyond simplistic interpretations featuring universal calendars which rest implicitly upon modern Western-style abstract conceptions of space and time, and which themselves ignore a weight of contrary archaeoastronomical evidence from the last two decades.

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Chapter 24

Between Orkney and Wessex:
the Search for the Regional Neolithics of Britain

Gordon J Barclay

While, in 1998, I was thinking about what to say in this paper the submission was made for some of Orkney's Neolithic monuments to be considered for World Heritage status. The World Heritage list is described as '... a list of properties forming part of the cultural and natural heritage which [UNESCO] considers as having universal value ...' (Historic Scotland 1998), and the nomination's celebration of the human achievement represented by the Orkney monuments is certainly to be welcomed.

But the various meanings of the word 'universal' triggered my thoughts, for we have also to consider the value of the Orkney monuments as sources of information, and how that information is interpreted and used. Here I really run into problems with the idea of universality. In 1989 Jan Harding (1991) warned of the 'danger of treating the exceptional as typical', and throughout my paper the problems of what I have termed universalist prehistories and the use of restricted regional archaeologies to develop universalist interpretative orthodoxies will run as a thread.

Kinnes, in his review of the Neolithic in Scotland (Kinnes 1985), commented that there was no such thing as a 'Scottish Neolithic', only a range of regionally distinct Neolithics. This might seem obvious to us today but it is not long since the Early Neolithic of Scotland was still described almost exclusively on the basis of its regional restricted chambered tombs (Henshall 1974; Ritchie & Ritchie 1985).

In 1996 a set of papers appeared under the title 'The Neolithic in no-mans land' (Frodsham 1996), prompted by the lack of any synthesis of the Neolithic between the Trent and the Tweed. In that volume it was noted that: '... while recent interpretative accounts acknowledge the fragmentary nature of the Neolithic they continue the traditional focus upon those intensively studied parts of England and Scotland — the Wessex chalkland and Orkney ... the reader of recent accounts would be hard pressed to find discussion of direct relevance to other regions' (Harding et al. 1996, 189).

There is no doubt that the Orcadian Neolithic is both striking and extraordinary, for a number of reasons, some related to building materials, others to survival conditions, and others to the inherent quality and scale of the structures. Rarely do such sites, monuments and other archaeological features survive so well. Nothing that follows is intended to detract from the importance of the monuments of the Orcadian Neolithic. However, the sheer quality of surviving archaeological material in Orkney exercises a mesmeric effect, and this has perhaps tended to lead to misperceptions about the other Neolithics of Scotland, just as the hypnotic influence of the monuments of Wessex continues to affect the interpretation of the archaeology of the British Isles. For it has been recognized that large pools of relatively well-preserved and well-studied material drive the creation of explanatory models which have a power that carries them into areas of less well-studied material, perhaps inappropriately.

Perhaps the sheer persistence with which images of the past in Scotland are presented as images of the prehistory of the areas of stone monuments, mostly Orkney and the Callanish site in the Western Isles, blunts the capacity of non-archaeologists elsewhere to recognize the value of their own past. The most striking example of this inferiority complex was the strident cry of some of the opponents of the Archaeolink Prehistory Park in Aberdeenshire — 'who on earth will find our prehistory interesting?'

This problem is surely reinforced by the distribution of monuments in which the prehistoric past is presented to the public. The map shows the distribution of broadly Neolithic sites in state care (Fig. 24.1). While some other sites are open to the public none are publicized to the same extent as those cared for by the state. It is to be hoped that centres like that at Archaeolink will begin to shift perceptions about
Figure 24.1. Distribution map of the broadly Neolithic properties in state care.
lowland archaeology, but public policy in a different area hampers the display of the prehistories of the lowlands. Heritage Lottery Funding can be applied to conserve a stone structure, but not to build a replica of a timber one (Heritage Lottery Fund 1998). This places obstacles in the way of the display of earth and timber sites: for example the plan of the Balbridie building cannot be turned into a reconstruction, at least not with HLF funds.

The story of the Neolithic of much of lowland Scotland in the last two decades is one of the emergence of a rich archaeological landscape, which until recently has been physically hidden or has lain unrecognised and which is still largely unexplored (Barclay 1992; 1995; Barclay & Maxwell 1998). The understanding of the Neolithic (particularly the earlier part of it) in this area of the lowlands has developed through a formative period in Scottish prehistoric studies in general. One of the main issues to emerge is regionality, in two senses: regional variation in the past, and the development of regionally based interpretative models rather than inappropriate ones erected in distant and different areas. The main part of my paper deals with these two themes, first, description and demonstration of regional variation, and then a consideration of the nature of 'British' prehistories.

Regional variation in the Neolithic of Scotland

The history of the study of the Neolithic reflects that of Scottish prehistory as a whole, and in the lowlands it is aerial survey that has been the prime agent of change in our understanding. This has revolutionised our understanding of areas which appeared to be largely devoid of monuments but which had produced rich assemblages of artefacts in the past.

While aerial survey began to have an impact on the prehistory of the southern part of Britain before the Second World War, in contrast it is only since the early 1970s that there has been any serious Scottish-based aerial photography programme. In southern England in particular, in the general upsurge in archaeology after 1945, cropmark archaeology was assimilated into the improving picture of that region’s past, a picture in which earthen monuments were familiar, if not the norm (RCHME 1960). In Scotland the parallel increase in activity took place with no major cropmark contribution, and to a great extent the existing perception of Scotland’s surviving archaeology as predominantly stone or upland, was reinforced. Only with RCAHMS’ published area surveys in the last four or five years do we see aerial photographic material achieving its due prominence (e.g. RCAHMS 1998).

There was no expectation, and therefore no conceptual capacity, to identify earthen monuments of a kind common elsewhere in Britain. For example a prominent earthen barrow, noticed only in 1989 (Discovery and Excavation in Scotland 1989, 27), lies 30 m across the arable field from the Corrimony cairn, excavated in the 1950s (Piggott 1956) subsequently displayed as a property in state care and visited, I would imagine, by most archaeologists active in Scotland during the 1960s to 1980s. Lowland Scotland was seen to have only relatively sparse distributions of Neolithic monuments, and those of kinds with few characteristics to encourage classification or further study (Coutts 1971). There has also been determined resistance to the interpretation of a great number of earthen barrows as anything other than glacial features. Most recently the nature of the Herald Hill long barrow, in Perthshire has been a matter of contention (Barclay & Maxwell 1998; RCAHMS 1994).

There are interesting parallels between archaeological perceptions and those of the Scottish landscape in general, particularly as expressed in landscape painting.

During the nineteenth century the popular image of Scotland was created by the painters of the vast panoramic landscapes ... [which] conformed with, and encouraged, the romantic notions of the Highlands evoked in a populace brought up on the novels of Sir Walter Scott and his imitators. That hypothetical visitor from outer space could be readily forgiven if, through knowledge of these paintings alone, he assumed that Scotland was entirely populated by sheep, woolly cattle and antlered beasts who stood proud against the snow, rain and fiery sun of this mountainous land (Billcliffe 1987, 8).

Where the life of the people was shown, it was that of the picturesque Highlander, not the prosperous lowland farmer. This concern with dreich highland and windswept island may be said to continue to haunt much of Scotland’s modern archaeological endeavour, for the lowlands have, in recent decades, singularly failed to attract as much university-based research, either from Scottish or English institutions, as the northern and western isles (Barclay 1997b). In this context it is encouraging to see Thomas’s and Bradley’s recent work in the southwest and northeast of Scotland respectively.

We may contrast this Victorian view of land-
scape with the reality for the most heavily populated areas of Scotland: the lowland landscape, particularly as depicted in the work of James McIntosh Patrick, who "... expressed more interest in a landscape which has offered man an opportunity to co-exist, a countryside that has not spurned his husbandry, but which has openly responded to his care and his exploitation of its contour ..." (Billcliffe 1987, 8). This separation of highland and lowland, myth and reality is a reflection of a well-recognized problem in the determination of Scottish identity — the idea of Highlandism, in which the whole country is represented by the paraphernalia of the Highlands, dress, scenery and even language, in the frequent assertions of the primacy of Gaelic over other tongues, and in the context of this chapter, archaeology (Chapman 1978; McCrone 1992; Womack 1989). While Orcadians would not think of themselves as part of the highlands, the islands must, as far as my arguments here are concerned, form part of them. I will return to the application of the term 'Highlandist' to prehistoric studies a little later.

It is in the landscapes like those painted by McIntosh Patrick in which aerial photography over the last twenty years or so has revealed an unexpected richness in sites of all periods, including the Neolithic. The distribution of hengiform monuments has changed markedly from the late 1960s, when Burl (1969) and Wainwright (1969) mapped 16 or 17 examples in Scotland, to more recently, when over 70 henges and small hengiform enclosures have been identified (Fig. 24.2) (Barclay 1999). It is interesting that Orkney has only two known henges, although the enclosures at Ring of Bookan and around Maes Howe may be related to the henge tradition. Denser distributions are now known to the south. Other parts of Scotland also contain regionally restricted monument types: for example, the timber building at Balbridie, the possible causewayed camp at Leadketty in Perthshire and the complex at Dunragit (RCAHMS 1996). In Clydesdale archaeologists have located numerous Neolithic timber buildings (Johnston 1997; Pollard 1997), and other examples have been found in the Black Isle, near Inverness (Dalland 1998). The dating of the Clava carins to the early Bronze Age (Bradley forthcoming) now allows us to suggest that there may be a tradition in eastern Scotland of vast mounds and carins covering single burials, as perhaps at the broadly contemporary North Mains mound in Perthshire (Barclay 1983).

The distribution of cursus monuments and bank barrows has also changed radically through the effects of aerial reconnaissance (Brophy 1999) (Fig. 24.3). Only a handful of these sites have been located by terrestrial survey and, apart from the Cleaven Dyke and one other, none was known before the mid 1970s. At that time the Cleaven Dyke was apparently 'too well preserved' as viewed from the south (Loveday pers. comm.) to be seen as a candidate for a Neolithic date, and was identified as a Roman monument (Barclay & Maxwell 1998). Excavation and survey have now demonstrated its Neolithic date and its long and complex history of construction. Brophy has listed over 40 cursus and apparently cursus-related monuments in Scotland (Brophy 1998), based on the results of aerial survey. There is a striking contrast between the high density of monuments in Tayside and Dumfries and Galloway and their almost complete absence elsewhere. One of the interesting features is the considerable regional variation in structural style, for the Scottish sites include traditional ditched sites as well as pit-and-post-defined and hybrid sites.

The eastern lowlands also provide what may be one of the most striking examples of regional variation, in the apparently almost exclusive distribution of henges and recumbent stone circles, monuments believed to be broadly contemporary. While henges, the supposed product of large scale communal effort, are relatively sparsely distributed, the recumbent stone circles, perhaps the products of individual farming settlements, are so densely distributed that they are frequently intervisible (Barclay 1997a). The distribution of carved stone balls, normally also interpreted as later Neolithic prestige items, is also concentrated in the northeast of Scotland (Edmonds 1992). Do these sites and artefacts reflect differing ceremonial practice or even different social structures?

Shadows of Empire: the recognition of regionally valid prehistories

Until relatively recently it seemed possible to deal with the Neolithic of Britain as a relatively unified phenomenon, and it was accepted, indeed it was the norm, that explanatory models erected in one area, usually on relatively well-studied data sets, could be exported wholesale to explain material from other areas. In the Neolithic this has meant that material throughout Britain has been interpreted on the basis of data largely from Wessex and the Thames Valley (Barrett 1994; Thomas 1991), amplified, although perhaps only where it fits pre-conceived ideas, by material from Orkney and Yorkshire — the other British Neolithic hot spots.
Figure 24.2. Distribution map of henges and recumbent stone circles (RSC distribution based on information provided by Clive Ruggles).

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Figure 24.3. Distribution map of cursus monuments and bank barrows (based on information provided by Kenneth Brophy). These seem to cluster in Tayside and Dumfries & Galloway.

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Within the last few years the extent of regional variation in the Neolithic has become clearer: for example we can see that farming was adopted in different parts of Scotland in different ways and at different rates. For example Armit & Finlayson's work in the Western Isles (Armit & Finlayson 1992) suggests a very gradual adoption, in contrast to the almost continental aspect of the structure and cereal assemblage at Balbridie (Fairweather &Ralston 1993).

As the extent of variability from one region to another has become clear, the application of models erected in one part of Britain, especially where this has been done uncritically or unthinkingly, has been rejected. This growing maturity of interpretation has been paralleled in other aspects of Scottish history and cultural studies. Beveridge & Turnbull in their polemic a decade ago (Beveridge & Turnbull 1989) argued that views of Scottish history and culture can be paralleled in Fanon's studies of the psychological and cultural dimensions of colonial domination in the Third World. Fanon argues that the native comes to internalise the message that local culture is inferior to that of the colonist, and Beveridge and Turnbull used his ideas of 'inferiorism' to reconsider the way in which Scotland's history before and after the Act of Union has been treated. Whether one agrees or disagrees with the historical points made, their suggestion that much intellectual consideration of Scottish matters is seen, by Scots themselves, through a metropolitan perspective may be more widely accepted. They conclude with a contemplation of a world view in which the themes, the typologies and periodisation perceived within the history of the core cultures come to define, not only for themselves, but for their satellite cultures, the very way of knowing what history is (Beveridge & Turnbull 1989, 50).

It can certainly be argued that Scottish prehistory has also been seen in 'inferiorist' terms viewed perhaps in a distorting mirror hovering above Wessex. The polemicians suggest that 'the development of alternative views of the Scottish past is rendered difficult in face of the social and intellectual power' of the southern English intellectual world which updates and embellishes the traditional inferiorizing view in contemporary works (Beveridge & Turnbull 1989). It could be argued that Scottish prehistory, indeed all regional prehistories, including those of Northern England as suggested by Frodsham (1996), find themselves in the same position.

Orkney is an anomaly, for it appears to be the only regional Neolithic in Scotland that is recognized as having interpretative value in prehistories written from a Wessex point of view, yet it too can be ignored when it provides evidence inconvenient to other mind-sets (Cooney 1997).

Although the problem of interpreting the whole archaeology of Britain based on the archaeology of one or two heavily-studied regions has been recognized, the acceptance can be seen as superficial and the problem persists. For example, in the last decade a model of settlement in the Neolithic based on the evidence of one region, Wessex and Sussex, where remains of domestic structures and cultivated cereals are rare, has been extended to cover the whole of Britain and Ireland, apparently without regard to the evidence elsewhere (Barrett 1994; Edmonds 1995; Parker Pearson 1993; Thomas 1991). The absurdity of this has been very elegantly exposed by Gabriel Cooney in a recent paper (Cooney 1997; see also Mallory & Hartwell 1997). He notes that the abundant Irish evidence for settled agriculture in the Neolithic is underplayed or, like evidence from regions of Britain itself that does not fit this mobility model (and Orkney is the example he uses), it is redefined as exceptional or peripheral rather than as something that offers evidence for a different interpretation of the Neolithic. Thus, even if the fragmentary nature of the Neolithic is accepted at one level (e.g. Thomas 1993), there is strong pressure for a generalized 'normative' pattern of settlement, based on an area the evidence from which is consciously or unconsciously assigned a primacy. As Cooney notes, this mobility settlement model has become another orthodoxy, driven, as the polemicians Beveridge and Turnbull might say, by those same 'ubiquitous institutional and ideological pressures exerted by core powers on their satellites' (Beveridge & Turnbull 1989). Cooney laments that the normal response to his arguments would be that such evidence comes from peripheral areas. But then he asks, who defines what is the core and what is the periphery.

The pressure towards 'normative' accounts of the Neolithic can be seen most clearly in books purporting to be 'British' prehistories, which too often read as accounts of southern English prehistory, with inconsistent and patchy mentions of divergences from norms.

Unfortunately Cooney's predictions about the reception of his reasoned challenge to the new orthodoxy have been all too accurate. They have been dismissed in a review as a 'rear-guard action on behalf of the sedentary farming Neolithic' (Thomas 1998). Although Thomas appears to accept the validity of regional approaches, he first accuses Cooney of a whiff of nationalism in presenting the Irish evi-
idence as a distinct entity defined solely, apparently, by modern political boundaries (he might perhaps try walking dry-shod across the purely political boundary between England and Ireland).

It is not good enough to dismiss the reality of different and, dare I say it, better evidence elsewhere, in favour of interpretations based on atypical areas. While most archaeologists would affirm their acceptance that evidence from all parts of the British Isles is important in building a fuller picture of the Neolithic, the way in which Cooney’s evidence and arguments have been underplayed and attacked seems to show that evidence from some areas is still more equal than others. Unfortunately from a Scottish perspective there may be a concern that the Orcadian material is likewise assigned a primacy, as a source of universalist prehistory. For example, most excavation of Neolithic settlement has clustered there and there is a dearth of data from other areas (Fig. 24.4).

A related problem that has constantly beset archaeological endeavour is that it is common to assume that where a phenomenon is first recognized and studied is where that phenomenon actually originated. For example, for over a century Greek black figure pottery was assumed to be Etruscan in origin, because the best and most complete examples were found in tombs in southern Italy, rather than in Greece (Boardman 1974). In this country, henge monuments were first noted and studied in southern England, and were assumed to have originated there and to have spread elsewhere, and origins were sought until less than a decade ago in the causewayed camp tradition of midland and southern England. Radiocarbon dating now suggests that the sites in the south are generally built later than those in the north. But one assumption seems to be that if they did not originate in one well-studied area, Wessex, the point of origin must now slide to the other end of the axis to Orkney, rather than to any point between (Parker Pearson 1993). It would seem that universalist interpretative structures cannot cope easily with the possibility that entire sequences of development may not be present in so-called ‘core areas’. For example, I would argue that in Wessex the absence of the supposed sequence of development from causewayed camp to henge has yet to be explained. At the conference it was clear that the conceptual framework of most speakers allowed only indigenous development of all features of the Orcadian Neolithic. It appears that there is an unwillingness to see ‘core’ areas as recipients rather than exporters of change. Only through a greater spread of regional studies can we understand, for example, what different meanings the henge and Grooved Ware phenomena may have had in different places, and how the distribution we perceive came about.

In the section on regional variation in Scotland I introduced the ideas of inferiorism and Highlandism. Their appearance in Scottish prehistoric studies is arguably demonstrated by Niall Sharples’ critical paper about Stuart Piggott’s career in Scotland, presented at the Nationalism in Archaeology conference in 1994 (Sharples 1996). Sharples suggested that Piggott chose only to excavate sites which could not ‘be regarded as having distinctive Scottish characteristics’, such as the henge at Cairnpapple and the Dalladies long barrow. Sharples makes it clear that he feels that truly Scottish monuments lie beyond the Highland Boundary fault, and are of a kind not found elsewhere — a Highlandist view. Sharples also takes up an inferiorist position in interpreting henges such as Cairnpapple and the Dalladies long barrow as of alien origin, coming from what he instinctively considers the core area, rather than as an important part of the Neolithic of southern and eastern Scotland, henges possibly even possibly originating there. Piggott was in my view entirely right in seeking to explore the underinvestigated lowlands.

Sharples also criticizes Piggott for seeking to marginalise the evidence from Orkney, to permit an extension of a Wessex-based interpretative model to the rest of the Neolithic of Scotland. But Sharples, in criticising Piggott’s position, seems to me to take up an equally erroneous position. He quotes, with disapproval, Piggott — ‘it would be wrong if because Skara Brae shows Stone Age architecture in astonishing detail, and a state of preservation unparalleled in contemporary Europe, we then went on to generalise from it as typical of Britain or even of the rest of Scotland . . .’. (Piggott 1982, 31). But Piggott was surely right. Orkney, like Wessex, has no universalist value, and evidence gathered since Piggott’s day has confirmed that the Neolithics of these areas do not somehow sit above the Neolithic of anywhere else. They have value in themselves as part of the pasts of their areas, not a greater value than the past of any other area.

Conclusion

It is government policy that the ‘distinctive prehistoric and historic archaeologies of all the regions of Scotland receive attention’ (Barclay 1997b).

Why is it important to consider the prehistory of all parts of the country? First, the past of all parts
Figure 24.4. Distribution of excavated sites which have produced substantial Neolithic settlement evidence.
of the country — the story of the development of place and people — is important, particularly at this
time when we need to explore the nature of Scottish identities. The inhabitants of the whole country surely
can expect some interest in investigating their past, their history, and not the history of another people
and place, with different experiences. The study of regional variation is important, because it challenges
simple explanations concerned only with generalised processes. Most important it challenges super-
facial generalised prehistories, and research agendas that may even be characterized on occasion as alien interventions of limited relevance to the his-
tories of particular places and peoples.

To return to Harding et al.'s remarks (1996, 189) about the neglect of English regional prehistories, the reader of accounts of the Neolithic in future
should no longer be hard pressed to find discussion of direct relevance to other regions. It is only when
we have better regional narratives that we can appreciate more easily those things which unite and
divide regions, and those complex interactions between regions over time, such as the inception and adoption of agriculture, the potentially many mean-
ings of the Grooved Ware phenomenon, and the plentiful evidence for long and short distance con-
tacts.

In this context we must recognize the Neolithic of Orkney and Wessex for what they are, the Neolithics of Orkney and Wessex, nothing more, nothing less. Orkney and Wessex are parts, and strik-
ing and extraordinary parts, of a larger whole. They may inspire archaeologist and non-archaeologist alike and may provide basic general analogies for how things may have been in other places, but their sup-
posed universal interpretative value lies in an out-
moded world view. Orcadian prehistory should be studied for itself, not as a sort of universal pattern. The problem of universalist generalized prehistories is one that affects the archaeology of all parts of the British Isles and hampers the writing of the history of much of these islands. We must hope that rational arguments for regionally valid prehistories are never again dismissed as mere petty nationalism.

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pressed here, which I should make clear are my own, and not in any way those of Historic Scotland.

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quaries of Scotland.


ABSTRACT

A small part of the terrace-edge enclosure at North Mains was excavated to test the hypothesis that it was contemporary with one or other of the Neolithic/early Bronze-Age ceremonial monuments immediately to the north. Two cropmark ditches and an entrance through them were confirmed by excavation. The inner ditch was very steep-sided; postholes were found on the inner edge of both ditches. Possible postholes were also noted on the outer edge of the outer ditch. Traces of a number of structures were located in the interior, including what may be the slight wall-trench of a circular house. The results of radiocarbon dating may suggest that the ditch was dug in the second millennium BC, while at least one of the structures in the interior was in use in the late first millennium BC.

INTRODUCTION

In 1960, aerial reconnaissance by the Cambridge University Committee for Aerial Photography located a double-ditched enclosure on the edge of a terrace above the Machany Water in Strathearn, Perthshire (NGR NO 928 158): named Waulkmill in the National Monuments Record for Scotland. The next 20 years saw the discovery of the ring-ditches, henge and massive barrow at North Mains, immediately to the north, and, in 1978 and 1979, their excavation in advance of developments at Strathallan Airfield (Barclay 1983a). The location of the terrace-edge enclosure is illustrated in figure 1 of the North Mains report (Barclay 1983a, 124, no 5 on the map). Recent work on Neolithic defences in southern Britain and north-west Europe was presented at a conference in 1984 (Burgess et al 1988); in the light of these proceedings it was felt that a trial excavation to test the date and nature of the enclosure at North Mains would be worthwhile. Mercer (Discovery Excav Scot 1983, 19) had already conducted a trial excavation at Spott Dod in East Lothian, on an interrupted-ditch enclosure, to test a possible causewayed-camp interpretation; the site proved to be of Iron-Age date.

A two-week season of excavation, partly funded by a grant of £250 from the Society of Antiquaries of Scotland, was undertaken at North Mains in the summer of 1987; it had four aims:

1. to recover datable artefacts, and material for radiocarbon dating;
2. to find out if the apparent gap in the enclosure ditches was a constructed entrance;
3. to examine the nature of the ditches and any accompanying barrier and gate structure;
4. to sample, for traces of structures, an area chosen at random within the interior.

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DESCRIPTION

Two trenches were stripped of topsoil by machine and cleaned by hand. Area 1 (illus 3) was set-out over the position of the apparent entrance (located on the ground by fluxgate gradiometer survey); area 2 was set out to the east on the same orientation (illus 5).

AREA 1

The main features located within the trench were the two ditches. Clear ditch-butts were found. Because of limited time and resources a section could be cut only through the inner ditch. The whole butt was excavated to a depth of 1 m; it could be bottomed only in a narrow section.

Inner ditch

The ditch was over 2 m deep and 4 m across. It was very steep-sided and would have formed a very considerable barrier. On its inner edge, apparently cut by erosion of the lip of the ditch, was a substantial feature (1015), which may be interpreted as a posthole (illus 4i). As far as could be told,
the ditch had filled naturally; however, towards the butt the quantity of large stone in the lower fills increased, as did the quantity of charcoal. Unfortunately the charcoal was in small flecks and in the event the sample recovered was not suitable for radiocarbon dating. In the topmost fill of the ditch an unusual feature was found: a roughly square platform of flattish stones measuring 1.9 m by 1.4 m, tilted slightly, conforming to the slope of the ditch fill (illus 4ii). No artefacts were found associated with it, apart from pieces and flecks of charcoal on its surface; a radiocarbon date of 1300 ±80 bc (GU-2682) was obtained. The function of the platform was not clear; there was no evidence of intense burning.

Outer ditch

Although the ditch butt was not excavated, cleaning of the edges of the ditch to allow planning revealed a number of possible postholes. Of these, four proved on excavation to be real features (1009, 1013, 1016 & 1017; illus 3 & 6).

AREA 2

The trench measured c 7.5 m by 6.5 m. Within it 15 separate features were located; many could be identified as certain or possible postholes (illus 5 & 6). In 1005 a clearly defined post burnt in situ

ILLUS 2 Plan of the visible cropmarks of the enclosure; the position of the excavation trenches is shown as a tone, Area 1 to the west, Area 2 to the east. Grid North lies at the top of the drawing
ILLUS 3  Plan of Area 1, the outer ditch at the bottom, the inner ditch at the top
was noted; a radiocarbon date of 250±50 BC (GU-2681) was obtained from the sample. In the southeast corner part of what seemed to be a large depression filled with dark loam was noted (1019); because the feature as it appeared in the excavated area seemed likely to be part of a greater whole, none of it was excavated. At the east edge a long curved linear feature was noted (1018: illus 5); on excavation it was found to be only 50 mm deep but clearly defined.

**INTERPRETATION AND DISCUSSION**

The enclosure at North Mains seems, by virtue of its substantial ditches and its situation, to have very much a defensive character. The features interpreted as postholes along the inner edges of the ditches seem likely to be the last remnants of palisades or fences associated with the ditches. On the outer ditch it may be suggested that a substantial fence was erected not only along the inner edge but possibly also the outer edge; a person attempting to enter the enclosure without using the more normal facilities might thus, on climbing the outer fence, be confronted by a fall of perhaps 4 m or more, and a near vertical climb of the same height again on the inner side. The great quantity of tumbled stone found in the butt of the inner ditch may indicate the presence of stone structures around the entrance through the ditches. It is not clear whether or not the posts along the edges of the ditches fronted dump ramparts formed from the gravel dug from the ditches or were the uprights of free-standing fences.

Parallels for a number of features found at North Mains can be found at Bannockburn in Central Region (*Discovery Excav Scot* 1982, 18; 1985, 8). The defensive ditches on the promontory fort there were dug through sand, an even more unsuitable material for rampart-building than the gravel at North Mains, and to the rear of the ditches were palisades. At the northern edge of the interior of the Bannockburn fort an arc of a slight wall-line of a circular house measuring some 14 m in
diameter was found, similar to those located in Area 2 at North Mains and within the palisaded enclosure at Myrehead (Barclay 1983b).

At most the enclosure could have measured some 100 m by 60 m internally. For this limited area very substantial defences had been erected.

At the time of excavation it seemed likely that the complete lack of artefacts and the presence of at least one house structure probably of late Bronze-Age or Iron-Age type indicated that the enclosure was not Neolithic in date. We are most grateful to Historic Buildings and Monuments for offering to fund two radiocarbon samples from North Mains to assist with the interpretation of the possibly-related Bannockburn promontory fort.

The radiocarbon dates suggest that one of the structures in the interior was built using wood which had grown in the second half of the first millennium bc and that wood which had grown in the later part of the second millennium bc was burned in or near the filled-in inner ditch, possibly associated with the stone platform.

It was expected when the samples were submitted that the two radiocarbon dates would not be significantly different. We must attempt to explain the divergence. First, the problems of using limited numbers of radiocarbon dates must be acknowledged; neither date can be taken as absolutely reliable.

We are grateful to John Barber for contributing the following comment:

'The two radiocarbon dates are clearly significantly different from each other. Taphonomically, the later date seems more secure and we can be reasonably confident that it dates from a post which burnt in situ. The context from which the earlier date is derived is less secure. The charcoal could, for example, have weathered out of the eroding ditch side and come to rest on the platform. However, it is clear from the excavation account that this is extremely improbable. The survival of the postholes on the inner edge of the ditch suggests that the edges cannot have eroded back very far, if at all.
The charcoal could be derived from sub-fossil (or 'bog') oak, used on a site which was exclusively Iron-Age in date. Dr Mills noted that only four fragments from this sample were identifiable and that all four were oak. She did not detect any insiling of the pore spaces, as one would expect in bog oak, nor any signs of mineralization. While this does not rule out the possibility, it indicates that there are no grounds for suggesting that the early date is caused by the use of sub-fossil materials on an Iron-Age site. It should be noted that the longevity of oak is not such as to account for differences in date of the order noted. A very few and very exceptional oaks have been known to survive for up to 400 to 500 years but the vast bulk of oaks do not exceed 200 to 300 years in age.
It may be suggested therefore that the original hypothesis has been proven; that is, the enclosure is of a date similar to some of the later activity on the henge or barrow. If it is accepted that the charcoal deposited on the surface of the stone platform built in the upper part of the ditch fills more or less accurately dates the use of the platform, then the ditch must have been dug earlier in the mid-second millennium bc. The radiocarbon date is earlier than those for the phase IV burials excavated just to the north of the North Mains henge: 905±85 bc (GU-1350); 1085±70 bc (GU-1351); 895±60 bc (GU-1437) (Barclay 1983a, 143).

It can be suggested that the Iron-Age settlement phase dated to the later first millennium had been erected within the low banks of an earlier (later Bronze Age) enclosure, or coincidentally on a site where no significant earlier trace was visible; the possibility of continuous occupation from the later Bronze Age into the Iron Age must be considered.

The excavation at Kinloch Farm, Fife (Barber 1982) produced evidence of occupation in the mid/late Neolithic and perhaps in the late Neolithic/earlier Bronze Age, apparently associated with a roughly circular enclosure c. 30 m in diameter within a double ditch. Mr Barber commented at that time:

'This group of features, on the basis of the aerial photographs available before excavation, seemed to represent a simple, probably single-period site for which comparanda, based on gross morphology, could be adduced which might indicate an Iron-Age date.'

It can be suggested, though with less satisfactory evidence than at Kinloch, that the origins of the North Mains enclosure may lie in the Bronze Age. The North Mains enclosure is a very different form of settlement from unenclosed types seen as characteristic of the later Bronze Age (eg Jobey 1980; Barclay 1983b). Further excavation in the class of undifferentiated enclosures so common in air photographcatalogues may reveal a greater variety of settlement types for this period than we would at present recognize.

APPENDIX 1
IDENTIFICATION OF CHARCOAL FROM NORTH MAINS
Coralie Mills

The charcoal samples from North Mains were forwarded for species identification, in advance of submission for radiocarbon dating. Identifications were made by reference to Schweingruber (1978), using a low power binocular microscope at magnifications of up to 90 times.

Sample 1
This sample has been interpreted as being from a post, burnt in situ (F 1002). The sample has fragmented into flat sheets of charcoal, but its appearance suggests that it could once have been a single lump of wood. Five fragments were identified, all as Quercus sp (oak). The longest sequence of rings seen was eight, but since neither the central ring or outer ring were present, the post must have been cut from an older tree.

The sample weighed c. 90 g, including some mineral material. There was some penetration by fine modern roots.

Sample 2
This small sample contained only four fragments of charcoal which were large enough for identification. All four were Quercus sp (oak). The longest sequence of annual rings seen was 20, but the central rings were not present.

The total sample weight was c. 11 g, including some mineral matter.
Sample 3
This sample was very small and comprised tiny pieces of charcoal. The size of the fragments meant that only tentative identifications could be made. Two fragments were identified as cf Salix sp (willow) and three as cf Pomoideae (group includes apple, pear, hawthorn and mountain ash). The total sample weighed only 1-5 g, and much of this was mineral matter.

APPENDIX 2
RADIOCARBON DATES
Three samples of charcoal were submitted to the Scottish Universities Research and Reactor Centre.

Sample 1
(GU-2681) 2200±50 bp. This sample was from F 1002 and appeared to be a post burnt in situ.

Sample 2
(GU-2682) 3250±80 bp. This sample was from the surface of the paved area constructed in the upper fill of the inner ditch.

ARCHIVE
The drawings, site records, photographs and ephemera have been lodged with the National Monuments Record for Scotland.

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Excavation of a Neolithic long mortuary enclosure within the Roman legionary fortress at Inchtuthil, Perthshire

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with a contribution by Coralie Mills

ABSTRACT

The excavation of the eastern half of a rectilinear ditched enclosure was undertaken to provide information on its date, structural details and function. Two fence-like structures had been erected consecutively along the line of the enclosing ditch; the second fence had been burned in situ. Elements of this fence were dated to the late fourth/early third millennium bc. There were indications of an elaboration of the eastern end of the enclosure. No associated artefacts were found.

Portions of two Roman barrack blocks were revealed, and a legionary axe was recovered from a disturbed pit cut through the eastern end of the ditch of the prehistoric enclosure.

INTRODUCTION

The Roman fortress at Inchtuthil in Perth & Kinross District, Tayside Region (NO 125 396), was excavated between 1952 and 1965 by Sir I A Richmond and Professor J K St Joseph (Pitts & St Joseph 1985) (illus 1). The excavation demonstrated that the site of the fortress had also seen funerary and ceremonial activity in the Neolithic and Bronze Age. The most significant pre-Roman feature discovered during the excavation was a trapezoidal enclosure with its long axis aligned east to west and its broader end at the east. Pitts and St Joseph reported that the enclosure was 53.9 m long, 10 m across at the east end and 8.4 m across at the west end and had been defined by a ditch 1.3–1.6 m wide at the surface and 0.9–1.2 m deep. The Inchtuthil plans were not drawn on site, but were prepared afterwards from measurements; there are discrepancies in the dimensions and locations of structures and the fence line on figs 75 (the plan of structure) and 81–2 (plans of the south-east and south-west quarters) in the report. Although the present excavation did not include any trenching at the west end, it is believed that the aerial photograph plot combined with the plan of the excavated east end (illus 7) more accurately represents the length of the structure (50 m).

Four sections and a plan were published in the Inchtuthil report (ibid, 248–50). The plans showed that only a very small proportion of the enclosed area was excavated and that no

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features other than the ditch were identified. The sections and the contemporary descriptions suggested that the lower half of the ditch had filled naturally, with, at a level about half way between the ditch bottom and the modern surface, considerable quantities of burnt material.

The monument was interpreted at the time of its discovery as the foundations of a Bronze Age house with a timber roof set in the fill of the ditch at an angle of 40°. The authors
were consulted by the authors and editor of the Inchtuthil report; as good parallels for the structure had since been identified (Ashbee 1966; Marsac, Scarre & Riley 1983; Loveday & Petchey 1982) we suggested that the enclosure belonged to a class of Neolithic structures associated with the long barrow tradition. Specifically, the ditch fills were interpreted as being the remains of a timber structure (perhaps a fence) erected on the inner side of the ditch, which had burned and fallen into the partly filled ditch. The trenches laid out by Richmond and St Joseph over the structure were positioned to investigate the ditch and a portion of the interior totalling some 65 m² (Pitts & St Joseph 1985, fig 75). Two of the trenches would not have located prehistoric features, as they were designed mainly to find the post trenches of Roman barracks (which largely filled the small excavated areas). No features were found in the two larger trenches in the interior of the enclosure.

The authors were intrigued by the Inchtuthil structure and by the unusual fills of the enclosure ditch, particularly against the background of the discovery of comparable ditched rectangular or trapezoidal structures in other parts of Britain (Loveday & Petchey 1982), and decided to undertake more extensive excavation.

The aims of the excavation were as follows:
(a) to locate the enclosure ditch and to excavate sections on the north and south sides, with the intention of examining the deposition processes within the ditch, paying particular attention to the burnt material;
(b) to gather samples for radiocarbon dating and for palaeobotanical analysis (macro-plant and pollen);
(c) to gather artefacts for stylistic and possibly residue analysis;
(d) to examine a portion of the interior at the east end to try to locate features associated with the use of the structure;
(e) to examine portions of the interior adjacent to the inner edge of the ditch to try to locate the site of any structure which might have burnt and fallen into the ditch;
(f) to examine an area outside the enclosure, particularly at the east end, where features associated with the use of the structure might be located.

The excavation was undertaken over three weeks in September 1989. An area of about 470 m² was stripped carefully, using the back actor of a JCB; the area was then hoed and trowelled.

The description and interpretation of the features recovered is presented as follows: first, Prehistoric Features: Description and Interpretation; then the specialist contribution relating to the burnt timbers of the structure by Dr Coralie Mills; followed by Prehistoric Features: Discussion; and Roman Structures and Artefacts. Work is in hand on the pollen from soils in the ditch.

**PREHISTORIC FEATURES: DESCRIPTION AND INTERPRETATION**

**THE DITCH**

The ditch was the most significant feature noted on the site, 62 m being exposed. The line of the ditch was clearest on the southern side, where it seemed to have been eroded to a greater degree than on the north side and the east end (where it was additionally obscured by a relict soil). Much of the north ditch was dug through silty sand, which was considerably disturbed by animal burrowing; the interpenetrated ditch-face thus provided insufficient contrast to the fill to allow the difference to be easily detectable.
Plan of the excavated area: between section lines F and G the south edge of the later cut, containing the burnt fence, is marked by a heavy dotted line; the outlines of at least three half-post-pipes, cut by the later can be seen on this line; the areas of dark tone mark two of Richmond and St. Joseph's trenches.
The ditch at the east end was difficult to trace because it had been severely affected by disturbance of a different kind: a Roman pit (F2) had been dug through part of it and subsequently an even greater portion of it had been disturbed by the growth of what must have been a very large tree, probably one of an avenue indicated on an early plan of the estate. The extent of the tree-root disturbance is marked on illus 2.

A further contrast between the north and south ditches was provided by the amount of burnt material visible on the cleaned surface of the southern ditch (illus 3). As excavation proceeded, it became clear that, while this difference was in part due to the greater depth to which the southern ditch had been eroded, it was in the main a reflection of the relative amounts of burnt material present.

The surface of the ditch was cleaned throughout the area under inspection, and portions were selected for excavation. They were the whole east end, two long sections of the south ditch (only parts were bottomed), the eastern end of the north ditch, and a narrow section near the west end of the north ditch. In all sections, but more particularly in the longer ones,
excavation proceeded in shallow spits, each level being planned before it was taken down. In general, the ditch-fills on the northern side provided little information in plan. The east end, although disturbed, revealed evidence for a line of at least 12 posts, each marked by a roughly circular concentration of charcoal flecking. The eastern edge of the ditch at the east end had been particularly badly damaged by tree root action. However, at one point immediately to the north-west of the tree-hole, the outer edge of the ditch turned to the east, suggesting that the ditch may have broadened or bifurcated at this point.

The ditch on the southern side survived only to a limited depth, particularly at the south-east corner, but it contained evidence of a complex sequence of events. The most prominent soils in the ditch were the orange/red soils and the charcoal concentrations. The sequence can be best understood by reference to the cross-sections.

Eight cross-sections across the ditch are illustrated (illus 9). The ditch, irregular in plan, was 1.1-1.7 m across and a maximum of 0.6 m deep below the subsoil surface. One clearly defined causeway (only 0.14 m across) was located at the south-east corner. The ditch appeared to be made up of segments, most of which were interlinked (the south-east causeway might not have reached the original ground surface, so narrow is it). Discontinuities can be seen in the line of the ditch about 2 m to the east of section G, about 3 m to the east of section B, and at the north-east and south-east corners (illus 4). Clear discontinuities can also be seen in the unexcavated west part of the enclosure, both on the aerial photographs (illus 5 & 6) and the plot of the cropmarks (illus 7). The ditch seemed throughout its exposed length to be a strictly unilinear feature, with the exception of one point at the east end. Immediately to the north-west of the area severely damaged by the tree-hole, the outer edge of the ditch seemed
not to parallel the inner ditch edge; instead it turned to the east, in the direction of a well-preserved post-pipe lying off the main fence line. Unfortunately the disturbance caused by the tree-hole prevented any further analysis of the stratigraphy. It is possible, particularly given the presence of a post at this point, that there was some elaboration of the east end of the enclosure, in the form of an additional post-setting. Possible parallels are considered below.

Ditch sections B, F, G and H show most clearly the relationship of the burnt material to the other fills. In section H a band of heavily charcoal-impregnated loam is overlain by a band of bright orange gravel, and the other sections, as well as the areas taken down in plan, duplicated or reflected this. The charcoal layer was continuous and relatively undisturbed. In the area between sections F and G six contemporary post-pipes were located, some still containing evidence of a burnt post. In particular, two post-pipes preserved, on the sides facing the interior of the enclosure (illus 8), clear traces of the charring of the timber; modern observations show that in a relatively short-lived fire major pieces of timber will char quickly, leaving the inner part of the post untouched for some time; this is what may be indicated here.

The bright orange colour of the layer above, below, or sandwiching the charcoal does not occur naturally on site, and it is suggested that it results from the effect of fire on the soils in an oxidizing atmosphere.
The upright posts, the charcoal layer and the layer of apparently fire-reddened soils are interpreted as the remains of a wooden fence. The fence would have been supported on substantial oak posts linked by timbers of mature oak (see Mills below), giving rise on burning to the continuous heavily charcoal-impregnated layer. The consistent angle at which the charcoal layer rests suggests that the fence fell or was pushed towards the interior of the
enclosure and that the ditch was not fully filled. The fire-reddening of the soils over and to a lesser extent under the charcoal suggests, too, that the structure was still burning when it fell and that in most places soil was thrown over the still burning remains. The layers of charcoal and fire-reddened soil are too consistent to allow for any interpretation involving the redeposition of burnt material from elsewhere, and the survival of post-pipes showing the effects of burning supports the interpretation of the fence having been set up in the ditch.

Two charcoal samples, of oak from the burnt fence, were submitted for radiocarbon dating. The results were:

sample 5a (GU-2760) 3210±70 bc
sample 6a (GU-2761) 3120±50 bc

It became clear, as excavation proceeded, that the more loamy soils associated with the erection and destruction of the wooden structure occupied a cut made through a layer of compacted gravel very similar to the natural subsoil, up against the outer side of the ditch. This shows particularly clearly on sections F (right-hand-outer-side) and G (left-hand-outer-side) in illus 9. In plan, the outer edges of three post-pipes were clearly visible in this layer against the outer side (illus 2). This is interpreted as the remains of a first phase of fence-building in the ditch; after this phase of the use of the ditch, when the remains of this postulated first fence had rotted or been removed, it is suggested that the ditch was recut, but not to the full depth or width of the original cut, and the second fence, subsequently burned down, was erected. There were hints in a number of areas of a final phase of disturbance, perhaps associated with yet another episode of fence-building, but the evidence was inconclusive. Within the enclosure
ILLUS 9  Ditch sections. Key: symbols may be combined. 1, loam; 2, silty sand/sandy silt; 3, silty loam/loamy sand; 4, charcoal staining; 5, sandy gravel; 6, sand; 7, burnt orange gravel or sandy silt; 8, solid charcoal

ILLUS 10  Miscellaneous sections: F1, pit, probably prehistoric; F8, post-pit of barrack block 6
patches of a hard, greasy, grey-brown layer survived, clearly in the process of being ploughed away by modern agriculture. More extensive remains of a relict B horizon survived, particularly on the north side, both inside and outside the enclosure, masking the north ditch to some extent. It may be that these fragments reflect the survival until recently of a buried land surface contemporary with one of the earlier uses of the area.

OTHER PREHISTORIC FEATURES

Only one other feature of probable prehistoric date was recovered (F1; illus 10): a pit measuring 0.65 m in diameter and 0.55 m deep. The pit had two fills: the upper a medium-brown fine silt loam, the lower a dark brown fine silt loam. The interpretation of the pit is not clear; it may have been a post-hole, although no post-pipe was visible.

THE BURNT TIMBERS

Coralie Mills

METHODS

Short lengths of burnt timbers were selectively sampled in the field, and 11 samples were forwarded for analysis. The samples were wrapped in aluminium foil to hold them together. Where timbers were sufficiently well preserved, their dimensions and cross-sections were recorded. Identification followed the keys in Schweingruber (1978).

RESULTS

All 11 samples are of oak (Quercus spp.), and the timbers were cut from mature, slow-grown trees. There is no young roundwood timber present in the selected assemblage. The timbers have not survived well, showing varying degrees of fragmentation and infiltration by mineral matter and by fine roots. The surfaces of the samples are rather eroded, so that no woodworking marks can be observed. Details of the form of each timber are given in the version of this report lodged in the NMRS. In the better-preserved samples, it is clear that the timbers have been radially split.

DISCUSSION

Analysis of the samples from the burnt structure at Inchtuthil suggests that it was constructed of radially split oak timbers (in contrast to the tangentially split timbers at Haddenham (Morgan 1990)). The timbers originated from mature, slow-grown trees, at least one of which is likely to have been in excess of 190 years old when felled. The form of the timbers is variable, with samples 5 and 6 being of narrow planks while 7 represents a stake and 12 is possibly part of a post. There is no evidence of a wattled structure amongst the examined assemblage.

The excavators have interpreted the site as a Neolithic mortuary enclosure. Oak timbers have been used in the construction of several Neolithic mortuary structures. In Scotland, for example, evidence of a timber mortuary structure and façade was found under the long cairn at Lochill, Kirkcudbrightshire, and remains of a burnt oak plank floor were found within the mortuary structure (Masters 1973, 97). The identifiable charcoal from the Dalladies long barrow (Grampian) was of oak (Piggott 1972). However, it is not clear whether this charcoal represents the remains of structural timbers.
There are several long barrow sites where there is evidence of a trapezoidal timber enclosure forming an early part of the sequence of construction, and in several instances burnt oak timbers have been identified. These sites are discussed in more detail by the excavators below.

Oak is easily split, and is strong and durable (Taylor 1981, 53), making it an ideal timber for many types of construction. Therefore, the employment of oak timbers in many Neolithic mortuary structures is perhaps not surprising. However, what remains unknown is whether timber selection was based entirely on practicalities of construction, or whether other, possibly cultural, factors were in operation.

THE PREHISTORIC FEATURES: DISCUSSION

The excavations reported here showed that the ditch had been dug in irregular segments, generally linked, and consequently varied appreciably in line and dimensions. It had been used as the bedding trench for what appeared to have been a wooden fence supported by substantial posts set at 1.6–2.4 m intervals, packed into position with clean gravel. The post settings of this fence survived as semicircular areas of loamy soil outlined on the southern side by the clean gravel at the outer edge of the ditch in the segment excavated between sections F and G. The northern half of the post-pipes, and the remainder of the fills associated with this use, seemed to have been removed or disrupted by the digging of a bedding trench for a second fence.

The second fence had been set on fire and, apparently while still burning, had fallen, or been pushed over, towards the interior of the enclosure. The continuous charcoal band thus produced (particularly on the south side) indicated that the upright posts had been linked to form a continuous barrier. The gravel and sand immediately overlying the charcoal was in most places burnt bright red/orange, indicating that it had been deposited while the wood was still burning. The charcoal and red/orange layers were extensive, consistently present, clearly defined and not redeposited. The burnt material had been dug through at a later stage. No contemporary artefacts were found. The traces of this fence were best preserved on the south side, where it was clear that the spacing of uprights was, very roughly, 0.8 m. On the north side, the burning seemed not to have been so intense, and the amount of animal disturbance greater, resulting in less coherent stratigraphy. The posts on the east end were spaced probably at similar intervals.

As discussed above, the growth of a large tree had disrupted the east end considerably, but slight indications of more elaborate structure in this area could be identified. It may be that the ditch bifurcated near the north-east angle, providing the bedding for a line of posts aligned at right angles to the east end. A similar feature may have been provided near the south terminal of the east end, thus forming a shallow post-defined forecourt, but all evidence of this was removed by the intrusive Roman pit and tree-hole.

The possible survival of what seemed to be a relict topsoil mostly within the eastern end of the enclosure, but fading into the relict soil partly obscuring the northern ditch, must be considered. The authors would hesitate to identify the layers as remains of a land surface contemporary with the enclosure. To have survived on the exposed gravel ridge, still under active cultivation, we would have to postulate that this surface was buried under at least 0.25 m of soil which had been deliberately deposited. There are three periods in which such soil movements could have been made: the early modern period, the Roman period, or the period of the construction of the enclosure itself. We might, for example, speculate as to whether the enclosure, in its final phase, was mounded over, to form a long barrow.
Even before the excavation reported here, it seemed very likely that the parallels for the enclosure or for elements in its structure lay firmly in the Neolithic period. The linked-segment style of digging ditches, where the alignment of individual segments can vary somewhat, seems to be a characteristic of Neolithic construction. It is interesting to note that the same technique is visible in the cropmark sections of the Cleaven Dyke, a probable cursus monument situated 3.5 km to the east.

In the most comprehensive survey of ditched enclosures of this type, Loveday & Petchey (1982) identified three morphological sub-types: oblong, ovate and trapeziform. The Inchtuthil enclosure is trapeziform, but not so pronouncedly as was suggested in the diagrammatic representation first published (Pitts & St Joseph 1985, fig 75). Loveday & Petchey point out the dangers of classification by simple morphological analysis, which can assume that small variations in basic shape were necessarily significant to the builders. In this context the south-west corner of the Inchtuthil enclosure is of interest; why does the ditch change course so radically about 8 m to the east of the corner?

Two northern English examples, Kilham and Skendleby – at one stage in their development into long barrows – take the form of trapezoidal palisaded enclosures (Phillips 1935; Manby 1976). The parallel between the size and nature of the enclosures at Kilham and Inchtuthil is particularly striking, notably in the irregular plan of the ditch. The radiocarbon date for Kilham is 2880±125 bc, compared with the Inchtuthil dates, for old oak, of 3210±70 and 3120±50 bc. The palisaded enclosure phase of the monument at Fussell’s Lodge also closely parallels the Inchtuthil enclosure (Ashbee 1966). The only radiocarbon date from this site, albeit of oak from the mortuary structure, is 3230±150 bc (BM-134). These sites were all completed as long barrows; at other morphologically similar sites this stage of use either cannot be identified or was apparently not felt necessary by the communities building and using them. There are similarities in the construction of the forecourt enclosure at Nuthane (Morgan 1959).

The local parallels for Inchtuthil are not close. At Douglasmuir, Kendrick (1980) excavated a post-defined enclosure measuring 65 x 19 m and internally divided, from which one radiocarbon date, of 2900±55 bc (GU-1210), was derived. At Balfarg, two post-defined enclosures surrounding the remains of free-standing post settings were dated to the mid-third millennium bc; they were associated at the end of their use with Grooved Ware and may have been mounded over (Barclay 1984; Barclay & Russell-White forthcoming). The only long barrow excavated in Scotland, at Dalladies (Piggott 1972), had no detectable phase as a post-defined enclosure. The interpretation of the timber structure below the mound at Court Hill, Dalry, as a Neolithic mortuary building (Coles & Simpson 1965; Linge 1987), has recently been challenged (Scott 1989).

The dimensions of some trapezoidal enclosures, whether defined only by posts or by posts set in a trench, are summarized in the table.

<table>
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<tr>
<th>Site</th>
<th>Length (m)</th>
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<td>Max</td>
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<tr>
<td>Fussell’s Lodge</td>
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<td>Dalry</td>
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<td>Dorchester VIII</td>
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<td>Wor Barrow</td>
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Table 1: Dimensions of the Inchtuthil enclosure and possibly comparable structures.
Loveday (1985) has argued that the enclosures which were not mounded over ('long mortuary enclosures') are the lower end of a continuum of sites which include, at the other extreme of size, the major cursus monuments. The enclosures form a distinct group 20–80 m in length, with a few up to 140 m. The next major grouping ('minor cursuses') are 200–500 m in length and are considerably wider than the normal 15–20 m of the oblong ditches. He notes the association of ring ditches and cursuses with oblong ditched enclosures. In this context the presence of a pit circle to the SSW of the Inchture enclosure (illus 5) is of interest; these sites may be of ceremonial or funerary function (Tolan 1988), and the Cleaven Dyke has been reinterpreted as a cursus (Pitts & St Joseph 1985). Recent RCAHMS aerial survey in the Blairgowrie area has revealed the presence of what appears to be a pit-defined cursus at Haugh and the possible remains of a Balfarg-type timber structure at Littleour, just to the north of the Cleaven Dyke. Mention must also be made of the probable cursus adjacent to a barrow cemetery at Blairhall on the left bank of the Tay some 11 km to the south of Inchture.

A large sherd of earlier Neolithic pottery was found on the Inchture plateau in the excavations at the beginning of this century; a note on the sherd is being prepared for publication by Trevor Cowie.

There are few securely contexted radiocarbon dates for earlier Neolithic activity in Tayside (eg Dalladies 3240±105 bc (I–6113); 2710±50 bc (SRR–289); 2585±55 bc (SRR–290) (Piggott 1972, 44); Pitnacree 2860±90 bc (GaK–601) (Coles & Simpson 1965, 46); Douglasmuir 2900±55 bc (GU–1210) (Kendrick 1980); North Mains ring ditches 2690±65 bc (GU–1546) (Barclay 1983, 259)). Although there is evidence for cereal cultivation in a similar riverside situation, at around 3730±70 bc (GU–1725) at North Mains in Strathearn, only some 30 km distant (Hulme & Shirriffs 1985), it may be suggested that the dates clustering around 3000 bc might represent the earliest substantial phase of agricultural clearance and settlement of much of the Tay/Earn catchment area, marking an expansion from more limited earlier clearance for farming. These late fourth/early third millennium dates are paralleled at Balbridie to the north in Grampian Region and in the earliest detected phase at Balfarg, to the south, in Fife. The Tay/Earn catchment area, through the effect of aerial reconnaissance, is becoming increasingly densely scattered with monuments of possible Neolithic date and seems to offer an increasingly good opportunity for the study of the development of Neolithic and early Bronze Age settlement. The excavations of the settlement enclosures at Kinloch, Fife (Barber 1982), and at North Mains (Barclay & Tolan 1990) show that activity of this period may not be represented solely by surviving monuments of funerary/tribal sites, although in neither case is the dating of the double enclosure ditches as secure as could be wished.

**ROMAN STRUCTURES AND ARTEFACTS**

Although the primary objective of the 1989 excavation at Inchture was the examination of the ditched enclosure, due attention was also paid to those structures and features of Roman date which fell within the area stripped. Foremost among these were the northern extremities of barracks 5 and 6, the easternmost members of the block of six barrack-buildings situated in the praetentura of the fortress, immediately east of the via praetoria. Portions of barracks 3, 4 and 5 had already been examined by Richmond and St Joseph, who demonstrated beyond doubt that the post-pits and post-trenches of the Roman buildings had been cut into the already-filled ditch of the enclosure – a sequence confirmed in 1989.
The additional information about Roman Inchtuthil which is presented in this report is relatively slight: the line of posts supporting the north end of the verandah of barrack 5 was identified, together with a part of the verandah of the opposing barrack (no 6), as well as the post-trenches defining its range of external rooms (illus 11). The form and dimensions of the structural remains conformed with those established by cross-trenching in the southern portions of the same blocks between 1952 and 1960 (Pitts & St Joseph 1985, 176 and fig 81): the street separating the two buildings was about 20 Roman ft (6 m) wide, the verandahs each 10 ft in width and the outer range of rooms in barrack 6 also about 10 ft in width. As in barracks elsewhere in the fortress, there was no post-trench to mark the end of the building, and the longitudinal trench provided for the internal division stopped some way short of the position of that end-wall. Furthermore, and perhaps more significantly, there was no trace of either internal cross-divisions between contubernia or drip-trenches to catch the rain shed from the sloping verandah-roofs on each side of the barrack-street; it is possible that these elements, being shallower than the others, had been removed by ploughing, which would have had a more powerfully erosive effect in this area, i.e. on the crest of the ridge along which the enclosure was aligned.

The only feature to be sectioned and examined in detail was the northernmost post-pit of the barrack 5 verandah, although surface indications of the corresponding pit in barrack 6 suggested an identical arrangement. The former was rectangular on plan, measuring about 0.6 × 0.4 m and cut 0.32 m into the subsoil. The impression of a timber upright, measuring approximately 0.17 × 0.19 m in cross-section and probably withdrawn during the demolition of the fortress, could easily be distinguished in its south-west angle; the fill of the pit itself (illus
10) was clearly stratified in the order of its original digging, which suggests careful backfilling of the upcast material in the construction-phase.

That equal care was taken with the dismantling of the fortress installations on its evacuation in AD 87 was amply demonstrated by the 1952–65 excavations (Pitts & St Joseph 1985, passim). Even within the relatively small area uncovered in 1989, further evidence of deliberate demolition was forthcoming, in addition to the indication of uprooted verandah-posts. For example, the recovery from unstratified debris-layers of iron nails with their shanks bent, as if by extraction with a claw-hammer, provided supportive, if undramatic, testimony to the nature of the abandonment.

From the disturbed area to the north-east of the enclosure, however, there was more explicit evidence. Although the presence of the tree-hole referred to above had greatly obscured the situation, it would appear that Roman demolition-teams had dug a rubbish pit and subsequently filled it; the upper fill consisted of turfy loam flecked with charcoal and calcined bone. A well-preserved iron axe-head was recovered from very near the top of this pit (see below). As far as could be ascertained, the axe-head was in excellent condition when deposited, and its loss may have been accidental. Possibly the tool was laid on one side during a rest from work and then covered mistakenly with debris; alternatively, the head may have flown off or the haft may have snapped under the pressure of work. In either case, it is easy to imagine the axe being wielded to good effect by a legionary demolition-team in the last hours of the Roman occupation!

ARTEFACTS

Pottery

The majority of Roman artefacts found during the 1989 excavation were severely abraded coarse-ware sherds, probably from bowls, jars and *lagenae*, and mostly in buff or pinkish sandy fabrics. Apart from the fragment of an amphora-neck, of uncertain type, found on the surface of the excavated post-pit, none could be associated with any of the identified structures.

Metal

Fragments of three iron nails, all with bent shanks, were found in unstratified contexts, along with the pottery, in the lowest levels of the modern ploughsoil.

The iron axe-head, which was found in the uppermost fill of the presumed Roman demolition-pit (illus 12), is a notably fine example of the standard single-bladed axe of legionary pattern. It measures 282 mm in length, and its width tapers evenly from 56 mm at the squared butt to 8 mm at a distance of 25 mm from the blade-edge. The slightly curved blade is 130 mm long and the slip-eye, near the butt, is provided with side-clips which project from the upper and lower surfaces. It is beautifully crafted in a solid piece and it is in every way comparable with the legionary felling-axe (also of late-1st-century date) discovered in Pit XVI at Newstead (Curle 1911, 282–3 (where its length is incorrectly given as 40 inches) and plate lxi, 4). Only when its conservation is complete will it be possible to determine if, like that specimen, it bears a maker’s stamp and owner’s mark. A less perfect example was found, also in a Flavian context, at the fort of Strageath (Frere & Wilkes 1989, 160–1; for analogies cf Manning 1966, 11–13).
ACKNOWLEDGEMENTS

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We are grateful to Colonel G Dunphie, chairman of the trustees of the estate, and to Mr David Gemmell, their tenant, for permission to excavate. Our thanks also to Mr and Mrs Taylor of Garden Cottage for their help. The area of the fortress is a scheduled ancient monument; we are grateful for the consent of the Secretary of State for Scotland to undertake work on the site.

Myra Tolan acted as assistant director; we would like to express our great thanks to her and to Jim Inglis, Ralph Troup, Philip Nappi and Gil Reid for all their hard work on site, and to Catrina Appleby and Stephen Fulford for their days on site.

We are grateful to Dr Colin Martin for permission to reproduce illustrations 5 and 6, which are from the Scottish History Collection, University of St Andrews; to RCAHMS for permission to reproduce illustration 7, which is from the forthcoming South-East Perth volume; and to the Historic Scotland photographic section, for assistance with the preparation of the other illustrations.
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Excavations in the ceremonial complex of the fourth to second millennium bc at Balfarg/Balbirnie, Glenrothes, Fife

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From text and reports prepared by: Gordon J Barclay, Lin Barnetson, Jaqueline Birnie, Gordon Cook, Trevor Cowie, Magnar Dalland, Jane Downes, Alan Fairweather, Audrey Henshall, David Hogg, David Jordan, Rod McCullagh, Valerie McLellan, Brian Moffat, David Reed, Colin Richards, Christopher J Russell-White, Ian Shepherd, Helen Smith, P Nicholas Tavener and Caroline Wickham-Jones

'Perfection in such inquiries is not in the power of any body of men to obtain at once, whatever may be the extent of their views or the vigour of their exertions.' (Bailey & Culley 1805)

ABSTRACT

The portions of the Balfarg/Balbirnie ceremonial complex excavated between 1983 and 1985 are described and related to the portions dug previously: Balbirnie stone circle and Balfarg henge.

The prehistoric ceremonial use of the area seems to have lasted from early in the third millennium until late in the second millennium bc (in terms of uncalibrated radiocarbon dates). The sequence began with pit digging and pottery deposition in two parts of the site, near Balfarg Riding School (BRS) and to the west of the Balfarg henge. Then, two timber structures, possibly with a mortuary function, were erected at BRS, probably in the early/mid third millennium bc (uncalibrated). The later of the two was mounded over and surrounded by a circular ditched enclosure (a henge?); this activity was associated with the deposition of Grooved Ware. At about the same time, at the west end of the site, a similar deposition of burnt and broken Grooved Ware predates the construction of the Balfarg henge, with its timber and stone circles, and there is evidence of the first use of the Balbirnie stone circle.

Later in the third millennium bc (uncalibrated) and in the second millennium, during
Balfarg

Recent housing development

Land over 100m

Contours in metres

[Location map showing the area of illus 4 is marked 'D' on map C. The location of four possibly related sites is shown: 1. Kinloch Farm – possible Neolithic settlement; 2. Strathmiglo – hengiform enclosure; 3. Balmalcolm – hengiform enclosure; 4. Rossie Drain – hengiform enclosure. (Based upon the Ordnance Survey map Crown copyright)]
the prolonged use of the Balfarg henge and the Balbirnie stone circle, a complex sequence of events unfolds at BRS, including the digging of a ring-ditch and the erection of two concentric ring-cairns and a further cairn.

Late in the use of the complex there are episodes of burial associated with Beaker and Food Vessel pottery. Most burials are simple cremations, mainly in the area of Balbirnie stone circle, all apparently late in the sequence of the sites on which they are found. At the west end of the complex cremations were deposited in simple urns.

The excavation was undertaken by Historic Scotland.

SECTION 1 INTRODUCTION

G J Barclay

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1.2 THE NATURE AND FORM OF THE REPORT

This report conforms to Historic Scotland’s draft publication policy; that is, the interpretation of the site is presented together with sufficient description of relevant features to support the conclusions of the excavator and to allow very limited re-working of the evidence. The editors of this report do not believe in the particular usefulness of the publication of large quantities of more detailed excavation evidence in microfiche; the reader is referred instead to the excavation archive in the National Monuments Record of Scotland. The microfiche appended to this report, therefore, contains only the catalogues of the pottery and stone artefacts, to allow relatively easy access to this specialist material. We have attempted to follow Alcock’s prescription (1978); he suggested that: ‘... the most that is needed is a summary account of major structures, most characteristic finds, and outline site history; with just enough presentation of the basic evidence to demonstrate how the main stratigraphic sequence is established, and with the excavator’s preferred solutions to all problems ... set out and justified as economically as possible’. Possibly rather more has been presented than Alcock would have wished. However, the editors present what they would wish to see in a report of this kind.

The interpretation of the excavated evidence suggests the sequence of events shown in illus 2. In the printed text the groups of features (pits, post-holes, etc) are described and interpreted in the first section, broadly in the chronological order interpreted by the excavator. The site feature numbers (eg F2501) are used throughout the report where they are relevant. The locations of all features believed not certainly to be of natural origin (with the exception of features within the timber structures) are shown on illus 7 (Area A, to the west
<table>
<thead>
<tr>
<th>Years BC</th>
<th>Earlier Neolithic</th>
<th>Later Neolithic</th>
<th>Later Neolithic/Earlier Bronze Age</th>
<th>Later Bronze Age</th>
</tr>
</thead>
<tbody>
<tr>
<td>4,000</td>
<td>Pit digging and deposition of earlier Neolithic pots.</td>
<td>The erection and use of two timber structures, probably for the exposure of the dead.</td>
<td>The formation of a ditched enclosure around structure 2, with Grooved Ware.</td>
<td>Cremation burials to the west of Balfarg Henge.</td>
</tr>
<tr>
<td>3,000</td>
<td>Group 1 pottery</td>
<td>The sealing of the timber structures at Balfarg Riding School under mounds; a ditched enclosure is formed round one. Grooved Ware pottery, charcoal and burnt bone is deposited in it.</td>
<td>The deposition of Grooved Ware, charcoal &amp; burnt bone, followed on the same site by the erection of Balfarg Henge (timber phase).</td>
<td>Cooking pits to east of Balfarg Henge.</td>
</tr>
<tr>
<td>2,000</td>
<td>Group 2 pottery</td>
<td></td>
<td>Early activity on the site of Balbirnie Stone Circle; Grooved Ware deposition.</td>
<td></td>
</tr>
<tr>
<td>1,000</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**ILLUS 2** Date chart: the solid blocks show the span of each activity, as indicated by calibrated radiocarbon dates; the open blocks are interpretations only.
of the henge excavated by Mercer) and illus 6 (Area C, the area around the Balfarg Riding School (BRS) enclosure). Only significant features, which are used to support arguments or which contained important evidence, are described in any detail. For example, in the case of the Neolithic timber structures (Section 2.2, below) the single-phase boundary post-holes are not described individually although their general characteristics are summarized and oddities noted. The post-holes and pits in the structures' interiors are described in more detail, however, because of their complexity and their significance for the interpretation of the structures. All pit and post-hole sections, however, are illustrated.

Specialist contributions are related as closely as possible to the excavation data, so that the feature descriptions and the finds and burnt bone, etc, are to be found together; an exception is the flintwork, the report of which is presented separately because of the difficulties of tying substantial quantities of undiagnostic and long-lived material to specific phases of use of the area. Additionally, much specialist material is incorporated in the main text as part of the feature descriptions (in particular, the palaeobotanical work which in most features was limited to assessments of floated samples). More substantial specialist contributions are attributed as far as possible to their author(s), by the display of initials.

The Discussion (GJB) deals with the broader context of individual elements of the Balfarg/ Balbirnie group, and with the nature of their relationship one to another; an interpretation of the place in the group of both the Balfarg henge (Mercer 1981; Mercer et al 1988) and the Balbirnie stone circle (Ritchie 1974) in the light of the excavation reported here is also presented. Finally there is a more general discussion of Neolithic and earlier Bronze Age ceremonial and burial practices, and the nature of 'ceremonial complexes' in relation to the Balfarg/ Balbirnie evidence.

In accordance with the Society's policy, uncalibrated radiocarbon dates and estimates of age based directly upon them, are indicated by the suffix 'uncal'. A consideration of the radiocarbon dates and their calibration is presented on p. 161.

1.3 THE TOPOGRAPHICAL CONTEXT OF THE COMPLEX

The Balfarg/ Balbirnie complex is situated at a height of 95–100 m OD between NGR NO 280030 and NO 286028, 1.75 km north of the River Leven on the north side of Glenrothes New Town in Fife (illus 1). The topography of the site itself is described by Jordan (Section 1.7 below) and the place of the complex in the archaeology of the region is dealt with in the general discussion (Section 4.8).

The complex lies at the eastern end of the Lomond Hills a little south of the watershed between the Howe of Fife (the middle valley of the River Eden) to the north and the River Leven to the south. Although substantial areas to the east and to the west of the Lomonds have been reclaimed by modern drainage there were, prior to the agricultural improvements, substantial areas of potentially good, well-drained arable land and grazing in this part of Fife to north and south, and on the Lomond Hills themselves (Thomson 1800).

1.4 BACKGROUND TO THE EXCAVATION

The modern excavation of the ceremonial complex at Balfarg/ Balbirnie (illus 4) took place over 15 years, in three phases, under three supervisory teams, arranged by Historic Scotland and its predecessor departments. The recorded antiquarian activity in the area (mainly by Balfour in the 1880s) has been described elsewhere (Ritchie 1974).
The area of the complex lies at the northern edge of Glenrothes New Town. The need for improved road communications threatened Balbirnie stone circle, leading to its excavation in 1970/1 and its removal to another site (Ritchie 1974). The henge at Balfarg was excavated in 1977/8 prior to its planned destruction by the expansion of the New Town (Mercer 1981). In 1978 RCAHMS photographed from the air a hitherto unknown enclosure (near Balfarg Riding School) in the north-east corner of the same field as the henge (illus 3). This enclosure, known as the Balfarg Riding School (BRS) enclosure, and the features within and around it (and further features near the stone circle and henge) were excavated between 1983
ILLUS 4 Plan showing the local topography, the location of the excavation areas and the sample trenches. The contour lines are at 1 m intervals. The locations of features are shown on Illustrations 7 (Area A) and 6 (Area C).
and 1985 (Barclay 1983a, 1983b, 1984, 1985, Barclay & Tavener 1985) in advance of their destruction, and it is this work which forms the basis of this report. A number of more recent features was found during the excavation, including a mill lade, the digging of which had damaged the ring-cairn at BRS. This later material will form the subject of another report (Russell-White in prep).

1.5 EXCAVATION AND SAMPLING

'It is scarcely possible, in an undertaking of this kind, to describe all the minutiae of practice...' (Bailey & Culley 1805)

In the spring of 1983 the Central Excavation Unit of Historic Scotland’s predecessor department carried out a trial excavation over the ditch and part of the interior of the BRS enclosure (illus 4). The excavation showed that in the interior there were post-holes (one of which produced Grooved Ware) and that the ditch contained considerable quantities of Grooved Ware and Beaker pottery (Barclay 1983a).

A second season was mounted later in 1983 to investigate the enclosure and its immediate surroundings. This revealed not only that there was a rectilinear timber structure within the enclosure but also that a considerable spread of features lay to the south-west (Barclay 1983b). A third season was undertaken in 1984 (Barclay 1984) to extend the excavation area to the west and south. At this stage it became clear that there was a strong likelihood that further remains might lie yet further to the south-west and a limited sampling exercise was undertaken to test the area. Two small, machine-dug trenches, out of 46 opened over the area to the south and west of the BRS enclosure, were productive – quantities of Grooved Ware were recovered from the western pit and a larger trench was opened up around it (this led to the discovery of F1002). A further trench located part of a mound of stones – this proved to be part of the ring-ditch/ring-cairn A group (Section 2.3.1; illus 6).

A fourth season was mounted, again in 1984 (Barclay 1985), to examine the features located by the sampling exercise. This revealed the ring-ditch/ring-cairn complex and, at the end of the season, the remains of a further rectilinear timber structure similar to that found in the centre of the BRS enclosure.

As it had become clear that the approach to date had been too site specific, a fifth season was mounted in 1985 (Barclay and Tavener 1986), to complete the work on the ring-cairn, ring-ditch and second timber structure, and to undertake extensive sampling of the ground between and around the three main foci of activity. Mercer (1981, 65) has written of the horrors of the subsoils at Balfarg: ‘...a bewildering pattern of differing soil compositions ranging from fine sand to large packed cobbles set in clay’. It was very difficult to find prehistoric pits and post-holes in the very varied subsoils at Balfarg and any sampling strategy had to recognize the considerable problems which would be faced in trying to find elusive features in small sample trenches. It was felt that, with the limited resources available, the most economical way to expose enough subsoil was to clear ‘lanes’ (illus 4 & 5) using a box-scrapers, followed by a JCB using a ditching bucket to produce a clean surface. This surface was then hoed clean and examined repeatedly in different weather conditions. This strategy was successful and led to the discovery of an area of Neolithic activity and a Bronze Age cremation cemetery to the west of the henge, and of further features between the henge and the BRS site (illus 5). It also allowed the examination of extensive sections through the soils in the area.
Throughout the excavation an extensive programme of soil-sieving and flotation was undertaken for most of the excavated features and layers on the site. The product of the flotation programme was assessed by Alan Fairweather and Helen Smith. The results showed that there were very few carbonized seeds and suggested strongly that the tiny number of seeds was the result of a general background of carbonized material finding its way into pits and layers. Only two contexts produced substantial numbers of seeds: Cist A (p 135) and F3001 (p 146), where barley grains were found (150+ in the former, 350+ in the latter, which was a later Bronze Age pit).

The grid for the excavation had its origin to the south-west of the site. It was roughly aligned north/south, east/west. References in the site archive to location are Cartesian coordinates within this grid; eastings (X-axis) are given before northings (Y-axis).

The archive of documents, photographs and drawings is lodged in the National Monuments Record of Scotland. The finds are in the Royal Museum of Scotland, with those from the Balbirnie stone circle and Balfarg henge.

1.6 PRESERVATION, RESTORATION AND DISPLAY

It has proved possible to preserve and present to the public certain elements of the complex. As the result of a local initiative, the Balbirnie stone circle was moved, shortly after the excavation, from its original site in the path of the proposed realignment of the A92 road, to a
Feature plan: area C

- Grooved Ware pit
- Cowie group pottery
- Related features
- Cremation deposit
- Modern disturbance

ILLUS 6 Plan of features in Area C. Pits containing Earlier Neolithic pottery and Grooved Ware are marked, except those within the two timber Structures.
new site on the east bank of the Balbirnie Burn. The henge was also saved from destruction and partially reconstructed. It also proved possible to redesign the housing scheme in such a way that the portion of the BRS enclosure which survived in the north-east corner of the field could be preserved, and the site of the timber structure in its interior has been marked by posts. Glenrothes Development Corporation has provided interpretative material for visitors, based on the conclusions of this report and its predecessors. In addition Fife Regional Council and Historic Scotland have prepared a summary popular report and guide to the visible elements of the complex (Barclay 1993).

1.7 SUMMARY REPORT ON THE TOPOGRAPHY, SOILS AND SEDIMENTS

D Jordan

Summary

At Balfarg the eastern slopes of East Lomond Hill flatten out into a broad shelf between the catchments of the Rivers Leven and Eden. The area around the sites undulates gently between two small streams and the depressions and elevations within these undulations contain deposits and soils with differing histories. The soils of the area may be classed as normal Darvel series Brown Forest Soils (containing most of the archaeological evidence, plough-truncated), Colluvial soils, and soils developed in Flandrian flood deposits. A buried soil beneath ring-cairn A may have been cultivated and is described below (p 121). The area to the north of the henge was probably wet and subject to flooding at the time of its construction. The regime of the stream to the west of the site changed in the middle of the third millennium bc (in terms of uncalibrated radiocarbon dates), possibly due to extensive land clearance in its upstream catchment.

Soils, sediments and archaeological evidence

Flooding and stream formation The area to the north of the henge is made up of fluvio-glacial sands and gravels overlain by Flandrian flood deposits. Only in a small proportion of this area is there any stratigraphic evidence of a hiatus between late glacial alluviation and Flandrian flood deposits. Over most of the area the transition is gradational over a depth of 0.2 m or so. This does not necessarily mean that a hiatus did not occur although the sediments deposited do not represent those of a very high energy streamflow, and there is little evidence to suggest that a previous surface has been eroded of soil. The best available terminus post quem for the start of deposition is the end of the glaciation. The presence of strata producing artefacts low in the alluvial sequence indicates that the alluvium is Flandrian and the presence of medieval pottery near the centre of the profile indicates that flooding continued until after that medieval period. Maps of the 18th century show that the streams around the site were already canalized and this would probably have prevented flooding. Thus we have a terminus ante quem for the close of deposition of the 18th century. It is thus quite possible that the area to the north of the henge was regularly flooded at the period when the henge was built.

Evidence for changes in landuse At the western edge of the complex (just to the west of lane 20 on illus 4) is a small stream valley. Where it passes near the site it broadens and the soils in the valley bottom are peaty. It was suspected that the valley bottom would be a favourable place to look for a continuous sedimentary record which would include the period
of activity on the site. The aim was to determine the nature and rate of sedimentary deposition in the valley and to relate this to erosion rate changes indicative of human activity.

Three holes were excavated to a depth of 3 m and their stratigraphy examined. All were very similar stratigraphically, and it may be assumed that they truly represent changes in depositional regime on the valley floor. The sequence in hole 3 (Table 1) is typical.

**Table 1**

<table>
<thead>
<tr>
<th>Unit</th>
<th>Depth (cm) below ground surface</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0-30</td>
<td>Ap light grey-brown, medium subangular blocky, plastic clay with common, fine, fibrous roots.</td>
</tr>
<tr>
<td>2</td>
<td>30-60</td>
<td>Light grey-brown silty clay with a weakly developed weak small subangular blocky structure. A few, well-developed orange mottles. Slight sandy bands indicate a little structure inherited from the parent material.</td>
</tr>
<tr>
<td>3</td>
<td>60-90</td>
<td>Light grey-brown loamy sand with massive structure and well-developed orange mottles aligned vertically around relic rootholes. Distinct horizontal sand structure inherited from parent material.</td>
</tr>
<tr>
<td>4</td>
<td>90-110</td>
<td>Light grey sand with massive structure. Rare small fragments of charcoal. Gravelly lenses and a few, well-developed orange mottles.</td>
</tr>
<tr>
<td>5</td>
<td>110-140</td>
<td>Massive grey clay with rare charcoal fragments. Orange mottles common along relic root channels, gradually becoming rare down the profile.</td>
</tr>
<tr>
<td>6</td>
<td>140-170</td>
<td>Massive light yellow-grey sandy clay loam. Common, poorly defined sandy lenses. Rare poorly developed yellow mottles.</td>
</tr>
<tr>
<td>7</td>
<td>170-185</td>
<td>Massive mid-grey peaty clay with abundant organic matter which increases in concentration down the profile. Large plant fragments (&gt;5 mm) found. Mottling rare and reducing, absent by 185 cm.</td>
</tr>
<tr>
<td>9</td>
<td>192-200</td>
<td>Massive, smooth, buttery mid-grey silty clay with common organic fragments and organic staining reducing downwards.</td>
</tr>
<tr>
<td>10</td>
<td>200-207</td>
<td>Massive light blue-grey sandy loam.</td>
</tr>
<tr>
<td>11</td>
<td>207-213</td>
<td>Massive light-grey silty clay becoming slightly organic down the profile.</td>
</tr>
<tr>
<td>12</td>
<td>213-240</td>
<td>Massive, moderately well-humified woody peat with common clay lenses and wood fragments (&lt;8 cm diameter).</td>
</tr>
<tr>
<td>13</td>
<td>240 +</td>
<td>Weakly developed columnar prismatic, light blue-grey silty clay. Common organic matter including woody roots and stems.</td>
</tr>
</tbody>
</table>

The section as observed was clearly divided into two parts. The upper part, approximately above unit 6, was generally coarser in texture and browner in colour than the lower part. This is taken to represent a change in stream depositional regime relating to an increase in stream flow rate, flow variability and bedload. Such a change might relate to a change in landuse, climate, vegetational regimes, or, indeed, to all three, in the stream catchment above the site. Coarser texture indicates an increase in stream competence while the greater oxidation of the upper units suggests that they were eroded from well-oxidized upper soil contexts or deposited under oxidizing conditions or both. The clays and peats of the lower units were laid down under subdued streamflow conditions where trees were able to establish themselves. Roots comparable to those of alder and willow were found in units 7, 8 and 12 along with wood of both species; in addition hazelnuts were found still attached to branches. Thus the lower units appear to represent deposition in a wooded carr with the low and persistent streamflow this implies. Roots and wood are absent from the upper units suggesting that this carr was displaced when the streamflow increased. It is not possible to determine from this evidence whether the displacement of the carr was itself directly due to human
activity or purely a response to changes in the drainage upstream. It could be both. Samples of peat and branch wood were submitted for radiocarbon dating from four units, 7, 8, 12 and 13, at depths of 1.8 m, 1.87 m, 2.27 m and 2.44 m respectively. These produced dates as follows:

- 2870±90 BC uncal (GU-2112) unit 7
- 2990±60 BC uncal (GU-2113) unit 8
- 4670±60 BC uncal (GU-2114) unit 12
- 4750±170 BC uncal (GU-2111) unit 13

Thus, the approximate transition between the two depositional types at 1.7 m occurred after 2870±90 BC uncal. How long after? There are two ways of estimating the deposition rate, first using only the two dates which come from samples closest to the transition and secondly using all four dates. The former approach is open to question because of the uncertainty implied by the counting error terms. The latter approach is open to question because the mean rate of deposition over the two millennia concerned might be quite different from the specific rate near the transition. Using the first approach and staying within the one standard deviation limits applied to the two dates, produces a date range for the transition between 2960 BC uncal and approximately 2350 BC uncal. Using the second approach produces a date for the transition of approximately 2470 BC uncal, all the extrapolations being approximated graphically. Thus the transition probably took place during the mid third millennium BC uncal and we might hypothesize that this is the date of the first extensive clearance episode in the catchment to the west of the site. This hypothesis has not been tested by the recovery of further, dated sedimentary sequences from the area and downstream, or of dated pollen profiles from the vicinity.

1.8 THE PREHISTORIC POTTERY: AN INTRODUCTION TO THE REPORTS

T G Cowie & A S Henshall

The prehistoric pottery descriptions and commentaries are distributed through the report so as to relate closely to contexts. The catalogues are presented on the fiche. This section introduces the way in which the reports have been arranged.

The total assemblage of prehistoric pottery from the BRS sites represents the products of various ceramic traditions, reflecting the long and complex history of use of the site. The catalogue and related discussion have been divided into sections as shown below: unless stated otherwise the numbers relate to identified individual vessels.

- P1–P40 : Plain Neolithic pottery (referred to as Group 1 and Group 2 in the text)
- P41–P82 : Grooved Ware
- P83–P114 : Impressed Ware (referred to as Group 3 in the text)
- P115–P153 : Beaker pottery
- P154–P155 : Food Vessels
- P156–P158 : Bucket urns

The Grooved Ware has been catalogued and discussed by ASH, the balance of the material by TGC. Inevitably we will have brought to our respective treatments of the material some differences in approach and interpretation, but discussion of doubtful identifications, and exchange of draft reports, has, it is to be hoped, ensured that we are in close agreement
about the overall content of the assemblage. Obviously identification has been easier where the pottery retains diagnostic features of form, decoration or, less often, fabric and it is such pieces that have been catalogued in detail and illustrated: a considerable quantity of undecorated coarse pottery too fragmentary or too featureless for detailed identification has largely been omitted from this discussion.

In its entirety, the prehistoric pottery assemblage from Balfarg Riding School provides a major addition to the inventory of Neolithic pottery from Scotland, but much of it is frustratingly fragmentary. Variations in the quality of the evidence clearly reflect differences in the circumstances of deposition of the vessels concerned. A striking feature of the distribution of the pottery is the tendency for discrete areas of the site to produce discrete bodies of material, for reasons that are not at all clear. The role of post-depositional processes, particularly the destruction by ploughing of most activity surfaces, must also remain unclear. Major overlaps in the distributions appear to occur only in areas where prehistoric surfaces have survived which would have acted as ‘surfaces of accumulation and/or disturbance’ – notably the old ground surface under the cairn, where Impressed Ware, Grooved Ware and Beaker were all retrieved (although only the first type in any quantity). Otherwise the principal deposits of pottery retrieved by the excavation reported here occur as a limited number of discrete units, which may be summarized as follows:

(a) Earlier Neolithic carinated, shouldered bowls: in situ material was largely confined to Area C pits F8016 and F8017; otherwise probably a residual scatter (eg in Area A pits).

(b) Earlier Neolithic heavy globular bowls (and other miscellaneous vessels) are limited to Area A pits, principally F2039 and F2430.

(c) Grooved Ware is limited to the layers in the Middle part of the filling of the BRS enclosure ditch and a limited number of contexts, principally the large pit F1002; it might be suggested that the Grooved Ware is surviving better – ie very fragmentary but in such a way that individual vessels retain some ‘integrity’ – because the pottery is perhaps being deliberately taken out of circulation and therefore the process of fragmentation and dispersal is arrested.

(d) Later Neolithic Impressed Wares consisting of heavily worn sherds but limited almost exclusively to the area of protected old ground surface under cairn A.

(e) Beaker: predominantly retrieved from Upper filling of the BRS enclosure ditch; there was some overlap with the spread of pottery from the protected old ground surface under the cairn. Again there is the possibility that, following breakage, portions of some vessels ended up as deliberate deposits in the ditch where the process of further fragmentation was halted.

(f) Food Vessels: a complete pot from a burial, and fragments of a further vessel, which may be the remains of another burial.

(g) Bucket urns: bucket urns limited to the pit group to the west of Balfarg henge (Area A).

SECTION 2: DESCRIPTION AND INTERPRETATION
G J Barclay, C J Russell-White & P N Tavener
(specialist contributions are attributed to their authors at the beginning of the relevant subsection)

2.1 EARLIER NEOLITHIC PITS

The earliest features identified at Balfarg are pits dated to the Earlier Neolithic by radiocarbon, and by Trevor Cowie’s identification of plain pottery types (below). He has identified two groups of pottery which may or may not reflect a chronological division. A
Features in Area A, to the west of the henge. The features are of two identifiable periods; pits containing Earlier Neolithic pottery, and pits containing Bronze Age cremations. The tone around feature F2005 shows the limits of a scatter of white quartz.
certain amount of plain pottery, the affinities of which are in some cases uncertain, has provisionally been allocated to a third, miscellaneous, category.

P1–P10: Group 1: Carinated bowl, shouldered bowl and miscellaneous sherds in the 'plain bowl style'.

P11–P30: Group 2: Heavy, globular bowls and miscellaneous associated pottery.

The pits associated with the two types of pottery are in the main located in two discrete areas: Group 1 in Area C, at the east side of the site (illus 6), and Group 2 in Area A, at the west edge of the site (illus 7), to the west of the henge excavated by Mercer. There are no vessels of Group 2 in Area C but there are a few sherds of Group 1 in Area A. The pits are dealt with below by area, Area C first. Only two pits are described in any detail (F8016 & F8017) but all pits assigned to a period are listed, to allow easy access to the detailed information available in the archive. Trevor Cowie's report on the pottery of this period follows the feature descriptions.

The pits of this period were generally less distinct than the later pits and in some cases, in Area A for example, it would have been relatively easy to assign a natural origin to them if they had not produced artefacts. The problem of interpretation was revealed when several pits, whose filling seemed to be natural, proved on excavation to contain moderate quantities of Earlier Neolithic pottery. The fill of the Bronze Age pits in the same area almost invariably looked like cultural material. If it is accepted that the origins of soil formation in Scotland are likely to be around 7000–5000 years BC uncal then it can be seen that in all likelihood the Earlier Neolithic pits (dated to c 3000 BC uncal), especially shallow ones, will have undergone more than 50% of the soil formation and alteration processes that have affected the surrounding natural soils, and that the fills may bear little resemblance to their original appearance, presumably tending to develop towards 'natural' soils. The section and plan drawings of many of these ill-defined and badly truncated pits were uninformative and are therefore not reproduced here.

2.1.1 Earlier Neolithic Pits in Area C

The location of these features is shown on illus 6. Only two pits (illus 8) contained any significant quantities of pottery Group 1 (F8016 & F8017). However, the unusual layers observed in them were replicated, except for the pottery concentrations, in at least five other pits in the area (marked + in the list below). In five of the seven, the lengths varied between 1 m and 1.4 m and the breadth between 0.55 m and 1 m. F8016, F8100 and F8012 were longer (1.85–2.7 m); only F8016 was significantly broader (1.7 m). Their depth varied between 0.25 m and 0.4 m. A particular feature was the presence of large stones (often very closely packed) in the upper layers of all seven with, in four of the seven, charcoal-stained soils and/or burnt bone fragments.

It is suggested that this group represents the remains of a coherent complex of activities involving the digging of pits and their careful backfilling; where pottery is found in any quantity (F8016) it appears to have been deposited carefully and deliberately. In the area around, sherds of the same type of pottery were found scattered, some finding their way into the fills of the later ditch, some preserved in the fragment of prehistoric land surface which survived beneath the ring-ditch/ring-cairn complex. It is clear, however, that the deposition of quantities of pottery was not a necessary part of the filling of these pits: only F8016 has such a deposit. The pottery in F8017 includes only a few sherds of the vessels which appeared in F8016 in far greater quantities; their deposition might be the result of accidental inclusion of
material not selected for F8016 and left lying in the area. In F8016 there were substantial portions of P1, but it was almost certainly already fragmentary when deposited.

In the ditch of the BRS enclosure, to the north of this group of pits, small numbers of sherds of this period were recovered from contexts in which Grooved Ware and Beaker sherds appeared in greater quantities: it seems likely that this material was incorporated into the ditch in a fragmentary condition, perhaps through the disturbance of earlier Neolithic features during the digging of the ditch.

A limited number of sherds, once again probably a residual scatter of pottery of this period, was found around the ring-ditch/ring-cairn feature group, to the west of the medieval mill-lade.

Main Contexts with Pottery

<table>
<thead>
<tr>
<th>Context</th>
<th>Description</th>
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<tbody>
<tr>
<td>F8016</td>
<td>Vessels P1, P2, P3</td>
</tr>
<tr>
<td>F8017</td>
<td>Vessel P2</td>
</tr>
</tbody>
</table>

Other contexts

- F8017 Charcoal & tightly packed stone
- F8002 Charcoal; heat-shattered stone; burning in situ?
- F8021 Tightly packed stone in upper fills
- F8010 Tightly packed stone in upper fills
- F8011 Tightly packed stone in fills
- F8013
- F8012
- F1132 Possibly animal origin (P5 – rim sherd)
F8016 (illus 8 & 9) A shallow distorted oval pit (2.6 m by 1.7 m and 0.3 m deep) indicated on the surface by a group of large stones. The upper edge of the pit around these stones was totally destructured to a depth of 0.1 m. On the west there seemed to be a ring of stones set into more consolidated material. The uppermost layer was a brown to mid-grey brown sandy loam with large stones (which are under-represented in the drawn section). The greater part of the pottery found in the pit was in the mid layer, a brown coarse sandy loam with smaller stones and considerable quantities of charcoal flecks and staining. Three charcoal samples from the mid layer were radiocarbon dated: 2815±55 bc uncal (GU-1903); 3220±90 bc uncal (GU-2604); 3000±70 bc uncal (GU-2605). The dates are significantly different and cannot be averaged. The two older dates include fragments of oak charcoal and the latest date (2815±55 bc uncal) provides the preferred estimate, the other dates being inferred to represent heartwood from large trees.

The remains of a minimum of three Earlier Neolithic vessels were recovered: P1 was the most complete. There was less of P2 (sherds of which also appeared in F8017). A single rim sherd of a third vessel, P3, was also recovered. There were numerous featureless sherds. One flaked stone fragment, S1, is illustrated (illus 65). Fragments of unidentifiable burnt bone were recovered.

F8017 This pit measured 1.2 m by 0.7 m and 0.3 m deep. Like F8016 it was a large, shallow, stone filled pit, with the upper edges badly destructured. There were only two layers, a brown, coarse, very sandy loam with large stones throughout and, on the south edge a grey brown silty loam. Sherds of vessel P2, which join those in F8016, were found in the former; fragmentary sherds of other plain bowls and fragments of unidentifiable burnt bone were also recovered.
2.1.2 Earlier Neolithic Pits in Area A (illus 7 & 10)

These pits were scattered across the summit of a low ridge, separated from the site of Mercer’s henge by a dry valley (in part of which the unusual south-west ditch segment of the henge was cut). Their location is shown on illus 7.

### Pits associated with Cowie’s Group 1 pottery in Area A

As noted above there are a few pits in Area A which are associated with Cowie’s Group 1 pottery; some of the sherds are single pieces found in contexts containing certain or possible sherds of Cowie’s Group 2. P10 is a portmanteau number for sherds which could not be allocated to an individual vessel.

- F2410 1 carinated body sherd (vessel P8)
- F2445 2 poss. sherds (P10) (Group 2 also)
- +F2424 rim fragment of bowl (vessel P7) and 1 poss. sherd (P10); (Group 2 also)
- F2429 1 poss. sherd
- +F2430 27 sherds and numerous fragments (P10); (Group 2 also)
- + = described in the section dealing with Group 2 pottery below.

In addition, sherds have been recovered from the topsoil in this area. Apart from F2430 none of the pits produced any great quantities of pottery of this type and the nature of the material found makes its identification less certain than in Area C.

Additionally three pits bore a superficial resemblance to the stone packing/sealing of the pits in Area C, although their association may be with the Group 2 pits or with the later (Bronze Age) cremations in the same area:

- F2215 charcoal, burnt soil, numerous fire blackened stones.
- F2058 patches of very dark charcoal staining; many stones.
- F2513 charcoal-stained soil with tightly packed burnt, shattered stone.

### Pits associated with Cowie’s Group 2 pottery in Area A

The bulk of the Earlier Neolithic pottery from Area A is of Cowie’s Group 2, which is not found elsewhere on the site (illus 7 & 10).

The pits apparently associated with Group 2 pottery are more disparate than the small group in Area C, associated there with Group 1 pottery. However, some similarities can be noted. Pit F2430 represents another example of the careful deposition of large quantities of pottery sherds, here comprising the remains of a minimum of 12 vessels (one virtually complete: vessel P11) and the presence of burnt material (or even in situ burning (cf F6002 in Area C)). Another 14 pits contain sherds of this type of pottery, often in conjunction with deposits of charcoal or charcoal-stained soil.

The main contexts and subsidiary contexts, with their associated finds are listed below. They are all shallow scoops except where indicated: F2430 is described in detail below.

- F2430 P11: complete bowl; P12, 13, 14, 15, 16, 17, 18, 19, 20, 21 – rim and body sherds (including many body sherds which could not be assigned to an individual vessel; vessel P22 lug (sherds of Group 1 pottery also).
- F2050 P24: rim and body sherds; C14 date from charcoal in upper layer: 2770±70 BC uncal (GU-2606)
- F2039 P30: rim and body sherds; vessel P28 (part); rim and body sherds; vessel P29 (part); rim and body sherds;
- F2040 Pit. P28 (part): rim and body sherds
ILLUS 10 Sections of Neolithic pits and pits possibly associated with them in Area A.

F2042 Possible post-hole. P39: body sherd with lug
F2212 P23 & vessel P26: rim and body sherds: C14 date from cereal grain in sherd: 2880±40 BC uncal (UIC-1302)
F2424 P34: rim and body sherds (sherds of Group I pottery also)
F2427 P27: rim and body sherds
F2429 P33: rim and body sherds (not certainly Neolithic)

The following contexts also produced miscellaneous Group 2 pottery: F2432; F2011; F2517; F2248; F2014; F209; F2445. From topsoil: P38 (body sherds with lugs); P25, P37 (rim and body sherds).

F2430 A poorly defined, shallow, near circular scoop c. 0.5 m in diameter and 0.2 m deep with a concave base and containing three identifiable layers. The main layer was a very charcoal-rich black sandy silt loam, which enclosed a light brown sandy silt, devoid of pottery; the bottom layer of the pit was a light yellow/orange silt containing a broken but complete Neolithic vessel P11 (as well as sherds and slabs of at least another 11 vessels (P12–P22) F2430 also contained featureless body sherds which could not be allocated to specific vessels). There were signs of burning in situ on the natural subsoil in places. Around the top edges of this layer were several sherds, including vertically set rimsherds. In places the pottery was layered, one slab upon another. The impression given was of a pit lined with slabs of pottery from a number of vessels, one more complete than the others, then backfilled. Fifteen seeds of barley (hulled), one alder, one Chenopodium cf. album, were recovered from this feature.

Other possibly related features There were 14 features around the pits associated with the Group 2 pottery, which are most simply explained as part of the same series of activities. They are uninformative as to their function and, like other features not directly dated by radiocarbon or by clear pottery associations in Area A, they may belong with the Group 1 or with the later (Bronze Age) cremation activity. Some may be the remnants of post-holes, although this interpretation is in no case secure. Three have more or less heavy
concentrations of charcoal: F2007, F2416 and F2502. The last contained burnt angular stones, and the apparent scorching of the underlying subsoil denotes burning in situ. An ill-defined area around the features in the southern part of Area A (the feature group containing F2416 etc; see illus 7), marked by a lower density of stones in the subsoil surface (F2443), containing a fragment of saddle quern, was described as the possible shadow of a floor; this feature, the quern fragment (S31), and the cereal fragments which appear in small numbers but widely spread, are perhaps the clearest indications of domestic activity in the area, although this may relate to later Bronze Age settlement (Sections 2.4 & 4.7 below).

In the topsoil above F2044 many sherds were found of vessels P4, P31 and P83. It may be that these had been ploughed out of the pit during its destruction.

2.1.3 The Neolithic Pottery

Vessels P1–P40: Plain Neolithic Pottery (Group 1 & Group 2)

T G Cowie

With the exception of a few undecorated Beaker sherds (mainly from the enclosure ditch) and a small group of fragmentary later (Bronze Age) urns from Area A, virtually all the plain pottery from the site can be identified as being of Neolithic date. For descriptive purposes, this mass of material can be subdivided into two main groups on the grounds of form and fabric quality, and these groups may also reflect a chronological division, although the radiocarbon evidence is not conclusive. A certain amount of plain pottery, the affinities of which are in some cases uncertain, has provisionally been allocated to a third, miscellaneous category. Many featureless sherds, fragments and crumbs of coarse, well-gritted pottery have not been included in the published catalogue. Found in isolation, most might be considered to be of just about any date from Later Neolithic to Bronze Age. Wherever possible sherds have been allocated to catalogued vessels but all too frequently this has not been possible without an impractical amount of further conservation and analysis.

P1–P10: Group 1: Carinated bowl, shouldered bowl and miscellaneous sherds in the ‘plain bowl style’ (mainly from Area C) The first group comprises a number of relatively thin-walled and often finely gritted sherds, often, but not invariably, with a good quality of surface finish. This element within the plain Neolithic pottery assemblage is best represented by portions of two bowls (vessels P1–P2) and a rather heterogeneous group of rim and body sherds, mostly too fragmentary to allow accurate assessment of their original form (P3–P9). To these may be added a number of otherwise featureless body sherds distinguishable more or less certainly on the basis of their fabric (P10) as being of Earlier Neolithic date. While the features of some of the vessels represented certainly invite comparison with the so-called Grimston/Lyles Hill series (cf Smith 1974, 106–8), the heterogeneity and fragmentary condition of the group precludes satisfactory application of this term to the whole. The present writer shares the reservations expressed by Kinnes (1985, 22) regarding the potentially misleading use of Grimston/Lyles Hill as a portmanteau category; while there is certainly a carinated bowl component, the relevant BRS pottery is perhaps better described simply as being in the ‘plain bowl style’ – to use a suitably all-embracing term for material that would formerly have been described as being in the ‘Western Neolithic’ tradition (Cowie 1993).
Context  In view of the fragmentary condition and dispersed distribution of much of the material under immediate discussion, most of the sherds are likely to represent unrelated pieces of separate vessels (P10); accordingly, no attempt has been made to assess the overall numbers of vessels present. However, there seems little doubt that the pottery retrieved from pits F8016 and F8017 does constitute a small closed group comprising portions of three vessels (P1–P3), as well as 17 body sherds not individually catalogued (included in P10). Otherwise, the apparently random distribution of sherds and fragments among widely dispersed features on the site strongly suggests a residual scatter of pottery stemming from the earliest identifiable Neolithic activity on the site. For example, only three small sherds of Neolithic pottery (including P5) occur among some 450 sherds of Beaker pottery from the Upper filling of the ditch. While bowls have in the past been seen as a very long-lived form, Herne’s recent review of carinated bowls has called much of the relevant evidence for this supposed longevity into question (1989, 14–15), and there are no grounds here for supposing that the few Neolithic sherds were associated with Beakers in anything other than fragmentary condition, simply as a result of the incorporation of material lying in the soils or in features disturbed during the digging of the ditch.

The contexts listed on p 61 and p 63 above produced plain Neolithic pottery of Cowie’s Group 1 (a carinated bowl - P1; a shouldered bowl - P2) and miscellaneous sherds in the ‘plain bowl style’ (early/middle Neolithic).

Description  Vessel P1 comprises a considerable proportion of a carinated bowl, unfortunately too fragmentary to allow a complete reconstruction of the profile. Nevertheless, the orientation of the principal sherds indicates an open shallow vessel with marked carination, probably set low on the body, and an everted rolled-over rim around 260 mm in diameter. The height of the vessel is uncertain but may have been in the region of 100–120 mm. Coupled with the hard, fine, slightly micaceous fabric, and burnished surfaces, the bowl possesses virtually the full complement of traits of the classic carinated bowl of Grimston type (Piggott 1954, 114; Herne 1989, 15). A number of body sherds with very little curvature suggest a shallow bowl, thinning at the base to as little as 5 mm in thickness. Particularly around the upper portion of the vessel, the fabric shows a distinct tendency to laminate, a feature also noted on related pottery from Clatchard Craig, Fife (Close-Brooks 1986, 150–1). The surface of P1 is curiously pock-marked, where spalls have been removed from the surface, almost certainly as a result of scorching.

Also from the pits F8016 and F8017, P2 consists of portions of the rim and body of a more upright shouldered bowl, rather larger than P1 with an estimated diameter of 290–300 mm and a height of c 200 mm. Although relatively thin-walled by comparison with pottery to be discussed below (see Group 2), this vessel is considerably coarser than P1, possessing a dark grey fabric with a rough unslipped external surface. The rim is of simple rounded form, with a rather irregular beading in places suggesting relatively careless modelling of the clay. As in P1, the sherds deriving from the lower body of this vessel appear to show the effects of heat.

The third vessel from this suite of contexts is represented by the single rim sherd P3, probably part of a simple bowl with a narrow rounded, but rather uneven rim. By comparison with P1, the fabric is coarse, with a roughly wiped, and rather lumpy unslipped external surface, but in relative terms, it is once again finer than, and quite distinct from, the group of thick-walled heavy bowls to be discussed presently.

Neolithic assemblages from Scotland which have Grimston/Lyles Hill series carinated bowls (such as P1) as a major component include Boghead, Moray (Henshall, in Birl 1984), Easterton of Roseisle, Moray (Henshall 1983), and Auchategan, Argyll (Scott, in Marshall 1978). Within Fife, carinated bowls comprise the main element of the small assemblage from
ILLUS 11 Earlier Neolithic pottery (Cowie's Group I): vessels P1 and P2
Clatchard Craig (Henshall, in Close-Brooks 1986), although, there, rather more closed bowl forms predominate. The closed form of P2 appears to be relatively uncommon but is paralleled at Boghead, Moray (ibid, cat no 18). P3 may derive from a simple unshouldered bowl, and comparison may be made with the simple hemispherical bowls which form, for example, a minor feature of the Boghead assemblage already mentioned (ibid, cat nos 25–29).

Radiocarbon determinations for sites which have produced pottery of the Grimston/Lyles Hill series span the second half of the fourth millennium bc uncal, but a recent reappraisal of the evidence suggests that the actual currency of carinated bowls may have been more restricted, with a date range of c 3200/3100–c 2900/2800 bc uncal (Herne 1989, 23–4). The three dates from F8016 fall one at each end of this range, while the third falls in the middle.

One gently carinated sherd (P8) (of rather finer quality than the majority of the Neolithic sherds recovered from Area A (see below)) was unfortunately the only pottery in the context in which it was found (F2410). While the original form of vessel represented is uncertain, it may derive from a gently carinated pot with upright or slightly closed neck. One other body sherd may also be mentioned here, P9, closely similar to P1 in fabric, with what may possibly be traces of incised lines on its external surface. Finally, on the grounds of their fabric, a number of otherwise featureless body sherds (listed under P10) invite comparison with Earlier Neolithic pottery, with varying degrees of certainty as noted in the relevant catalogue entry (in fiche).

In summary, a limited quantity of pottery from the site can be attributed more or less confidently to the plain bowl style of the Earlier Neolithic: at least some of the vessels represented appear to derive from intact pits involving the primary discard of artefacts (viz: F8016 and F8017) but the remainder form a rather heterogeneous group most economically explained as a residual, and therefore possibly unrepresentative, scatter of pottery incorporated into later features. Difficulties in matching fragmentary material are hardly
avoidable while the inventory of Neolithic pottery in east and central Scotland remains extremely (possibly even misleadingly) restricted (Cowie 1992; 1993). Apart from Clatchard Craig, already mentioned, published finds of comparable Neolithic pottery from Fife are limited to the few sherds from Barns Farm, Dalgety Bay (Watkins 1982, 111–13), and a rim sherd from Calais Muir, Dunfermline (ibid, 113).

Taken as a whole, this group of material reflects the earliest discernible Neolithic activity on the site, and the radiocarbon dates are broadly consistent with the expected date range from the last quarter of the fourth millennium to the first quarter of the third millennium BC uncal. It is also possible that such activity was small-scale or intermittent, hence the heterogeneity of the sherds.

**P11–P30: Group 2: Heavy, globular bowls and miscellaneous associated pottery**

Contrasting with the pottery just described is a group of material found *exclusively in Area A*: this predominantly comprises what, despite the near absence of reconstructable profiles, appears to be a range of heavy bowl forms in well-made but coarse fabrics. This group clearly owes much to the unshouldered bag-shaped component of the Earlier Neolithic ‘plain bowl styles’, but the quality of its manufacture stands in such marked contrast to ‘classic’ Earlier Neolithic pottery that it is tempting to suggest that it marks a ‘watershed’ in terms of local ceramic developments: while the ancestry of the vessel shapes is hardly in doubt, the heaviness of the rim forms, and the relative coarseness and thickness of the fabrics appear to reflect changing designs and techniques of manufacture. Typologically, these vessels may lie behind the development of the thick-rimmed heavy bowls that form a major element of the Scottish Later Neolithic Impressed Ware assemblages – a development that principally involved further elaboration of the rim to provide a major ‘platform’ for decoration. The differences between the two Balfarg groups are such that they would not seem to be readily explained as a reflection of functional differences within a single ceramic repertoire – that is, these are not simply the coarse counterparts of the finer bowls discussed previously; the writer would prefer to see the two groups as chronologically distinct, but the interpretation of the radiocarbon dates suggests that there is a significant likelihood of an overlap. If the two earlier dates for F8016 are left out of consideration (p 62 above) the longer calibrated ranges of the relevant dates are as follows:

- F8016 (GU-1903) 3685–3380 BC cal – Cowie Group 1 pottery
- F2606 (GU-2606) 3670–3345 BC cal – Cowie Group 2 pottery
- F2212 (UtC-1302) 3710–3510 BC cal – Cowie Group 2 pottery

**Context**

With only a few exceptions, the pottery of this group was recovered from Area A pits, principally F2039 (P28, but see also P29–P31 below) and F2430 (P11–P22) and nearby pits. In particular, F2430 appears to have contained deliberate deposits of pottery including one complete bowl, substantial portions of two others, and parts (mostly only a few sherds or fragments) of at least a further eight vessels, as well as over 150 sherds, fragments and crumbs not allocated to individual pots.

**Description**

In view of its association by context (particularly the prolific pit F2430), this pottery constitutes a significant new group of material in the inventory of Scottish Neolithic pottery. The forms present appear to have comprised a range of thick-walled heavy bowls, but with the exception of P11 there are no fully reconstructable profiles.
The complete P11 is a globular vessel with a somewhat upright slightly thickened and outwardly expanded club-like rim, while a poorly defined shallow concave zone marks the neck below which the rounded belly of the vessel swells before giving way to a thick, sagging base. The forms of most of the incomplete vessels are likely to have represented variations on this basic shape: the surviving portions of P12 and P23 in particular suggest close similarity to P11. Two of the body sherds of P23 are slightly thickened (unfortunately just beside break edges) in a manner suggestive of seatings for lugs. That lugs were a feature of bowls of this group is probably attested by the presence of several detached examples (P22, P38 & P39). P23 is of especial interest in view of the presence of a well-preserved carbonized grain within the core, identified as barley by Alan Fairweather; the grain has been radiocarbon dated to 2880±40 bc uncal (UTC-1302).

Similarities in the rim form, orientation and fabric of P13, P14, P24 and P25 suggest that these pots may have been broadly similar in size and proportions – in the case of P13 possibly some 280 mm in diameter. In so far as it is possible to judge, these would again appear to have been deep and somewhat globular bowls. The form of P30 is uncertain, but its wall tapers noticeably below the everted rim. P26 may have been a somewhat squatte vessel, of closed form with a rounded shoulder. In other cases, the surviving portions appear to indicate vessels of more upright, and perhaps slightly less globular form: they include P15 and P29 and possibly P16, P17 and P19.

While they differ in details of their fabric and surface finish, pots P27 and P28 appear to have been broadly similar in form: both have carinations, marking significant building joints, set only 25–30 mm below the rim, and the orientation of the sherds suggests a deep bag-shaped lower body. Pronounced shoulders are otherwise absent from this group of heavy bowls.

The form of most of the remaining sherds is unfortunately uncertain owing to the fragmentary condition of the pottery: P18 appears to have had an unusual 'channelled' external surface. Irregular low channels or ridges also occur on the exterior of P28, P17 and P19, while a single slight channel encircles P15 c 40 mm below the rim. The incompleteness of the pots unfortunately leaves the significance of these features unclear but they appear more likely to be a factor of the modelling and building of the pots rather than to be decorative. Their occurrence on vessels with more upright forms might possibly indicate the incorporation of ridges as an aid to handling. Two vessels, represented by P20 and P21, have a slightly more compact fabric and are thinner-walled than the bulk of the pottery with which they were associated: the pinched-out rim of P20 clearly recalls Earlier Neolithic pinched-out rim forms in better quality fabrics. The small externally expanded rim sherd P21 cannot readily be matched.

Finally it should be noted that a large proportion of the many featureless undecorated sherds, fragments and crumbs not allocated to specific vessels from contexts in Area A and not catalogued in detail, especially those in the north-west and south-east pit groups, are mostly likely to represent the undecorated portions of plain bowls such as those described above. Mention may also be made of the portions of several thick, rounded bases (eg P40).

In summary, a major element of the Balfarg pottery assemblage comprises a range of heavy bowls, associated with a phase of activity which can be dated approximately to the first quarter of the third millennium bc uncal. While the origins of this group clearly lie in the plain bowl styles of the Earlier Neolithic, it has proved surprisingly difficult to match the vessels closely: certainly this aspect of the Balfarg assemblage is virtually unparalleled among the range of published Neolithic pottery from east-central Scotland. Relatively
ILLUS 14 Earlier Neolithic pottery (Cowie's Group 2): vessels P15–P24
ILLUS 15 Earlier Neolithic pottery (Cowie's Group 2): vessels P25–P30
thick-walled vessels do form a component of some assemblages both in Scotland (eg East Finnecry, Aberdeenshire: Henshall 1983; Knappers, Dunbartonshire: Mackay 1950; Ritchie & Adamson 1981) and it is thus perhaps arguable that the group of heavy bowls from Balfarg simply represents one extreme of a range of globular bowl pottery manufacture. However, not only are the rim and wall thicknesses considerably in excess of those found on the heavy component of these ‘earlier’ Neolithic assemblages, but also the fabric is quite different in composition and texture, inviting comparison instead with the generally coarser wares of the Later Neolithic. The writer has suggested that what is beginning to emerge in lowland Scotland is a picture analogous to that of Yorkshire where Manby has discerned two main Early Neolithic ceramic traditions represented by Grimston and Towthorpe Ware (Manby 1988; Cowie 1992 and 1993). However, further work is required in northern Britain to allow a more objective assessment of these differences.

**P31-P40: Miscellaneous pottery from vessels of uncertain overall form** Among the group of pottery recovered from pit F2039 were sherds of an unusual vessel (P31) with no close parallels known to the writer. The overall form of the pot is uncertain, but it appears to have had a prominent expanded rim the modelling of which has resulted in a heavily fingertipped rim/neck junction; a prominent horizontal cordon appears to have encircled the upper part of the body, while a swelling in the wall hints at a further cordon at the lower break-edge. While the rim recalls Earlier Neolithic forms, the prominent cordons and the cylindrical barrel-like form of the body of the vessel invite comparison with Grooved Ware. The hard gritty fabric also sets this vessel apart from the remainder of the pots with which it was associated.

A number of other vessels – again so fragmentary that their original shapes are left tantalizingly uncertain – have proved difficult to parallel satisfactorily, although details of their form, fabric or circumstances of deposition tend to indicate that most are indeed of Neolithic date. P32 is in a slightly less fragmentary state than most of the material from the contexts (the material of ring-cairn A and the soil buried below it) from which it derives, but the expanded and channelled rim is not closely matched by any other sherds from Balfarg. One of the features in the pit group in Area A (F2429) produced sherds of another exceptional vessel (P33), massively thick-walled in a very compact gritty fabric, with a flattened rim expanded externally and what appears to have been a pronounced shoulder. P34 (F2424) is possibly a portion of the base of this, or a closely similar vessel.

In three cases, P35-P37, the pots in question are represented by single rim sherds of
simple upright form providing little clue to their original shape; the wall of P37 has been perforated prior to firing.

Two large oval lugs (P38–P39) almost certainly derive from the rounded shoulders of heavy bowls of the type discussed above; from such bowls too, probably derive a few fragmentary rounded bases of considerable thickness (eg P40: up to 18 mm thick) from pits in Area A.

2.2 THE RECTILINEAR TIMBER STRUCTURES AND LATER ACTIVITY ASSOCIATED WITH GROOVED WARE

G J Barclay, C J Russell-White & P N Tavener

2.2.1 Timber Structure 1

There were two similar timber structures within Area C at Balfarg (illus 6). Part of the remains of Structure 1 had been cut by the ring-ditch and buried by ring-cairn A, and Structure 2 lay within the BRs ditched enclosure. It is argued below that Structure 1 preceded Structure 2, and the former is described first.

Both structures have two main elements: what appears to be a boundary defined by posts, and a number of pits or post-holes within that boundary. The arrangement of posts of Structure 2 (the first timber structure to be revealed, in 1983), appeared at first to represent the remains of an incomplete, aisled, roofed building. Discussion of the nature and relationship of the two identifiable elements of the structures follows, where it will be argued that they are not roofed buildings (Section 4.2 of the report, below).

The boundary of both structures is incomplete, although different parts are missing; in Structure 1, at the south-west, five posts seem to have been eroded away and one post at the north has been removed by the digging of the ring-ditch. In Structure 2, the northern part has been removed, apparently by erosion.

The boundary post-holes of Structure 1  In Structure 1 (illus 18 & 19) features survive which may be interpreted as post-holes; they are regularly spaced (1–1.2 m apart) to form the two sides and two curved ends. It can be seen from illus 19 that the post-holes on the west side and at the southern end of the structure are very much shallower than those on the east and north. The ring-ditch/ring-cairn complex which overlies the north end sits on a distinct ridge. The modern ground level falls away to the west and south; this disguises an even steeper subsoil slope, falling to a hollow to the south-west, now largely filled with colluvium. It seems likely that the features of the structure have suffered differential erosion, the south and west suffering more. It is suggested that the lines of post-holes supported a continuous barrier; therefore, as a convenient shorthand term, the lines have been referred to as ‘walls’ throughout.

F1120, a post-hole of the northern boundary wall, was cut by the ring-ditch (illus 18). The surviving dimensions of the post-holes varied from c 0.35 m to 0.8 m across (most were between 0.4–0.65 m; average 0.56 m). Most were roughly circular but a number were quite irregular. The depth varied considerably, between 0.1 m and 0.53 m, largely because of the increase in erosion towards the south-west. Four post-holes at the north end were protected from major modern erosion by the material of the ring-cairn built over them (F1116–F1119). Three are 0.5–0.53 m in depth, the fourth was 0.32 m, from
the subsoil surface: presumably a topsoil depth of at least 0.1 m could be added to these dimensions. In most of the post-holes the clear traces of post-pipes could be recognized. These were mainly about 0.2-0.25 m (averaging c 0.24 m) across; some appeared to be rectilinear (eg F1207 & F1215) but this cannot be taken as a sure indicator of the shape of the post.

On the western boundary wall a cremation deposit (Burial 5) was found in the upper weathering cone of the post-pipe of F1228 (illus 6). The flat stone that lay upon may be a collapsed packing-stone, and the bone may have worked its way down the weathering cone, although, as another flat slab was laid on top of it, it seems more likely to have been placed deliberately. The bone was mixed accidentally with another deposit on site and therefore no identification can be offered.

On the south wall, in F1234, it was noted that the post-pipe leant inwards, but this may be due to subsidence of materials during the weathering process; this post-hole was surprisingly deep considering its location.

The posts of the north sector of the boundary, protected under the material of the ring-cairn, are probably preserved to their original depth. It can confidently be assumed that the boundary walls were complete; five posts are therefore missing at the south-west and one on the north. The boundary would therefore have comprised 44 posts; 14 on both sides and eight at each end (counting the corner posts as part of the sides).

**Internal features of Structure 1** Within the boundary were 16 pits, which were identified as post-holes, except where noted; they are described only where unusual features were noted, where artefacts were recovered or where they appear to be significant to the discussion.

**F1129 & F1130** seem to form a pair of similar, very large, post-holes at the extreme north end of the structure. F1129 has some stone-packing. F1130 has numerous packing-stones, with the post set against the opposite side. Because of their location beneath the later cairn, protected from erosion, it is likely that their depths (F1129-0.93 m; F1130-0.72 m) are the closest, of all the features within Structure 1, to what they were when dug.

**F1104/1131** A double post-hole with two post-pipes with packing. Sherds of Grooved Ware vessel P55 were found during the cleaning of the surface of the feature but none was found during its excavation.

**F1105** A post-hole located to the east of F1131. The post-pipe was canted to one side towards the bottom (and therefore not fully represented in the section).

**F1111** (Section not illustrated) A possible double post-hole (ie two post-pipes in the same cut). The western post-pipe produced two sherds of Grooved Ware (from vessels P63 and P66 both of which are represented in greater quantities in pit F1002). The western post-pipe was separated from the eastern by large stone packing and no relationship could be established between the two post-pipes.

**F1107** A post-hole. The post-pipe (0.22 m across in section) was at an angle; ie the post appears not to have been vertical.

**F1108** A probable post-hole which was filled with numerous tightly packed rounded stones (up to 0.15 m3) with little room for a matrix, surrounded by gravel packing. Some of the stones of the central mass were burnt. They may represent the backfill of a removed post as such a concentration of material infiltrating down a weathering cone (all the way to the base of the feature) seems unlikely.

**F1121** A pit with a single fill and no clear function. A single sherd of Grooved Ware (vessel P57) was recovered about half way down the pit.

**F1123** Perhaps a post-hole from which the post has been extracted.
ILUS 18 Plan of timber Structure 1. The ring-ditch cuts through the north-eastern end of the Structure.
ILLUS 19 Sections of the pits and postholes of timber Structure 1; the sections reflect the plan position of the features
ILLUS 20 Plan of timber Structure 2. The toned area in the southern part of the Structure shows the approximate surviving extent of the 'obscurring layer', comprising soil and stones, and possibly representing the remains of a low mound covering the Structure. The layer obscured all features except F030 - the others are shown clear of the stipple only for clarity. The post-pipes of later post-holes cutting earlier post-holes are shown in solid black.
2.2.2 Timber Structure 2 and other features within the BRS Enclosure

The second timber structure was similar to Structure 1, in that it comprised two elements - a fence of posts apparently enclosing less ordered settings of posts (illus 6, 20 & 22). While the preservation of the surviving posts, especially in the interior, seemed better than in Structure 1, the presumed northern portion of the enclosure had been lost to erosion on the east side, and to modern sand extraction on the west.

Before the features were excavated the topsoil was removed, producing burnt cattle bone (0.57g) and an edge-retouched flake, S27 (illus 67). At this stage a layer (the 'obscuring layer') below the ploughsoil was noted covering the southern part of the structure, surviving in a slight hollow in the subsoil. Its approximate extent is marked on the plan (illus 20) but it survived fragmentarily over a larger area and may once have extended very much further. The layer was clearly the result of human activity, as it contained substantial pieces of Grooved Ware and it obscured the pits and post-holes of the south part of the structure, with the possible exception of F030. It varied in depth from between 0.05–0.3 m. It comprised a soil matrix similar to the B-horizon elsewhere on site, with an admixture of a considerable number of stones (varying between 25% and 70% by volume). Substantial pieces of a number of Grooved Ware vessels were recovered: P46, P48 (also found in the post-pipe of post-hole F021) and P54 (75% of vessel). Most of the sherds of vessels P46 and P54 were found close together immediately to the south-east of post-hole F7028, which had stones from the layer in its upper fill; similar stone fill in the upper part or in the post-pipe was noted also in F7023 and F009. It is argued below that this layer was deposited towards the end of the use of the structure.
Boundary post-holes of Structure 2 The surviving boundary of the structure comprised 10 posts in the east wall (F7057; F7061; F7063–F7069; F7083; including the corner post), eight posts in the west wall (F7029–F7031; F7036–F7040; including the corner post) and nine posts in the southern end wall (F7041–F7048; F7075). The ordinary post-holes of the wall vary between 0.6–0.3m across (average 0.45 m); post-holes F7031 and F7036 on the west wall and F7066 and F7067 on the east wall are larger, although the post-pipes are of the same diameter as the others. Both surviving corner post-holes are very much larger than the other wall post-holes; the south-east post-pipe is of average size, the south-west post is larger than average. In most cases the post-pipe observed at the surface before excavation corresponded with the pipe seen in half section; as usual, there were cases where the two did not register. Where the post-pipe can be considered to represent the size of the post reliably, their diameters varied between 0.12m and 0.24m (average c 0.19 m). The largest post was that at the south-west corner (0.28 m). The posts were spaced at c 1.25 m to 1.35 m intervals. The depths of the post-holes varied from 0.09 m at the north end where they were badly truncated to up to 0.52 m on the south-west. The average depths were 0.25 m to 0.4 m.

Just over half of the posts had been packed only with gravel, sand or loam; in the remainder some stones were included in the packing but only in a handful of cases could the post-holes be described as ‘stone-packed’. There was some evidence for silting and even some deliberate filling in the bottoms of some post-holes.

Finds from the post-holes were very limited; a pitchstone inner flake was found in the packing of F7041 and a polished flint inner flake (S5, illus 65) was found in the packing of F7036. In F7063 five fragments of cremated bone were found, including one piece of long bone diaphysis (total 60g), possibly sheep.

Internal features of Structure 2 Within the enclosure formed by the posts described above lay 26 features certainly identifiable as of human origin, mostly post-holes. Some showed clear evidence of the supersession of one post-hole by another. Very generally they fell into two rough lines approximately parallel to the axis of the enclosure. They are described from the north. More artefacts were found in these features than in the boundary features. The great bulk of the flaked stone, where securely contexted, was found in the post-pipes of post-holes which cut earlier post-holes (F7021 cuts F7024 and F7051; F7019 cuts F7052), or where a post-hole might be the later of an adjacent pair. (For instance, F7023 and F7022 may be the equivalent – although one not cutting the other – of F021 cutting F049; F7017 may have obliterated its predecessor, and might be the equivalent second post to F7019.) The Grooved Ware found in the area of this structure was also found only in these secondary post-holes (F021–P48; possibly F7023–P45), in the material filling the post-pipes of other post-holes (F7096 (upper post-pipe) – P80; F7081 (upper post-pipe) – P82 and in the stony layer (the ‘obscuring layer’) described above); thus, the Grooved Ware associations were not primary. Only those features which contribute to the understanding of the structure are described in detail below.

F7019 & F7052 Post-hole F7019 cut an earlier pit (F7052, probably a post-hole). The well-defined post-pipe of F7019 is a maximum of 0.28 m across. Post-hole F7052 is recognizable as a larger pit; F7019 seems to have been cut through its base. A flint secondary chunk was found in the post-pipe fill.

F7051, F7024 & F7021 A complex of three pits or post-holes (two sections are shown on illus 22). F7021 cuts both F7051 and F7024; the relationship between F7051 and F7024 could not be determined. F7051 was truncated by F7021, a clear post-hole, with some 30 rounded and sub-angular packing-stones, surrounding a well-defined post-pipe. F7024 had a clearly defined post-hole. The only find from the group was a piece of worked stone from the packing of F7024.

F026 & F055 One post-hole (F026) cut an earlier post-hole (F055). F026 had packing material of loamy sand, surrounding a post-pipe filled with charcoal-stained loamy material.
ILLUS 22 Sections of the pits and postholes of timber Structure 2; the sections reflect the plan position of the features
F7023 A post-hole. Some 50% of the upper post-pipe fill was made up of angular stone fragments. The feature produced many finds from the upper and lower post-pipe fill, notably parts of two Grooved Ware vessels (P45 from the upper fill and one sherd of P60c from animal-disturbed packing), a fragment of burnt cattle bone (upper fill), and flakes of stone.

F021 & F049 One post-hole (F021) cut an earlier pit (F049), probably a post-hole. A sherd of Grooved Ware (P48) was recovered from the charcoal-impregnated fill of the post-pipe of F021; including this sherd about 20% of the vessel was recovered from here and the ‘obscuring layer’ which covered the south end of the structure.

F7005 An unusual feature, possibly the truncated remnants of a post-hole or post pad, comprising an area of four flattish slabs, two of limestone and two of sandstone, with smaller stones around, forming a flat platform 0.62 x 0.5 m across in a matrix of medium red-brown loamy sand. This was marked, in error, as a post-hole with post-pipe on versions of the plan of the structure published in the interim reports.

F7054 (Section not illustrated) A possibly truncated post-hole in which a clear post-pipe visible on the surface, very similar to that in F7035, bottomed out at a depth of c 0.1 m. No post-hole cut could be located. The fill of the possible post-pipe produced fragments of Grooved Ware (P42).

F009 Post-hole. Burnt bone identified as of sheep, with fragments of fish, was recovered, with a single cereal grain (cf oats).

F030 A shallow (0.15 m) circular pit at the south end of the structure filled with flat stones; perhaps a post pad. This was seen before the removal of the ‘obscuring layer’ of stones and soil which lay over the other features at the south end of the structure. After the removal of the stone layer an ill-defined post-hole (F7076) below part of F030 was found.

The other features within the structure were certain post-holes, with the exception of F7032, where the identification was not certain.

Other features within the BRS Enclosure F7079 & F7082 (illus 20 & 22) One post-hole (F7079) cuts an earlier post-hole (F7082); they lie just outside the south-west boundary of Structure 2.

F7078 (illus 20) Post-hole just to the west of the south-west corner post-hole of Structure 2 (F7040).

It is suggested that F7079/F7082 and F7078 are related to the use of Structure 2.

F7091 (illus 6; section not illustrated) A fairly large cone-shaped feature with some basalt blocks at the top, suggesting a stone setting, but fewer and more random stones further down. The remainder of the fill was a homogeneous, fine to medium fine, slightly humic, pale yellow brown sand. A pitchstone chip was found in the feature.

Burial 6 (F7095; illus 6) A cremation deposit on the edge of the ditch, which seems to have been very badly disrupted by a large animal hole, to the extent that no trace of the original pit, if such there was, survived. The bone was of a human adult (126.3g). A flint flake which may have been associated with the burial was found in the area.

2.2.3 Grooved Ware pits

The Grooved Ware activity on the site was, it is argued in the discussion below, associated with the last use of the two timber structures. Other Grooved Ware activity is evinced elsewhere at Balbirnie stone circle, Balfarg henge, in the layers filling the lower middle parts of the BRS enclosure ditch, and in five isolated pits outside the BRS enclosure. Of the last
group, pits F1002, F1040 and F8133 were the most notable features, perhaps indicating the deliberate deposition of broken pottery (as in the earlier pits F8016 and F2430 and on the Balfarg henge: Mercer 1981, 84-101). Richards (below) discusses the nature of Grooved Ware deposition.

The main contexts which contain Grooved Ware other than those associated with the timber structures and the ditch were: F1002, F8133, F1040, F8015 and F8029, which are all described below.

**F1002** (illus 6) This was a shallow ill-defined pit which was taken down in plan, as its edges could not be defined clearly (therefore no section drawing is available); its overall dimensions could not be ascertained. It contained in its largely homogeneous dark brown loamy fill considerable quantities of Grooved Ware. The only different layer noted was F1003, a thin lens of charcoal-stained soil. It was 0.1 m in diameter and 0.03 m thick. From this layer a radiocarbon date was obtained: 2300±85 bc uncal (GU-1902). Portions of the Grooved Ware vessels (over 25% of P65) marked on illus 26 were recovered from this pit. In addition three flakes were recovered, of which two, S2 and S3, are illustrated (T38).

**F1040** (illus 6 & 23) This pit lay close to the south edge of the ring-cairn. One layer of its fill produced the remains of a Grooved Ware vessel (P76). The only pottery in the pit which was not identifiable as Grooved Ware comprised four undiagnostic sherds of plain Neolithic pottery (not catalogued in detail), a single sherd of P90 (Group 3 – see below) and a single abraded sherd of AOC Beaker, which could not be allocated to a specific vessel. It is likely, given the appearance of a substantial proportion of a Grooved Ware vessel, that the feature is of mid-third millennium bc uncal date. An edge-retouched flake (S4, illus 65) was recovered from the same context.

**F8133** (illus 6; section not illustrated) A sub-rectangular shallow scoop c 1.6 m long by 1 m wide and 0.32 m deep, containing moderate quantities of Grooved Ware, and three groups of layers in its fills, most containing pottery. The pottery (largely parts of vessels P60 and P51 – about one-third of the latter pot) was mainly around the edges of the pit. Most of the pottery showed clear signs of scorching or burning.

**F8015** This was a small conical hole, sub-circular in plan and excavated in the third season. It was densely packed with Grooved Ware sherds and charcoal. There were only small and very small stones. One layer of yellow-grey brown loamy sand filled the pit along with the many sherds of pottery and three fragments of burnt bone. The largest dimensions were about 0.3 m wide by 0.2 m deep.

**F8029** A small feature containing parts of Grooved Ware vessels P43 and P75, disturbed by animals on its north side. There were three layers. The finds were found in the lower layers; the bottom-most was heavily charcoal-stained. A flint flake was recovered.
2.2.4 The ditch of the BRS Enclosure

The arc of ditch excavated at BRS was the only feature within the complex, apart from the henge excavated by Mercer, to appear as a cropmark prior to excavation (illus 3); it ran in an arc on the south and west sides of timber Structure 2 (illus 6). In the east it had been destroyed or buried by the A92 road and in the north it had been removed by modern disturbance associated with sand extraction and with the culverting of the Balbirnie Burn. Extrapolating the arc which survives would suggest that if the ditch had enclosed a circular area, it would have been c. 38–43 m in diameter (to the inner edge of the ditch) with Structure 2 set in its centre; however, the line of the portion of the ditch excavated on the road verge suggested that the enclosure might not be perfectly circular. No original causeways in the ditch survived in the area available for excavation (illus 25). A feature which might be the inner part of the ditch was excavated at the northern edge of the main area at BRS (illus 6); no outer edge was located and, because of the disturbed state of the area the feature cannot be identified with certainty as the ditch. It does not sit happily on a ditch line reconstructed as a circle from the surviving arc at the south and south-west. If the enclosure was circular, then roughly 20% of the enclosure ditch was available for investigation.

In the excavated areas the depth of the ditch varied between 0.5 m and 1.1 m (the norm was c. 0.6–0.9 m) and its width varied between 2.2 m and 4.5 m (the norm was c. 2.5–3.5 m). The shallowest depths were the result of truncation of the ditch, and the greatest widths reflected the erosion of the friable subsoil edges of the ditch in some areas. The profile of the ditch varied according to the material through which it was dug: the sides were steeper where it was cut through compact gravel than where it was cut through sand or loose gravel. In general it had a flattened bottom with steep sides which became shallower for the upper 0.3 m or so of subsoil. In a few places there was stepping closer to the bottom, mainly as a result of a change in the compactness of the subsoil.

There were three distinct groups of layers in the ditch-fill, a pattern which was repeated over its whole excavated length:

Upper The top of the ditch for its full visible length had a dark brown loam fill.

Middle Below the upper fill and between it and the edge were wedges of lighter, less loamy layers more akin to their neighbouring periglacial deposits.

Lower The lowest layers were always fairly clean-looking silts and fine sands and/or gravels, bottomed in most cases by a medium orange brown gravel.

The three zones - dark loam, lighter less loamy soils, silts - are clearly visible on the sections (illus 24). In cutting IV there was a charcoal- and find-rich layer at the interface of the Upper and Middle fills, which produced Beaker pottery. Large stones, where they appeared in any number in the ditch, seemed to occur at certain stages, mainly at the bottom of Upper and Middle fill. The finds likewise had their set levels: Grooved Ware in the Middle fill, and Beaker within the Upper fill. It had been hoped that a study of the silting pattern from the sides would indicate the position of a bank. However, the lenses and horizontal layers on the sides and bottom clearly related to the very varied types of subsoil through which it was cut. It is interesting to note, however, that the very charcoal-rich layer in the Middle fill (visible in section A–B on illus 24), containing Grooved Ware sherds, clearly entered the ditch from the outer edge.
ILLUS 24 Sections across the ditch. To aid the reader, in all the sections the outer side of the ditch lies on the left; some of the drawings have had to be reversed to allow this. Cutting VI (A–B); II (O–P); III (M–N); IV (G–H); V(C–D)
Considerable quantities of pottery, particularly sherds of Beaker, were recovered from the ditch, although it may be noted that these coalesced into significant remains of a relatively limited number of vessels (fewer than six) and the fragmentary remains of many more. Superficially it would appear that there is a significant admixture of pottery types in the ditch, but if the quantities involved are taken into account a clearer picture appears.

The pottery in the excavated ditch sections is distributed as shown on Table 2. None was found in Cutting II.

Table 2
Pottery from the ditch sections excavated

<table>
<thead>
<tr>
<th>Context &amp; Fill</th>
<th>Grooved Ware Sherds</th>
<th>Beaker Sherds</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cutting III Upper</td>
<td>&lt;5</td>
<td>&gt;52</td>
</tr>
<tr>
<td>Cutting IV Upper</td>
<td>&lt;5</td>
<td>&gt;147</td>
</tr>
<tr>
<td>Middle</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Cutting V Upper</td>
<td>&gt;115</td>
<td>&gt;110</td>
</tr>
<tr>
<td>Middle</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Cutting VI Upper</td>
<td>&gt;35</td>
<td></td>
</tr>
<tr>
<td>Middle</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cutting VII Upper</td>
<td>&gt;36</td>
<td></td>
</tr>
<tr>
<td>Middle</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The Beaker pottery was concentrated in Cuttings III, IV and V, in the Upper fill. The Grooved Ware was concentrated in cuttings V, VI and VII, in the Middle fill, associated
particularly (in Cuttings V and VI) with the lens of charcoal-stained soil (shown on illus 24: A–B), apparently entering from the outer side of the ditch. At the north end of the surviving arc of the ditch the pottery was closer to the bottom of the ditch, but still within the Middle fill; sherds of vessel P47 were found both in this layer and in the heavily charcoal-stained layer higher in the Middle fillings in Cutting VI. The very few Grooved Ware sherds in the Upper fill seem best interpreted as residual. The very few small sherds of Beaker pottery in the Middle fill may have been brought there by animal activity, of which there is ample evidence.

The palaeobotanical information recovered from the ditch was limited; sloe stones appeared in cutting V, Upper and Middle fills, with oat and barley grains and hazel fragments; a possible bramble seed was also found. In VI a sloe stone and a crab apple pip were found, with cereal fragments and a possible legume pod.

**Cutting II** (section O–P on illus 24) The sides of this cutting were steeper than elsewhere primarily because of the uniformly stony nature of the glacial subsoil. As a result the profile and the silting pattern were also simpler with fewer changes of slope and fewer fill wedges down the ditch sides. An edge-retouched flake (S16: illus 66) was found in the Upper fill. (Cutting I was a trial section cut in the first season and is incorporated in Cutting II.)

**Cutting III** (section M–N on illus 24) This cutting was dug through glacial sand. There was a break of slope half-way down the side which corresponds with the top of the lowest fill. Again the ditch bottoms out flatly on to gravel. Thirty-five pieces of flaked stone were recovered from the Upper fill; two are illustrated (S10 – chip illus 65; S15 – chunk scraper – illus 66). Flakes were also found in the Middle fill.

**Cutting IV** (section G–H on illus 24) This portion of the ditch was cut, in the main, through sand and disturbed sand but reached the gravels at a depth of 0.3–0.5 m from the surface, where there was a break of slope.

**Cutting V** (section C–D on illus 24) Four different glacial deposits were visible in the sides of this cutting. There was a break of slope in the ditch side between sand and coarse gravel about 0.3 m down. Over 35 pieces of flint were recovered. Three pieces are illustrated (illus 65 & 66): from the Upper fill – an end and side flake scraper S12; a serrated edged flake S13; a reworked barbed and tanged flake point S14; a thumbnail flake scraper S17; an edge-retouched flake S18. Fragments of burnt (?)cattle) bone recovered from the Upper fill; fragments of burnt bone, possibly sheep and cattle, were found in the Middle fill.

**Cutting VI** (section A–B on illus 24) This was the site of one of the trial trenches of the first season, which was cut on the diagonal. The ditch was truncated here by the erosion slope to the north. The profile, where clearest, showed the double break of slope, at depths of about 0.3 m and 0.7 m. In the Middle fill was a very dark charcoal-stained sandy loam containing substantial sherds of Grooved Ware vessel P69. It extended from the outer side of the ditch towards and past the centre of the ditch. A flake (S7) from this layer is illustrated (illus 65), as is a serrated edge blade-like flake (S8 from another part of the Middle fill. Two samples of charcoal recovered from the charcoal-impregnated layer were radiocarbon dated: 2475±50 BC uncal (GU-1670); 2435±55 BC uncal (GU-1904). The layer also produced burnt bone, possibly of sheep.

**VII** This cutting was excavated along the axis of the ditch, to demonstrate the relationship of the ditch to the sand pit, which was shown clearly to cut the ditch. Portions of Grooved Ware vessels P47 and P75b were found in the lowest part of the Middle fill.
2.2.5 The Grooved Ware: vessels P41–82

A S Henshall

In this report the Grooved Ware recovered in the excavations of 1983–5 at BRS is described and compared with the Grooved Ware recovered by Mercer (1981) from the Balfarg henge.

The considerable assemblage of sherds can be treated as a unit, both because the same forms, decorative techniques and designs appear on pots of all sizes (and there is a very wide range of size) and because the content of the main deposits is similar. There are also direct links between the pottery in the ditch and in pit F8133, and between Structure 1 and the ill-defined pit F1002, provided by joining sherds of pots P52, P63 and P66. Sherds likely to be from P43 came from F1002 and from below ring-cairn A; a single sherd in the ditch from P75b suggests a link between it and two pits (F8015 and F8029) outside the ditch on the south-east side, which contain P75a, which may be the same pot as P75b; another possible link, between F8133 and Structure 2 may be provided by the small sherd P60c. F8133 and pit F1040 are possibly linked by the single sherd of P76b which may be from the same pot as P76a. The relationships are shown in illus 26.

The pottery is very fragmentary and incomplete. Nonetheless it is possible to allocate the great majority of sherds to individual pots on the basis of decoration, size and wall thickness, sometimes assisted by fabric variations. It is thus possible to estimate, with unusual precision for a Neolithic assemblage, the number of pots present. The total is probably 43 (42 catalogue numbers were assigned and in addition the sherds of P71a–d are probably from two vessels). It would be possible to raise the total to 49 if unattached sherds from bases or lower walls do not belong to the pots to which they have been allocated; or the total could be lowered to 39 if certain sherds listed separately derive from otherwise identified pots (eg P66 might belong to P63, P68 might be from P67, P73 might be from P71, and P81 might be from P61). However, there is considerable confidence that the estimate of 43 pots is correct, give or take no more than one or two pots. The relatively few sherds not listed in the catalogue are small and characterless, and there is no reason to believe they come from additional pots.

The profiles of five pots can be reconstructed, all of them having flat bases and straight, somewhat everted walls. They vary from quite shallow relatively open dishes, eg P41 (illus 27) and P54 (illus 28), to deeper more upright forms, eg P48 (illus 28), and to deep tub shapes, eg P65 (illus 31). There is no evidence for pots outside this range, and the indications are that the smaller pots were generally of the shallower form and the larger pots were of the tub-like form. There is a wide variation in the size of the pots but they fall roughly into two groups, small to medium, and large to very large. In the first group there are three small dishes with external rim diameters of 110 mm to about 125 mm, followed by about 10 pots between about 140 mm and 160 mm in diameter (some estimated from the base diameters), and about seven pots in the broader size-range between about 160 mm to 250 mm. There is only one pot between this and 300 mm, yet at least 17 pots have diameters of 300 mm or more and form the second group. The largest established rim diameter is 400 mm (P63; illus 30) but, judging by the thickness of the walls of some of the very fragmentary pots such as P72, P74, and P78, these were considerably larger still.

Although the fabrics vary there is no clear grouping, and the character of many has been destroyed by burning or scorching and so defies comment. It is likely the colour was predominantly dark, the lighter tones varying through brown to buff. The quality of the small and medium-sized vessels is excellent, the fabrics being hard or very hard, the forms regular, the surfaces carefully finished and the decoration generally carefully executed. The fabric of some of these pots (eg P41, P42,
ILLUS 26 The distribution of sherds from numbered Grooved Ware vessels on the BRS site. X = pot found in only one context; • = sherds of vessel found in more than one context. The subdivisions a, b, c etc indicate that sherds may be from the same vessel.
ILLUS 27 Grooved Ware: vessels P41–P47; P49
P47, P53) is fine and rather sandy in texture, but when some larger grits are included it has a rather harsh texture (eg P56, P61).

The fabric of others is tempered with angular grits, some quite large, and is finished with a thick slip giving a fine smooth surface (eg P44, P51, P52). The thickness of the walls varies from 5 mm to 10 mm. Among the larger pots, P63 & P64 and P66–P68 are quite heavily tempered with large grits, yet the walls are relatively thin and the fabric is hard, and although the grits show through the surface the exterior is well finished. P65 is so heavily tempered with large grits that it must be described as a coarse fabric and the exposed grits give it an uneven rough surface, yet some of the rim sherds which have escaped burning are hard. Some of the very large pots are similarly very coarse, and in thickness range up to 25 mm, but the sherds are fragmentary and so heavily scorched that their original quality cannot be judged: they are now extremely friable. In contrast the large thick-walled pots P71 and P78 are tempered with surprisingly fine grits. Most of the large pots had a fine outer surface.

On all sizes of pots there is a tendency to break along the building rings, and on some pots (eg P43, P51, P63 & P64) these breaks are very noticeable; also the lower wall tends to break away from the base. It is clear from the impressions on the exterior of sherds from the lower walls of some large pots that these were built up against a basketry support, as discussed on p 108.

Carbonized material adhering to some of the larger pots (P63–P66, P71, P75, P76a) might conventionally have been taken to indicate that they had been used for cooking, and this would have been taken to account for much of the scorching, especially where the poor condition of the lower part contrasted with the good condition of the upper part as on P45 and P65. One sherd of P48 and probably also pots P47 and P55 were scorched after breakage. The very incomplete condition of most pots, and the reduction of the major part of P61 and P65 into very small sherds, together with the evidence from the burnt residues and scorching might, in another context, allow an interpretation of the assemblage as redeposited domestic rubbish; however, Moffat’s analyses (below) seem to indicate a more dangerous recipe, and Barclay & Richards (below), in their discussions of the context of Grooved Ware deposition, in particular in the sealing of Structure 2, would suggest a less prosaic origin for all the Grooved Ware deposits.

Although the decoration may be elaborate and was generally extensive (and there is no firm evidence for undecorated pots), the actual decorative techniques employed were limited. There are incised lines, which are generally firm, fairly narrow grooves, but varying to fine lines as on P77, light scoring as on P65, or to wide grooves as on P49 (illus 27), P55 or P71. Incised lines alone were used on the small dishes P41 and P42, but generally cordon formed the more important part of the design. These were so neatly worked that it is often difficult to see whether they have been raised from the surface of the pot or have been applied, the latter probably being the usual method and certainly the case where the relief is high. It is quite common for the cordons to be edged by grooves which served both to define the cordon and to firm the edges of an applied strip, as on P51, P52 and P58. Some cordons have been worked into wavy lines in relief by impressions made alternately from each side. This has sometimes been done very carefully to produce crisp regular waves, notably on P44, P49 and P54, but on some pots the decoration was less careful and on other examples the cordon received only two rough rows of stabs, as on P48 and P58. Several pots have cordons bearing a single row of neat impressions, as on P46 and P56. The tool making the impressions generally had a plain point, but P43 is distinguished by the use of a hollow-ended tool, and P61 by the use of a rough-ended tool. One of the large pots, P69, has a cordon bearing finger-tip impressions. Some of the larger pots also bear spaced deep depressions, in some cases almost penetrating the wall. On P63 and probably on P76 they have been made by a finger-tip; on P69 and P75 they were made by a thin round-section tool penetrating very deeply. A line of impressed cord appears only once, inside the rim of P51.

The smallest pot, P41, bears a simple incised design, two lines below the rim, triple lines above the base, and a single row of triple-line chevrons between, with one repeat in the circuit. A similar incised design with several rows of chevrons, or possibly two zones of chevrons, was used on the slightly larger P42. Insufficient remains of P53 to demonstrate the whole design, but it appears to have been in two zones. There was a cordon with waves in relief below the rim, another about half way
down, and another forming wide chevrons at the base. The spaces between them were filled with paired grooves, either horizontal or forming rather disorganized chevrons. What little remains of P45 suggests a similar design.

Several of the relatively small pots have all-over decoration based on slanting cordons joining to form elongated lozenges and triangles. On pots P48 and P51 the design consists of a straight cordon below the rim and another above the base, with slanting cordons between, each cordon joined alternately to that above and below, there being two repetitions of the pattern in the circuit. P48 has 10 slanting cordons forming alternately four and five recessed lozenges, and P51 has eight slanting cordons. Laying out the design was not easy, especially on a pot with splayed sides; on P51 the potter’s error in joining the lowest pair of cordons can be seen on the illustration. The fragmentary P47, probably about the same size as P48, had a similar design but carried out with double cordons. Double cordons were also used on the larger P52 and the even larger P59 but these designs which involved recessed lozenges cannot be reconstructed.

The decoration of P54, a variant of the design described, has been carefully worked out and executed with four repeats in the circuit. Instead of slanting, the cordons (defined by deep grooves) are horizontal, and are linked alternately to those above and below by applied vertical ribs. Between the ribs the cordons are alternately plain and wavy. A similar, although less carefully executed, mixture of plain and wavy cordons can be seen on P48, and on a sherd of pot P56 which is further allied with P54 by the use of a vertical link between paired cordons. The few sherds of P44 include converging cordons, some wavy, suggesting a design similar to that of P48. The single sherd P50 bears paired cordons, both plain and wavy. Fragments were found of five other pots (P43, P46, P49, P55, P62) all bearing wavy cordons and slanting lines and evidently decorated in the general style described above; in particular P43 is very like P44.

Sherds from two pots of medium size (P58, P60) and one rather larger (P61) also have double cordons, some wavy or stabbed, some of them slanting, which create a more open decoration but evidently on the same themes. There is the probability, however, that the lower parts of pots P60 and P61 were undecorated. The lower part of the smaller P57 was certainly undecorated and there were evidently cordons on the upper part.

Of the 22 pots considered, comprising all the small and medium-sized vessels and one (P61) of larger diameter, only two are without cordon decoration (being incised), and of the cordoned pots only two do not have wavy relief or stabbed cordons. Except for the three pots at the larger end of the size range (P47, P60, P61) the decoration covers the whole pot.

The absence of decoration on the lower parts is a feature of the larger pots, those with diameters of 300 mm or more. On these the whole treatment is more restrained, with horizontal decoration of grooves or cordons below the rim, and scored lattice and depressions the only identified decoration on the rest of the body. Yet links with the smaller pots are obvious: four pots (P63, P69, P74, P80) have wavy or stabbed cordons (and P74 is one of the largest pots in the assemblage); P63 has a chevron cordon, and the treatment of the rims and lugs is common to all sizes of pots. The differences are the appearance of lattice and the horizontal rows of depressions. The latter may be below the rim (P63, P65, P69, P71 and probably P76), on the body (P75), and/or immediately above the base (P71, P75). There are about 17 large pots but unfortunately relatively little remains of most of them, and P65 alone gives a complete profile. The heavy decoration of P69 with its alternately impressed and plain heavy cordons is unusual yet in a sense echoes the treatment of cordons on the small pots.

Except for P68 and perhaps a few of the other larger pots, all the rims are decorated inside, sometimes only by a single or double incised line or groove (exceptionally on P51 by an impressed cord) running just below the lip. Some rims are simply rounded, but others have been bevelled, and in some cases the lower edge of the bevel has been emphasised by paring away the wall below. P64 has light nicks along the rim edge. A few of the larger pots have rims thickened on the inside (P69, P70, P71), and one has a slight cordon (P76a). P70 has a groove along the wide flat upper surface.

Nine pots have applied lugs which project above the rim edge; this is another feature which unifies the assemblage as the lugs appear on small fine pots and on some of the heaviest. Unfortunately
Illus 30 Grooved Ware: vessels P61–P63
the arrangement of the lugs is not known. On the most complete pot (P54) the lugs have been in close-set pairs (illus 28) spaced into four groups, probably with one and possibly all the groups having the pairs grouped in pairs. On P65 the lugs, no more than low lumps, are in pairs, but on other pots there is no indication of the arrangement except that they are widely spaced. In all but one case (P63) the lugs extend across the internal rim bevel as a rib: on P64 the lug was applied as a large pellet with a deep vertical impression. Sherd P72 bears a scar on the outer surface of the rim where the lug has been extended as a boss and has subsequently broken away. Directly below the lugs on P51 and P60 the uppermost external groove below the rim has been interrupted, clearly intentionally.

The Grooved Ware recovered in 1977–8 during the excavation of the nearby henge at Balfarg (given BH P numbers in the following text to differentiate it from the BRS material) had to be considered almost in isolation as the nearest Grooved Ware assemblages of any size were in Orkney and in Yorkshire (Henshall 1981, 128–33, 136–9). The extremely fragmentary condition of the sherd from the henge further restricted assessment, although the number of pots represented was only a little less than from the BRS sites. The two assemblages have in common similar fabrics and also, in general terms, similar forms and range of decorative techniques, both characteristic of Grooved Ware as a whole. In some respects there are similarities in the decoration and occasionally there are specific links. The circumstances of the various deposits make it unlikely that sherd were transferred from one area to another. The differences are such that it is clear the two assemblages are distinct.

The range of pot size was greater at Balfarg Riding School (BRS) than at Balfarg henge (BH). The maximum sizes are unknown but a comparison of the maximum sherd thickness is indicative: 25 mm at BRS with altogether coarser fabrics, and 13 mm at the henge, implying that the largest BRS pots were greatly in excess of the largest rim diameter of 355 mm recorded at the henge. Several of the very fragmentary BRS pots appear to have been immense. Some of these large pots bear impressions of the baskets and mats used during their manufacture. One base sherd from the henge bears a mat impression, but as there is a similar sherd from Rinyo, Orkney, it may be that such aids were widespread and the evidence was usually pared away on pots of manageable size. The smallest BRS pots are slightly smaller than any from the henge, and it is unlikely that any of the pots from the henge were of the unusually shallow proportions found at least twice at BRS.

The rim forms and internal decoration of the pottery from the two sites are in general not dissimilar, but whereas at BRS only two relatively large pots have no decoration, at the henge a number of small pots are undecorated. Also at the henge the internal decoration may be somewhat more elaborate, one pot having a relief wavy line (a technique only used externally at BRS), and four pots having applied cordon: besides single incised lines there is also multiple grooving at the henge, and an absence of upstanding lugs. Among the large BRS pots there are occasional thickened rims and in one case nicked decoration, neither found among the pots from the henge.

In contrast with the BRS site, one pot from the henge was certainly undecorated externally, and this was probably also true of a further seven or more. Another merely had three lines incised below the rim. The actual techniques of decoration at the two sites only differ in the presence at the henge of a few sherd of finger-nail rustication, and there is a specific link in the single appearance at each of string-impressions, in both cases inside the rim. There is, however, a marked contrast in the way these techniques were used, particularly between the elaborate tight all-over linear plastic treatment on the small and medium-sized pots from BRS and the restrained effect produced by incision and light jabs on the pots from the henge. At the BRS site the chevrons and lozenges were exaggeratedly elongated, and
ILLUS 31 Grooved Ware: vessels P64–P65
there was no infilling of geometric spaces by light jabs, nor incised hatching nor herringbone, nor undecorated wide cordons. Wavy lines in relief, so extensively used at BRS, appeared on only one pot at the henge.

As far as exterior decoration goes, it is the large BRS pots with their simpler treatment and the tendency for the decoration on them to be concentrated in the upper parts which are closer to the henge assemblage with its bold use of spaced cordons and horizontal grooved lines below the rim. The chevron cordons of BRS P63 can be compared with henge BH P18 and BH P19. More notable still is the similarity of the curious BRS P69 with BH P16, both having heavy finger-impressed horizontal cordons and deep narrow round-section impressions: in one almost perforating the thick wall, in the other doing so. Very deep impressions in roughly horizontal rows occur on several other large BRS pots, and there is a row of perforations on another pot from the henge, BH P40.

The Balfarg henge pottery, although a single deposit, appeared to incorporate elements from each of the styles of Grooved Ware which have been distinguished by Wainwright & Longworth in a study which was based unavoidably on material from the south of England (1971, 236–43). It was unsatisfactory but not surprising to infer that the henge assemblage represented a local sub-style in south-east Scotland, a region which to date has produced relatively little Grooved Ware and where the largest group of sherds was inadequate for attempting a definition.

The situation regarding the BRS assemblage is clearer. Wainwright & Longworth (1971) identified a number of sub-styles of Grooved Ware; the difficulties in reconciling the subdivisions with the appearance of different sub-styles on the same site were explored by David V Clarke in an unpublished paper. More recently, Richards & Thomas (1984) have taken the argument further in their consideration of the hierarchy of decoration on Grooved Ware, and Richards has undertaken a similar examination of the Balfarg material (below). While the classification proposed by Wainwright and Longworth may not have the significance they suggested, their sub-styles are still useful as a shorthand for the description of Grooved Ware decoration and it is in this way that the names of the sub-styles are used here.

Much of the pottery, especially the smaller vessels, is unmistakably of the ‘Woodlands style’ (Wainwright & Longworth 1971, 238–40; sites listed with references 268–306), and the larger vessels have features of this style, although in our present state of ignorance the pots themselves appear idiosyncratic. The outstanding characteristic of the ‘Woodlands style’ is all-over zoneless decoration by neat cordons either applied or raised from the surface, the cordons being either plain or decorated with jabs or incisions, and arranged either horizontally or in elongated lozenges. Open bowls with simple rims are a normal form, and they may be small and delicate. BRS pots P47, P48, P51, P52, P54, P59, are of precisely this type. Three distinctive features which are widespread but relatively uncommon in the ‘Woodlands style’ appear at the BRS sites: vertical applied ‘ribs’ or ‘lugs’ linking horizontal cordons, relief wavy lines on cordons, and applied pellets or ‘upstanding lugs’ on the rim edges. The close correspondence between some of the BRS pots and some of the geographically remote southern English pots is striking. For instance the small collection of sherds from Woodlands itself, near Woodhenge in Wiltshire, included part of a shallow bowl with horizontal cordons alternately nicked and plain (as on BRS pots P48, P54), linked by applied vertical ribs (as on P54, P56), and with applied ribs rising above the rim reminiscent of the upstanding lugs at Balfarg. There were also sherds of a second pot with horizontal and slanting cordons, some decorated with waves in relief and some plain. When they were
ILLUS 32 Grooved Ware: vessels P66, P68-P72
published, comparison was made with sherds from Honington, Suffolk, some of which were reconstructed as two larger bowls with plain cordons similar in appearance to P51, but notable for the paired upstanding lugs very similar to those on pot P54.

The ‘Woodlands style’ is widespread although less than prolific in southern and southeastern England. Our knowledge of Grooved Ware in the north of England was greatly increased by Manby (1974), and it is evident that the ‘Woodlands style’ is present at a number of sites extending almost to the Scottish border (op cit, list of sites 3–10, discussion 79; McInnes 1977, 354–5). A few examples are known of each of the distinctive features already mentioned. Because Grooved Ware was first isolated and later extensively studied in the south of Britain (with an outpost in Orkney), and subsequently recognized in small quantities widespread in northern England, there is a tendency to assume the pottery style spread northward from an inception-area in the south: this assumption should be resisted, as the limited chronological evidence indicates the reverse may well be the case.

In Scotland only a few sherds in the ‘Woodlands style’ have been recognized, scattered from Rinyo in Orkney, to Callanish in Lewis (Ashmore in prep), Tentsmuir in Fife (Longworth 1967, 75–8), Knappers in Dunbartonshire (Ritchie & Adamson 1981, 187–8), Townhead in Bute (see below) and Luce Sands in Wigtownshire (McInnes 1964, 47–9, 66–8). The distinctive features of the BRS pots are very rare or absent; the wavy line in relief is known at Tentsmuir, Callanish and Balfarg henge although careless jabbed versions are known elsewhere; alternating plain and decorated cordons at Tentsmuir and Knappers; upstanding rim lugs, perhaps of the type under discussion, at Kirkburn in Dumfriesshire on an undecorated rim (Cormack 1963, 121, 128), and from a recently disturbed part of the fill of the pit dug for a cist at Dornoch, Sutherland (Ashmore 1989, 64, 68, 70, illus 6a, 3); linking vertical ribs are unknown.

Other decorative traits are present at the BRS sites besides the features which relate the assemblage so clearly to the ‘Woodlands style’. The tiny bowls P41 and P42 bear triple incised chevrons similar to the decoration of a distinctive but scattered group of pots discussed by Ritchie (1976, 20–1). Yet grooved decoration without cordons is an element in the ‘Woodlands style’ and the motif of lozenges or triangles is characteristic. Support for the inclusion of some pots of this type comes from Tentsmuir, Knappers and Townhead where bowls with triple incised elongated lozenges were found with unmistakably ‘Woodlands style’ sherds. (The ladder pattern, listed by Wainwright & Longworth as one of the definitive features of the ‘Woodlands style’, was omitted from the drawing of the Townhead sherd illustrated by Mackay 1950, 181, fig 1, 4.) So it seems that this precise form of decoration may be common to both the ‘Woodlands’ and ‘Rinyo styles’, and a further link might be seen in the use of pellets on the rim edge, single or paired in the former style, multiple in the latter style. P53 at BRS, and possibly one or two more, appears to be decorated in two zones divided by horizontal lines, and another one or two pots were undecorated near the base. So much of the ‘Woodlands style’ pottery is fragmentary that the frequency and significance of these apparent aberrations cannot be assessed at present, but it may be noted that a group of ‘Woodlands style’ sherds at Flamborough, Yorkshire, included two large pots, one with the lower part undecorated (Manby 1974, 72–4).

Large pots are certainly a component of other Grooved Ware assemblages, in Scotland notably in Orkney (eg Clarke 1976, figs 13.2, 13.3) and at the Balfarg henge. Little comment can be offered on the large BRS pots except to note the relatively restrained decoration and close affinity with the smaller pots. The rows of bold deep depressions introduce a new element for which it is difficult to find meaningful parallels other than those tentatively
ILLUS 33 Grooved Ware: vessels P74–P77; P79; P80
suggested when considering BH P16 (Henshall 1981, 132) which closely resembles the pot BRS P69. It is tempting, too, to suggest a tenuous connection with that small part of the assemblage from Knap of Howar, Orkney, which has decoration in the Grooved Ware manner and includes rows of deep depressions, and perforations (Henshall 1983, 70–1, 73).

While it is appropriate for henge monuments and allied structures to be associated with Grooved Ware, the ‘Woodlands style’ in England and Scotland comes almost exclusively from pits, generally ‘domestic’, although occasionally interpreted as having a ritual purpose, or from surface scatters or re-deposited material. At Knappers and Callanish there is, however, the possibility of a connection with a ritual monument. At Balfarg Riding School the pots which may be attributed to the ‘Woodlands style’ were found in the ditch of the enclosure (eg P47), in association with the timber structures (eg P48), in the isolated pits (eg P51) or in more than one context (eg P52), as is shown in illus 26.

2.2.6 Basketry and Textile Impressions on the Grooved Ware

V J McLellan

In the course of cleaning the Neolithic pottery from BRS it was observed that a small number of sherds from five different pots bore faint impressions, possibly indicating the way in which some of the more substantial vessels were constructed. The vessels with such traces were P60c, P61, P69, P70 and P71b.

The impressions seem to have been produced by row upon row of unevenly twisted twine, generally 4–5 mm thick. They occur both on the lower body and on the basal sherds of large vessels with relatively thin walls. The impressions are so indistinct as to suggest they were not intended as decoration as were the cord-impressions on Beakers. They could, however, result from the pot having been supported in a basket while the clay was plastic. There is no evidence to suggest whether the vessels had been made in a basket and then left to dry to a leather-hard condition, shrinking enough to remove the pot from the mould/support, or whether the vessels were fired in the basket. The patchy and sometimes smeared appearance of the impressions suggests that the vessel would have been loose within the basket. Also, the basal impression is eccentric and although the markings appear to be restricted to the lower part of the vessels, they do not extend to the bottom of the wall – again suggesting they did not fit tightly.

It is suggested that the vessels were contained in shallow baskets which allowed the potter to handle with relative ease these relatively thin-walled, substantial vessels while in a plastic state.

The baskets appear to have been constructed from unknown lengths of unevenly twisted twine tightly woven together. There is some evidence to suggest that variation in weaving style did occur on one basket, that used for vessel P69.

2.2.7 An Assessment of the Residues on the Grooved Ware

B Moffat

Samples of organic residues were taken, mainly from two Grooved Ware vessels (P63 and P64 – in the larger size of Grooved Ware vessel at BRS). There is burned material of three broad yet distinct types. Two types, ‘amorphous and burned’ (ABM) and ‘amorphous,
granular and burned' (AGM), are present in abundance in all the samples. The third type has been called burned cereal mash (BCM) and comprises the range of processed and prepared cereal products. Both barley and oats have been distinguished from part grains, but in the absence of entire, carbonized grain – the grain having been thoroughly ground down – taxonomic identification is inappropriate.

The macroremains give plain indications of a cereal-based preparation, but the pollen records – from 15 of the 31 samples – provide much additional detail. Pollen cannot but be carried along with admixed source plant, and it is likely to persist in a readily identifiable state long after the plant itself has been processed (cut up, ground, cooked and mixed up) so as to be utterly unrecognizable. Minute droplets of beeswax (1–2 mm across) and solidified resin (0.5–1 mm across) were also noted. Meadowsweet is indicated by both pollen and macroplant remains, and the clumps in one related sample, 14, indicate that a flowerhead was added. This plant has a widespread and common application as a flavouring (flowers) and as a potherb (young leaves). There are extremely high values for fat hen and cabbage/mustards, in sharp contrast with the ‘broad spectrum – low values’ for almost all other herbs, and these values suggest that potherbs may be in use. Cultivated flax, an exceptionally low producer of pollen, is a plainly indicated ingredient – perhaps for its oil. The single record of nightshade – family pollen, a rarity (containing plants which without exception contain powerful and dangerous alkaloids), is puzzling. Coupled with pollen of the Solanaceae (hemlock family, but not always toxic plants) there seems to have been either an elaborate use of potent plants or a dangerous or careless misuse of them. What of the original preparation and its consistency? Judging from the heterogeneous and coarse texture of most deposits, it seems that the mix is normally coarse and crude. A consistency of a coarse porridge with added pottage (potherbs) and flavourings, is indicated.

A deposit encrusted on the outer surface of one sherd of P63 was examined in more detail. The size and the very fact of the pollen count of Solanaceae in this sample is strikingly anomalous in Fife (at a latitude of around 56°N). The Balfarg Solanaceae pollen was found to consist wholly of black henbane (Hyoscyamus niger). The seeds are extremely robust and resilient and the breaks showed mechanical rending. Pollen and seed fragments were fairly well intermixed suggesting an incomplete process of homogenization. The small cache of seeds is of black henbane alone. Setting aside the pollen adjudged to be ‘environmental pollen’, the remaining pollen may have some place in ethnobotany at Balfarg: hemlock family (not hemlock, but one or more of the 22 genera of the hemlock family/ Umbelliferae native to Fife); meadowsweet; fat hen; cultivated flax.

The Solanaceae are represented in northern Britain by only three species of significance, according to the Atlas of the British Flora (Perring & Walters 1982). In the 26 grid-squares that cover Fife, bittersweet or woody nightshade has been recorded in five since 1930 (nil before); deadly nightshade in nil (two before) and black henbane in one (one before). Native representatives of the family are few and most sparsely and inconstantly distributed today. The Solanaceae may be equated with a range of complex and potent phytochemical alkaloids. Alkaloids have, typically, ‘a marked physiological action on man or other animals’ (Trease & Evans 1978, 543). Most Solanaceae act upon the human autonomic nervous system, as they antagonize acetylcholine. Additionally the tropane alkaloids that they contain act as a central depressant of motor function. Consequently, in manuals of poisonous plants, they are classified as ‘poisonous’, strictly to be avoided. Black henbane seeds, for instance, contain 0.06–0.10% of alkaloids (hyoscyamine with a little hyoscine and atropine) according to Trease & Evans (1978). Historically, the main purpose for the use of black
henbane (where this may be ascertained) has been as a ‘narcotic medicine’ – to procure sleep and to allay pains – for which it may be taken internally or externally (Grieve 1980). A broadly similar pharmacological assay has been made for the other native Solanaceae.

The recent ethnobotanic history of the Solanaceae, notably in the medieval and post-medieval periods, is complex and intriguing. Webster (1978) expresses a widely held opinion of black henbane: ‘Introduced in north Scotland. Rare, usually near old Kirks and Abbeys, and occasionally as a weed in gardens and tips. All parts poisonous and narcotic ....’. The Floras that cover Fife are broadly on the same lines. Botanists have noted black henbane on islands off the Fife coast where there were once monasteries (Inchcolm, the Isle of May and the Bass Rock), and also on the mainland at Culross Abbey (Anon 1908; 1910). It is not possible at present to determine the nearest source of black henbane in the third millennium BC uncaw, but the possibility of long-distance movement of rare plant resources must be borne in mind.

The progressive symptoms of henbane poisoning are blurred vision, dry mouth, confusion, dilated pupils and rapid heartbeat, and possibly dizziness, nausea, headache, euphoria, hallucinations; the possible use of henbane deliberately to induce these symptoms is considered below (p 185). In the Middle Ages henbane preparations were used for medicinal purposes and this possible interpretation for the Balfarg material must also be borne in mind.

2.3 LATER NEOLITHIC AND EARLIER BRONZE AGE ACTIVITY

G J Barclay, C J Russell-White & P N Tavener

2.3.1 Ring-ditch, Ring-cairn and Cairn Sequence

The most complex group of stratified features was discovered at the end of the third season, and excavated in the fourth and fifth seasons, to the west of the BRS enclosure (illus 34, 35 & 37). The group comprised: pits, post-holes and one burial, penetrating the old land surface and/or the subsoil, some of which lie within –

(a) a ring-ditch (illus 34), lying under –

(b) a complex double ring-cairn (A – i being the outer ring-cairn, ii being the inner one) (illus 40), probably covered by an earthen barrow, adjacent to, and probably earlier than –

(c) a complex cairn (B) (illus 40), probably also covered by an earthen barrow, and associated with –

(d) at least four burials and probably –

(e) a line of large post-holes.

The soil cut by all these features may possibly have been cultivated (Jordan, below).

The upper surfaces of ring-cairn A and cairn B had been disturbed by modern ploughing, leading to difficulties in establishing relationships between pits and the cairns. In addition, the greater part of cairn B had been removed in the past, leaving a number of
possible features uncovered, with no clue to how they related to that cairn. The only clear indications of when the ring-ditch/ring-cairn/cairn complex was built and in use are provided by two relationships:

– the ring-ditch cuts timber Structure 1 (illus 18).
– cairn B is cut by the pit of a Food Vessel-accompanied burial (Burial A–Cist A).

The complex therefore would seem to date from after the mid-third millennium BC uncal and before the mid-second millennium BC uncal, when Food Vessel burials were current.

The pottery found in the area offers no great assistance in understanding the chronology of the group; most of the material was found in buried topsoil or in other contexts where it could be secondary. There are possible Earlier Neolithic (Cowie’s Group I) sherds, and Grooved Ware and Beaker sherds were also found, but in small numbers, together with a single Food Vessel sherd. Their contexts are none too secure because of the smallness of the sherds and the episodes of disturbance suffered by the cairns. The largest group of material is of Later Neolithic sherds; virtually all the sherds of Cowie’s Group 3 were found in the buried old land surface and in other soils associated with the cairns. This group of pottery falls into the category of what have been described as the Scottish Impressed Wares (McInnes 1969) or more loosely, Decorated Styles (Kinnes 1985). While neither of those terms is wholly satisfactory, the term Impressed Ware has been retained here to distinguish this category from the Grooved Ware on the site. It is characterized principally by the use of impressed or jabbed decorative techniques, but is also distinguished from the other Neolithic pottery on the site partly on the grounds of its fabric. It is possible that this material provides the best clue to the date of construction of the ring-ditch/ring-cairn feature. The common centre of the ring-ditch and the ring-cairns (Ai & ii) lies on an extension of the axis of timber Structure 1; the possible significance of this coincidence is discussed below.

Ring-cairn A and cairn B both survived on the summit of a ridge in an arable field, under 0.15–0.2 m of regularly cultivated ploughsoil, in a situation where soil erosion rather than soil accretion would be expected. It is argued below that only the dumping of soil over the stone element of the cairns (in the form of a barrow?) could have allowed their preservation.

The ring-ditch and features below ring-cairn A (illus 6, 34 & 35) Portions of Grooved Ware vessels P43b, P79 and P81 were recovered from the soil below the ring-cairn; sherds possibly from the same vessels were found in F8029 and F1002. Chunks and flakes of stone were also recovered from the soils buried by and around the cairn. Those illustrated (illus 66) are flakes S24, S25, and bifacial leafed points S22 and S23.

Only five non-natural features were identified below and within the area bounded by ring-cairn A:

F1113 (illus 34 & 35) A large sub-circular post-hole containing five distinct elements in the fill, the topmost of which contained many large stones. It was cut through the buried A-horizon under the cairn, near the centre of the ring-ditch. The feature was nearly circular at the top, but nearly oval lower down. The stones in the upper fill of this feature protruded all the way to the top of the old A-horizon buried by the cairn – which might indicate that cairn material had subsided into the post-hole in the terminal stages of decay (below ground). There was no indication that this post protruded through the cairn.
F1133 (illus 35) A post-hole sealed below the kerb of ring-cairn Ai. The location of this feature on illus 34 - a small circle cut by the northern portion of section G-H - is approximate.

F1134 (illus 35) A large, somewhat enigmatic, pit (perhaps a post-hole), which had probably been sealed by the cairn, containing fragments of cremated bone (perhaps from F1135) in its backfill.

Burial 7 (F1135) A small, unstructured cremation deposit in a shallow pit c 0.35 m wide (north end destroyed) and c 0.5 m deep, cut by F1134. The fill was predominantly burnt bone, mostly in the northern part of the feature in a matrix of medium brown sandy loam.
The area enclosed by the ring-ditch measured 14.2 m in diameter (illus 34). On the north-east side the latter mill lade had removed it (Russell-White, in prep) but otherwise there was no break. It varied between 0.8 m and 1.3 m across and up to 0.6 m deep. The sequence of digging and filling was as follows. Once dug, the ditch had been allowed to fill naturally to a depth of about 0.1-0.15 m (illus 37, a). On this surface in much of the circuit a scatter of quartz pebbles had been deposited (illus 37, b); more mixed stone including quartz was then deposited, apparently shortly after this (illus 37, c). The ditch was filled with stone and mounded above the level of its edge (illus 36, 37 d). There was no evidence of a break between the filling with stone of the top part of the ditch and the building of the ring-cairn, into which this stone fill was incorporated. In three sections there seemed to be the possibility that the ditch had been recut before the stone associated with the ring-cairn had been deposited; the differences in soil were, in general, slight, however. It may be that the ring-ditch was partly cleared out for some purpose prior to the deposition of the quartz and stone.
As it survived on the south-west the ditch was quite shallow in places; the natural silting had in places reached closer to the top of the ditch before the stone element was introduced. The outer edge of ring-cairn Ai and the ring-ditch had been truncated, particularly on the west and south, probably by ploughing. The only finds were S33, a flaked quartzite cobble and six undistinguished flint flakes.

**Ring-cairns Ai and Aii** Cairn A had two elements: an outer ring-cairn, Ai, surrounding an inner ring-cairn, Aii (illus 39 & 40). As noted above, ring-cairn Ai seemed to 'grow out' of the ring-ditch below it (illus 37, e). It comprised a band of rounded stones measuring a
maximum of 2 m across, defined on the inner side by a carefully arranged kerb of slabs, more than one layer deep in places, angled back against the rounded stones, and set in a slot dug into the old land surface. On the outer side the band of stones had a clear edge. The cairn survived on the summit of a ridge; the ground all around it, except to the north, where cairn B stood, falls away quite sharply, perhaps largely as a result of differential plough erosion since the construction of the mound. The stones of the band appeared slightly smaller in general than the stones filling the upper part of the ring-ditch below, but, as noted above there was no real evidence of a break long enough for soil development.

The kerb of ring-cairn Ai, as it survived, was made up exclusively (bar one stone) of
ILLUS 38 Sections running south (left) to north (right) through the ring-ditch, ring-cairns Ai and Aii and the

ILLUS 39 Photograph of the ring-cairn from the south-east during excavation. Ring-cairn Ai is intact; the surviving kerb and mass of ring-cairn Aii within Ai has been removed by excavation in the north and south quadrants. The small surviving portion of cairn B is visible, attached to the north-west edge of ring-cairn Ai.
slabs of two types of sandstone in sharply contrasting colours: a yellow/white and a dark red. Illus 41 shows the arrangement of the slabs. When fresh the appearance of the kerb must have been very striking. The kerb was backed by a ramp of soil of variable depth below the stones of the band, not readily distinguishable from the soil horizon (on which it lay) buried below the cairn complex; considerable quantities of Later Neolithic Impressed Ware (Group 3; p 121 below), similar to that found in the soil buried below the ring-cairn were found in it; this material formed by far the greatest part of the pottery from the area of the ring-ditch/ring-cairn. In places it seemed that some of this soil overlay the stone upper fill of the ring-ditch; the general picture was confused and it seems likely that some of this soil had accumulated as a result of soil movement during the construction of the kerb.

Within the area enclosed by the kerb were the remains of another ring-cairn (Aii; illus 38, 40). It was defined by a poorly surviving kerb of rounded boulders which had been set on, rather than into, the old land surface. Within this kerb the cairn was made up of small rounded stones, the inner edge of which was also bounded by a poorly surviving kerb; the best impression of the nature of the structure is given by illus 40. This smaller cairn seems to have been set a little higher than ring-cairn Ai and had, as a result, been damaged to a greater extent by ploughing. The outer kerb enclosed an area approximately 9.5–10 m in diameter, and the inner kerb an area 3–3.5 m in diameter. The kerb stones had been dragged out of position, probably by modern cultivation, over much of their circumference, into the area, originally stone-free, between the outer kerb of the inner cairn and the kerb of the outer cairn. The area of greatest damage to both parts of ring-cairn A was in the south.

The sequence of development in the central area of the inner ring-cairn (Aii) was confused. A broad shallow pit (only c 0.1 m deep) had been dug in the central area, apparently before the erection of the inner kerb partly over its edge but there was clear evidence of later disturbance which makes this difficult to prove. The presence of two large slabs, at the edge of the enclosed area and lying partly over the kerb, may suggest that a burial had been disturbed here. Otherwise the only evidence of burial on the site was F1135, the disturbed cremation (Burial 7; illus 36). Two sherds of a Food Vessel were found in the area of the ring-ditch/ring-cairn complex; one lay in the uppermost part of the ring-ditch fill (the stones of the ring-cairn in effect) at the south side of the ring-ditch, the other in a particularly disturbed part of the central enclosed area of the ring-cairn. Neither was therefore in a completely secure context; they may relate, however, to the disturbance of a Food Vessel-accompanied burial in the central area of ring-cairn Aii.
ILLUS 40 Plan of the complex comprising ring-cairn A, ring-cairn Aii and cairn B. The kerbs of the cairns are highlighted. Ring-cairn A lies over and concentric with the ring-ditch.
There is no clear evidence to suggest which part of ring-cairn A was earlier. It is possible, however, that the outer ring-cairn (Ai) was built first, to enclose, but in a different way, an area already defined by the ring-ditch, and that ring-cairn Aii was erected subsequently, within Ai, as part of the development of the ritual or burial function of the site.
Features below or apparently below cairn B  To the north of ring-cairn A were the fragmentary remains of a further cairn (cairn B). Less than a quarter of cairn B survived; many of the features found in the subsoil below where the cairn had been removed cannot therefore be related stratigraphically to the body of the cairn.

As under ring-cairn A, the remains of pits were recorded in the subsoil below the cairn; their interpretation as anthropogenic is in some doubt and the function of those which seem likely to be non-natural is in most cases still unclear. There are three pits which seem to be of some interest (F8030, F8032 and F8033) and these are described in detail and are marked with solid lines on illus 6; their sections are shown on illus 35. The remainder are marked on illus 6 with dotted lines. In the buried soils beneath the surviving portion of the cairn were found a worked stone pebble, three flakes (two of flint) and a worked stone chunk.

F8030 (illus 35) A sub-circular, vertical-sided, post-hole 0.9 x 1.1 m and 0.95 m deep. Post-hole F1033 is perhaps a parallel. Within the feature and in the area around it were scattered jet disc beads (see Shepherd below)

F8032/8039 (illus 35) Probably cut through the cairn. A large stone-packed oval pit measuring 1.8 x 1.3 m and 0.7 m deep, with flattened ends. The east end was apparently overlain by the cairn material but further to the west the cairn material had tumbled into it forming a very loose stony fill. This may perhaps have been related to 19th-century excavations by Balfour. At the west was a hint of collapsed dry-stone walling. An edge-retouched flake (S26, illus 67) was recovered.

F8033 (illus 35) Another large stone-filled pit, roughly oval in plan, and measuring 1.1 x 0.67 m and 0.63 m deep. Possibly disturbed in antiquity. The fills were fairly loose because of large stones but not very loamy. There was dry stone walling at both ends and a rough dry stone bank at the north side.

Cairn B  Less than a quarter of the area of cairn B survived (illus 40) – only an area 10.2 x 3.4 m (about 20 sq m). The surviving edge of the cairn is defined by about 8 m of a substantial kerb of boulders; after the removal of some cairn material a second, slightly lower setting of stones was noted on the inner side. The kerb was about 0.7 m across from the inner to the outer face. The kerb, if complete, would be c 11.2 m in diameter. Within the kerb the cairn comprised stone of similar size to ring-cairn Ai, surviving at most 2.5 m from the kerb. On the south-west, outside the kerb, was a spread of stone similar to the body of ring-cairn Ai; it is possible, but not proveable, that cairn B was also a ring-cairn, with an open central area subsequently closed after use. This halo seemed to overlie the stone of ring-cairn Ai (illus 37, e). The surviving body of material within the kerb was disturbed, particularly in the east, where a number of burials had survived. In the western part of the kerb many of the kerbstones from both faces had been dislodged, some apparently by recent activity, as modern glass was found under one of the stones.

The possible mounding over of the cairns  As has been noted above, the ring-cairn A/cairn B complex was situated on an exposed ridge, from which soil must have been regularly eroding when the field was ploughed. However, both cairns had up to 0.2 m of ploughsoil over them; we must therefore seek an explanation for the survival of ring-cairn A in a relatively good state of preservation, and it is suggested that soil had been dumped over the cairns to form earthen mounds towards the end of their use.
2.3.2 Soils buried beneath ring-cairn A

D Jordan

The ring-cairn A complex overlay a buried soil. Six profiles through this soil were examined and revealed similar sequences of horizon development. The buried soil is a Brown Forest Soil with fewer indications of acidification and leaching than modern soils developed on the sands and gravels. An iron pan was found in one of the sections but, passing through the buried A-horizon, it appears to have formed since the cairn was built. The weathering of dolerite cobbles and gravels has produced locally base-rich pockets in the upper parts of the buried soil and the profile may have been influenced more generally by such weathering-induced enrichment. Caution should therefore be exercised in interpreting the properties of the buried soil since its current properties are demonstrably not those which it had when first buried. A typical profile through the buried soil is shown in Table 3.

<table>
<thead>
<tr>
<th>Horizon</th>
<th>Depth (cm)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ah</td>
<td>0–17</td>
<td>Dark brown sandy loam. Compound crumb and sub-angular blocky structure. Rare roots, occasional stones, common charcoal. Abrupt boundary.</td>
</tr>
<tr>
<td>B3</td>
<td>33–51</td>
<td>Mid orange brown loamy sand. Apedal, weakly indurated, no roots or charcoal, moderately stony. Gradual boundary.</td>
</tr>
<tr>
<td>C</td>
<td>51+</td>
<td>Indurated sand and gravel.</td>
</tr>
</tbody>
</table>

This profile is similar to those found nearby today, although acidification and leaching are less advanced in it than in the modern soils. For example, bleached sand grains are occasionally found in the modern soil Ap and upper B horizons but these were absent from the buried soil. The abrupt, wavy boundary and possible ard marks between the Ah and B2 horizons might indicate that the soil was cultivated. This interpretation of the evidence is very tentative, however, since the possible ard marks could not be confirmed as such in plan.

To sum up, the buried soil appears to represent a Brown Forest Soil, possibly cultivated, of higher base status than modern, local soils. The probability of post-burial alteration and the limited extent of the soil which was exposed cause any interpretation to be made tentatively.

2.3.3 Later Neolithic Impressed Ware: vessels P83–P114 (Group 3)

T G Cowic

Approximately 95 sherds and fragments of the decorated pottery from BRS invite general comparison with the category of Later Neolithic decorated pottery characterized by McInnes (1969) as 'Scottish Impressed Wares', best known from coastal sites such as Hedderwick, East Lothian, Luce Sands, Wigtownshire, and Tentsmuir in Fife itself. With the principal exceptions of P90, P96 and P109, the pots are represented by single sherds (illus 42–3). Some of the plain body sherds found in association with these may well derive from undecorated portions of the vessels in question, but no attempt has been made to isolate such pieces as it is very doubtful whether such an exercise would permit any further reconstruction of vessel
form. In particular, many of the plain sherds recovered from the old ground surface beneath ring-cairn A and cairn B at BRS almost certainly derive from the undecorated portions of vessels represented in the following section.

Context With only a few exceptions the decorated sherds derive from a variety of contexts sealed by ring-cairn A; those which do not derive from these contexts include P89 from F8067, but the sherd is very worn and could be residual, while the identification of P91 from F8070 is also uncertain, and it could possibly be part of a coarse Beaker or Food Vessel. P103 from F8056 is also uncertain - hard and relatively thin-walled, neither the form nor the slightly gritty fabric is easily paralleled. P111 is a tiny badly worn rim fragment from F8051 - a feature with both Later Neolithic and Beaker sherds, while P113 from the same feature may bear jabbed-and-dragged lines, a technique matched among the decorated Later Neolithic sherds.

Apparently, therefore, the decorated pottery under discussion is confined to a very limited area of the site. It comprises an assemblage composed of worn and already fragmentary pottery. It is clear that the contexts from which most of this pottery was recovered represented the end of a process of fragmentation and redistribution of the pieces of the original freshly broken pots. It may be noted, for example, that the fragments of P90 have different degrees of scorching and abrasion and it seems clear that the sherds had a chequered history prior to their deposition in the contexts from which they were recovered. It is possible that they were from domestic rubbish spread as part of manuring of the old land surface beneath the ring-cairn. The loss of the old land surface may account for the lack of survival of such sherds elsewhere.

Description Most of the surviving portions of rims (eg P85, P90, P95) clearly derive from pots whose broad rim-tops or bevels provided the focus for decoration using a variety of simple impressed techniques. Although their overall profiles are mostly indeterminate, there has clearly been a considerable range of vessel form. For example, P85 appears to derive from a vessel with upright walls, whereas the surviving portions of P90 indicate a more open bowl form. The most complete profile available is that of P96, an unusual shouldered bowl with flat internal bevel. The general fabric range is in keeping with that found in the richer assemblages mentioned above, and in some cases the comparisons are very close (P95, for example, is virtually indistinguishable from material from Luce Sands or Hedderwick).

Four pieces bear individual oval or elongated jabbed impressions made with a pointed implement applied at an angle: these include two rim sherds (P85) almost certainly from the same vessel despite the differences in their profiles, and two very worn rim fragments (P86 (not illustrated) and P89). In the case of P85 the external surface of the sherd has traces of shallow horizontal grooves probably applied with a light jab-and-drag action using the same tool as that employed to decorate the top of the rim. Continuous lines formed of deeper, contiguous jabs occur on a small fragment almost certainly deriving from a vessel with an expanded rim (P87). However, the most striking use of jabbed-and-dragged ornament occurs on P96, comprising a small group of sherds from a bipartite vessel of uncertain overall form: the internally bevelled rim, and the slightly convex upper part of the vessel bear horizontal and curving jabbed-and-dragged lines set out in a rather haphazard ‘panelled’ arrangement.

A number of sherds bear fingernail-impressions, reflecting an alternative form of jabbed decorative technique. The clearest example is provided by P90, comprising a small number of sherds recovered from several different contexts: the broad internal bevel of this vessel has been decorated with rows of horizontal fingernail-impressions. Neatly arranged horizontal fingernail-impressions also occur on the body sherd P91, part of a rounded shoulder. Fine fingernail-impressions and incised lines occur together on P92 as part of a more complex arrangement, but too little survives to allow even a guess at the
ILLUS 42 Later Neolithic Impressed Ware (Cowie's Group 3); vessels P83–P85; P87–P96
original design. Coarser fingernail-impressions are present on several sherds and fragments: in the case of P93, the fingernail-impressions have been arranged vertically on either side of a slight carination, but the form of vessel is again unknown. P94, however, is representative of a small number of pieces evidently decorated with more or less random fingernail-impressions on their external surfaces. Finally, one vessel, represented by several fragments (P95), has irregular broad fingertip-impressions in the top of the rim, with a pair of incised strokes on the surviving portion of external surface.
Incised lines also feature on the external surfaces of a number of sherds (P84, P97–P103) mostly too fragmentary to merit more than passing reference to the presence of the technique. However, P84 appears to be a very worn T-headed rim in hard, compact fabric, with transverse incisions on the flat top of the rim: although included with the decorated pottery for convenience, it may conceivably be of earlier Neolithic date. Transverse incisions also occur on P97, a simple rounded rim, possibly from a vessel with irregular incised lines around the upper portion of the exterior, and on P101, a fragment possibly from the inner edge of a thickly-expanded rim. As will be clear from the illustration and the relevant catalogue entries, incised ornament occurs on a very heterogeneous group of sherds, varying in form and in fabric, and in the details of the application of the ornament.

Twisted-cord impressions occur on two rim sherds and two body fragments, all from different vessels. The original form of vessel from which P104 derives is uncertain, but this rim appears to have been thickened and internally expanded to form a sloping bevel ornamented with short transverse cord-impressions. These partly overlie traces of a single corded line running around the lower margin of the bevel. Two concentric lines of twisted cord-impressions ornament the internal bevel of the other rim sherd P106, while a single horizontal corded line crosses the surviving portion of the external surface. The carinated external profiles of the two body fragments suggest that both derive from the shoulders of the vessels concerned: P105 has traces of four lines of twisted cord meeting the carination obliquely, with traces of fingernail-impressions accidentally incorporated into the intervening spaces as a result of impressing the cord into the clay, while P107 retains worn traces of unusual ‘doubled’ cord-impressions, the precise method of application being uncertain.

Whipped-cord maggot-impressions occur only twice, on two small and very badly worn rim fragments (P111): on the clearer piece, there are traces of two rows of oblique maggot-impressions on what may be a fragment of a flat-topped rim.

P109 comprises several rim sherds and fragments and a body sherd from a vessel of uncertain overall form, possibly a deep bowl. The moulded rim has a pronounced external expansion and gently sloping internal bevel on which there are an irregular series of punctuations applied with a sharp point. Finally one body sherd (P108), in a coarse laminated fabric, bears traces of intersecting rows of fine dots or punctuations, just possibly applied with a coarse comb.

Although a proportion of the plain and featureless sherds from the relevant contexts could derive from the undecorated portions of vessels represented by the decorated sherds and fragments described above, it will be clear that this group is composed of pottery in a very fragmentary condition. In view of this, it is impracticable to attempt more than a very general survey of the relevant comparative material. The almost complete absence of diagnostic formal features means that attention has mainly to be focused on the range of decorative techniques, and to a lesser extent the nature of the fabrics. Despite these limitations, it is possible to be reasonably confident about the general affinities of the decorated pottery under discussion and in some cases to cite more specific analogies. The general ceramic background is that provided by McInnes’ ‘Impressed Wares’ (1969) or Kinnes’s ‘Decorated Styles’ (1985), exemplified by the large (and almost entirely unstratified) collections from coastal sand dune sites such as Luce Sands, Hedderwick and Tentsmuir (see list in Kinnes 1985, 49). Proportions of forms and decorative techniques vary from site to site, and virtually every technique represented at BRS can be found elsewhere. Significantly, however, there are close matches for some of the more distinctive sherds among the few sites known from eastern central Scotland. In particular, both the form and the jabbed-and-dragged decoration of P53 and P96 find parallels among the assemblage recovered from a pit at Brackmont Mill, Fife (Longworth 1967: especially nos 9–11, 13), while the general form of P96 also occurs at Grandtully, Perthshire (McInnes 1969; Simpson & Coles 1990).

Taking into account, too, the presence of related pottery at North Mains, Perthshire
(Barclay 1983c, 211), the BRS material goes some way to reinforcing Longworth's suggestion (1967, 72) that the Brackmont Mill assemblage might represent a local regional variant on the range of Scottish Later Neolithic decorated styles. The site at Grandtully, Perthshire, is one of the few to have furnished radiocarbon dates for features associated with this general tradition of pottery (Simpson & Coles 1990): determinations of 1970±100 bc uncal (GaK-1396) and 2130±190 bc uncal (GaK-1398) suggest a range from the late third millennium bc to the early second millennium bc (uncalibrated), and are in keeping with the much fuller sequence of dates for Meldon Bridge, Peeblesshire (cf Burgess 1976). At the latter site the published dates for features associated with the local sub-style range from 2736±90 bc uncal (SRR-648) and 2726±180 bc uncal (SRR-643) to 2132±90 bc uncal (SRR-645). While the excavator kept an open mind regarding the possibility that such pottery might have been as early as the first half of the third millennium in radiocarbon years, the main cluster of dates would tend to favour currency of the local 'Meldon Bridge style' in the second half of the third millennium bc (uncalibrated). This would also be in keeping with the few radiocarbon dates available from samples associated with related pottery from northern England (eg Thirlings, Northumberland; 2130±130 bc uncal (HAR-1451); Miket 1976). A comparable date range might be expected for the Balfarg material.

The post alignment north-east of cairn B (G J B) An alignment of large post-holes was noted to the north-east of cairn B in the third season (illus 6 & 44). If extended to the south-west it would intersect with the estimated position of the centre of cairn B. It comprised six post-holes, four of which are very similar (F8023, F8020, F8021, F8027). There was little direct evidence for the date of these post-holes. Two sherds of Beaker pottery were found in the post-pipe of F8020 and one in the post-pipe of F8021, but it is likely that this is residual material which had found its way into the post-pipes during the rotting of the posts. One of the others is very shallow and the last, nearest cairn B, is less than half the average depth of the others. It is argued below that the two post-holes nearest cairn B were cut through the earthen material forming the barrow over cairn B, accounting for their reduced depth. It may further be suggested that a seventh post might have been erected on the edge of the enclosure ditch at the north-east of the alignment; if erected on an external bank the hole would not have penetrated the subsoil.

Table 4
Features in the post alignment

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<tr>
<th>Dimensions</th>
<th>Depth</th>
<th>Finds</th>
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<tbody>
<tr>
<td>F8023</td>
<td>0.8 x 0.7m</td>
<td>0.48 m</td>
</tr>
<tr>
<td>F8020</td>
<td>0.8 m</td>
<td>0.75 m</td>
</tr>
<tr>
<td>F8021</td>
<td>0.9 x 0.8 m</td>
<td>0.64 m</td>
</tr>
<tr>
<td>F8027</td>
<td>0.8 x 0.7 m</td>
<td>0.55 m</td>
</tr>
<tr>
<td>F8035</td>
<td>0.6 m</td>
<td>0.18 m</td>
</tr>
<tr>
<td>F8031</td>
<td>0.37 x 0.3 m</td>
<td>0.2 m</td>
</tr>
</tbody>
</table>

2.3.4 Activity associated with Beaker pottery

The activity associated with the use of Beaker pottery at Balfarg is represented by few surviving features. Mercer (1981) found only one Beaker-associated feature: the burial near the centre of the henge. Ritchie (1974) found the disturbed remains of a Beaker probably originally associated with a burial. The Beaker material from the excavations reported here
occurred in very much larger quantities, but in contexts where the purpose of the deposition was not so clear; almost all the Beaker pottery recovered was from the BRS enclosure ditch. The location of the Beaker sherds in the ditch is probably fortuitous; they appear in the topmost fill and probably only survive here because the surfaces around have since been destroyed by ploughing. Three sherds, probably residual, were found during the excavation of the line of post-holes running north-east from the cairn (above). The remainder of the material comprised a few sherds and fragments from insecure contexts associated with the old land surface buried beneath ring-cairn A, and from the material of that cairn. It is interesting to note that the quantities preserved under the cairn and in the ditch are very different; it is suggested that the activity which resulted in the deposition of hundreds of sherds of Beaker pottery in the ditch occurred after the building of the cairn, as is argued above. It may be that the material was cleared into the slight hollow which marked the ditch at that stage. The nature of the Beaker activity is discussed further below. No Beaker sherds were found in any contexts associated with the two Neolithic timber structures.

2.3.5 Beaker Pottery: vessels P115–P153

T G Cowie

Over 450 sherds, fragments and crumbs of Beaker pottery were recovered from the BRS site; approximately 90% of these were retrieved from the upper fill of the enclosure ditch and comprise substantial parts of four vessels (P115, P118, P120 & P153) and smaller portions of a minimum of 21 others. In addition, at least a further three vessels are represented by sherds from non-ditch contexts. However, since a sizeable number of body sherds (in particular see
Vessels in ditch and in another context

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Vessels found only outside ditch

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ILLUS 45 The distribution of the few Beaker vessels represented by sherds found outside the ditch fills. X = pot found in only one context; ● = sherds of vessel found in more than one context.

P133 and P148) and parts of several plain bases (P149–P152) cannot be allocated to individual vessels, the maximum number of pots represented could be very much higher. Nearly all the Beaker pottery derives from a fairly confined stretch of the ditch (particularly cuttings IV and V; see Table 2: p 92); however, there appears to have been some pattern to the deposition, for the distribution of individual sherds indicates that, while P115 and P120 were chiefly present in ditch cutting IV, the main portions of P118 had been deposited in cutting III, and P153 primarily lay in cutting V. In marked contrast to the decorated Neolithic pottery, this pattern must reflect disposal of some Beakers in a partly intact condition (or at least disposal prior to their complete fragmentation and dispersal), and may indicate that the deposition of the Beaker pottery in the ditch was a relatively rapid episode. However, as some of the Beaker sherds have clearly been reduced to an abraded condition, or occur only singly, the source of the Beaker assemblage in the ditch must have encapsulated both recently broken pots and the fragmentary remains of earlier breakages – the kind of accumulation that might arise in a domestic context (amongst other possibilities). A number of Beaker sherds...
therefore furnish potentially informative links between the ditch and other site contexts, and could perhaps throw some light on where other, perhaps domestic, activity may have been focused.

Sherds of a number of Beakers were found both in the ditch and also in other contexts (see illus 45). It is perhaps significant that no piece certainly identifiable as Beaker pottery was recovered from Area A, an absence which tends to reinforce the likelihood that the episode of Neolithic activity marked by the deposition of the ‘heavy bowl’ assemblage (Cowie’s Group 2) in Area A contexts completely predates the appearance of Beakers at Balfarg.

Description  The Beaker assemblage is dominated by cord-ornamented sherds (P115–P133). Despite their superficial uniformity, a large number of the corded sherds can be distinguished on the basis of differences in their fabric and variations in the type and layout of the cord-impressions. As a result of such sherd-matching, it has been possible to allocate, with a fair degree of certainty, a very high proportion of the material to just three vessels, while several other pots are represented by smaller groups of sherds. Unfortunately, owing to their very fragmentary condition, little light is shed on the original form of most of the vessels concerned but in a few instances enough survives for their profiles to be partly reconstructed. The rims are generally everted or slightly flaring with rounded tops (and internal decoration in several cases), the necks concave, and the shoulders/bellies of the vessels apparently rounded rather than angular (cf Clarke 1970, 52; Appendix 1.2: shape II). The few comb-ornamented vessels (P134–P140) are even more fragmentary, but in two cases the rims appear to have been slightly flared, particularly in the case of P138. At least two vessels, one comb- and the other cord-ornamented, have had horizontal cordons a short distance below the rim (P124, P134): such cordons have been interpreted as functional features (as aids to handling and to securing covers on vessels) and are much more frequent in domestic assemblages than in funerary contexts (Clarke 1970, 36). P147 (not illustrated) appears to represent a fragment of a further badly abraded cordon. Base sherds are heavily under-represented within the assemblage as a whole, and in only a few cases has it been possible to make a tentative allocation to a specific vessel.

The size range of the vessels in the assemblage is uncertain owing to their fragmentary condition, but P115 indicates the presence of pots of considerable size at the upper end of the scale (approximate rim diameter: 220 mm), while P134 may be representative of some of the smaller vessels. Fabric quality, too, is variable: some sherds (eg P129: not illustrated) derive from vessels with fine compact fabrics, with a good quality surface finish, while others are somewhat coarser and rougher in texture.

In this respect, attention may finally be drawn to the unusual undecorated vessel P153, represented by some 84 sherds, fragments and crumbs recovered from layers in the Upper ditch fill. Although quite clearly deposited along with the Beaker pottery, this vessel is distinguished by both form and fabric. The most prominent features of this most unusual vessel are the series of moulded horizontal ridges encircling its upper portion, the profile of the lower body unfortunately being uncertain (conservation proved very difficult owing to friability of fabric). The fabric of this pot is without parallel in the BRS assemblage as a whole, the most noticeable feature being the presence of tiny fragments of crushed calcined bone as inclusions within a particularly friable fabric. In common with a number of the Beakers (eg P120), the condition of the fabric suggests that the pot has been subject to severe scorching, possibly when already fragmentary, but in the case of P153 the effects have been very much more marked (reducing some of the sherds to the consistency of an over-fired Digestive biscuit). While the rim form of P153 can be matched with the everted cordoned rims of domestic Beakers (cf Clarke 1970, 37, fig VI), the writer has been able to find only one close parallel for the overall form of this pot, a ridged vessel from Risby Warren, Lincolnshire (Riley 1957, 55, fig 9.1).

All-over-cord was the most common technique used to decorate the Beaker pottery, with the caveat that only in very few cases is anything like a complete profile available; it is consequently possible that some corded sherds may derive from vessels which could also have incorporated
ILLUS 46  Beaker pottery: vessels P115 and P116
undecorated areas, or zones ornamented using other techniques (although it may be said that no sherd shows evidence of such combinations). Certainly the presence of narrow reserved zones suggests that on some of the vessels (eg P118, P120), the decorative layout may have involved some 'zone contraction' (cf Clarke 1970). With only a few exceptions noted below, the corded decoration has been applied using S- or clockwise twisted fibre (thereby forming a Z-twist when seen as an impression). The types of cord used vary from fine (eg P132) to relatively coarse (eg P128) and sometimes combinations of such impressions occur, as on P125, suggesting unevennesses within the length of the cord wrap involved. Decoration of the interior of rim with several lines of horizontal cord occurs in four or five cases – another feature particularly common among domestic Beaker assemblages (Clarke 1970; Gibson 1988).

Two vessels stand apart on account of unusual features of their cord ornament: in the case of P127, tentative reconstruction of the upper portion of the vessel suggests that a distinctive 'doubled cord' wrap was used to create an arrangement of zones composed of three or four horizontal corded lines separated by reserved areas. A similar combination of lines of horizontal cord-impressions alternating with reserved zones may have been present on P130, but in this case the type of cord applied created a distinctive pattern resembling the tracks of a worn bicycle tyre.

Combs ornament occurs on only a relatively small number of sherds, mostly from the fill of the ditch and representing a minimum of six vessels (just possibly five if P139 and P138 are from the same vessels). The surviving portions of P134 and P138 have all-over ornament composed of horizontal comb-impressions: in the former case, however, the somewhat irregularly spaced impressions indicate a comb with broad rectangular teeth, while a comb with closer-set teeth has been used to ornament both the exterior and the flattened rim of P138. More complex comb ornament is apparent on P137 comprising portions of only the belly and base of the vessel concerned. Applied with a square-toothed comb, the teeth of which appear to have been rather irregularly cut, the surviving ornament appears to consist of multiple horizontal lines alternating with single zigzag lines made up of short oblique impressions. A combination of horizontal and oblique combed lines also occurs on a single body sherd (P140) in a coarser fabric.

Two sherds (P136), probably from the neck and shoulder of the same vessel, appear at first sight to have been incised, but closer inspection suggests that decoration was with a square-toothed comb which has been applied to the clay and then 'dragged' to create an arrangement of multiple horizontal lines, possibly alternating with reserved zones. The overall effect is somewhat similar to that produced by incised ornament. Use of this technique is confined to three sherds, two of which may be from the same vessel, since P142 may be from above the shoulder of the same vessel as P141, a small Beaker with incised horizontal lines on the surviving areas of its exterior. A further very worn sherd P143 (not illustrated) is possibly from the neck region of a further vessel.

A number of Beaker sherds – all body or basal sherds/fragments – are completely plain (P144–P152) but in view of their small size and the undoubted presence of reserved zones on other vessels in the assemblage, these cannot be identified as parts of undecorated vessels with any certainty. However, two rim sherds and a number of body sherds (P144–P146) may possibly derive from a single plain vessel. The exceptional nature of the plain carinated/ridged vessel P153 has already been noted above.

Most of the elements of the Beaker pottery from BRS can be paralleled among the sherd assemblages from coastal sand dune sites such as Tentsmuir, in north-east Fife; Hedderwick, Archerfield and Tusculum in East Lothian; Ross Links in Northumberland, and Luce Sands, Wigtownshire (Gibson 1982, with further references to individual sites). Some of the more uncommon features of the BRS Beaker pottery can also be compared elsewhere: for example, the unusual doubled lines on P127 can be matched on a basal sherd from Archerfield, while a rim sherd from that site also provides a parallel for the application of transverse comb-impressions to the flattened rim of P138. Rim-top decoration is a feature of northern British Beakers, being found, for example, on Beakers of Clarke’s N2/DD, N1 and N2 groups (1970).
Similarly, the fringe zigzag on the combed Beaker P127 is a predominantly northern motif. In the light of the presence of such features as minor components alongside the main all-over-cord element, the Beaker pottery from BRS may be described as a middle style (cf Case 1977) or Step 2 assemblage (Lanting & Van der Waals 1972). However, the validity of Beaker typology is once again a matter of debate because of the British Museum programme of radiocarbon dating of human bone. Simple all-over-ornamented Beakers may have had a long currency, and it would be unwise to attempt to date the Balfarg Beaker assemblage any more precisely than within the broad date-range of Beakers as a whole, that is from c 2600 to 1800 BC (Kinnes et al 1991, 39).

2.3.6 Burials Associated with Cairn B

G J Barclay

Burial 1 – Cist A (illus 51 & 52)

This was cut through the cairn material. The uppermost fill of the pit was a dark brown to red brown gravel which overlay cairn-like rubble of small to medium stones in a matrix of dark brown sandy loam. This overlay the cist slab. The cist was set in a pit 1.6 m long by 1.4 m wide by 0.35 m
deep from the subsoil surface, lined with a double (treble at the north) thickness of slabs on edge. Between two and four courses of dry stone walling were raised on top of these slabs.

At the north end of the cist lay the only substantial fragment of bone - a portion of a human femur, covered by a red sandstone slab similar in appearance to the kerbstones of ring-cairn Ai. The stone covered the head of the femur (illus 51 c) and would have covered the pelvis and probably the feet of the crouched inhumation. In the acidic soils of Balfarg this limited survival of unburnt bone is what would be expected. There was a pile of small slabs stepped in the north-east corner of the cist. Under these stones and around the bone was a yellow brown slightly loamy clay forming a thin layer. This was very limited in area. The bottom fill of the cist was a yellow brown sandy loam with flecks of charcoal and lots of small stones, containing fragments of tooth enamel and the remains of a jet disc necklace; this had been disturbed by animal burrowing but still survived in complete runs of beads. An almost intact Food Vessel (P155; illus 51 b) lay on its side in the south-east corner of the cist. There was insufficient room for it to have been placed upright and to have fallen into the position it was found in; it is likely that it was deliberately placed on its side. Examination by the author of the location of organic residues or staining in Scottish Beakers and Food Vessels in the National Museum and other collections suggests that a significant number had been placed deliberately on their side, containing small quantities of liquid leaving a distinct ‘tide-mark’.

The rest of the cist was filled with a fine yellowish brown clayey loam with charcoal flecks. A dark brown wormy, greasy loam covered this, probably more recent silting. Above this was, in places, a small airspace. The slab measured 1 m long by 0.6 m wide and 0.35 m deep. It rested both on parts of the fill and the dry-stone walling, suggesting perhaps that the cist was largely backfilled before capping. Finally the slab was packed around with smaller stones, including some white quartz, and covered by a small pile of larger stones and finally an area of orange gravel. Apart from the grave goods, a flint chunk was recovered from the upper fill. From the same fill 155 grains of hulled six-row barley and further barley fragments were recovered, with four of oats and one caryopsis of Bromus sp. This was the second largest deposit of cereal grains found on the site but its context was felt to be too insecure for radiocarbon dating.

Burial 2 – Cist B (illus 51)
The double capstones of a small cist were visible from an early stage in the cleaning of the area. The large upper capstone was sub-rounded and smoother than the lower which was sub-angular. Both stones were stabilized with smaller packing-stones. The cist pit was roughly egg-shaped with its blunt end to the north. The four side slabs formed a small neat rectangle in the centre north-east of the pit. The cist was filled completely with soil, on which the cist slab rested. Some unidentifiable pottery fragments and three pieces of unidentifiable burnt bone were found in the main fill, along with the following seeds: 13 barley and four further barley fragments; one oat grain.

Burials 3 & 4
There were two small cremation deposits in the top of cairn B. Both of these were just over half a metre in from the kerb. They are marked on illus 40. They lay in rough depressions in the cairn material. Burial 3 was the burial of a juvenile/adult? human, female?; the cremated bone weighed 281.2g. Burial 4 was smaller and has been identified as human(?); the bone weighed 38.7g.
The cist burials associated with cairn B. In the larger cist, a = the jet necklace, b = Food Vessel (P155), c = surviving fragment of human bone.

In the plans of both cists the dashed lines indicate the positions of the capstones.
2.3.7 The Food Vessels: vessels P154–P155

T G Cowie

Context Two Food Vessels were recovered from contexts in Area C. Two rim sherds (P154) of what has tentatively been identified as a Food Vessel were recovered from disturbed contexts in ring-cairn Ai or Aii. They may perhaps be from a disturbed burial (see discussion of cairn B). The complete vessel (P155) accompanied the burial in Cist A.
Description  P154 represents part of the rim and neck of a vessel of uncertain overall form, with slightly thickened, internally bevelled rim, and gently concave neck, which appears to be swelling out towards a shoulder at the break; the decoration consists of transverse maggot-impressions on the bevel, and rows of jabs and oblique maggot-impressions ornament the exterior. All of these elements of form and decoration would be in keeping with the features of a simple vase Food Vessel.

The other vessel, P155, is a tripartite bowl, complete apart from some damage around the rim and a hole in one side. These flaws, and the friability of the fabric may be the result of heat damage, although the circumstances of its discovery show no sign of burning in situ. The vessel is profusely decorated with cord maggot-impressions, arranged vertically on the internal bevel, and horizontally or herring-bone fashion on the exterior, where triangular jabs have also been used to emphasise the exterior of the rim and the two mouldings. The squat form recalls the Irish-Scottish bowls but the decoration is more in keeping with that found on Northern Tripartite Vases; however, it has been noted that vessels from this region of Scotland show an amalgamation of traits (cf Pierpoint 1980).

Both Food Vessels are of forms well known from eastern central Scotland, and the range of decorative techniques and the manner of their application can be readily matched elsewhere. Finds of Food Vessels from Fife have been discussed by Shepherd in reports on the finds from Barns Farm, Dalgety Bay (Watkins 1982, 99, 106, 110), while the available radiocarbon dates for burials discovered in eastern central Scotland associated with Food Vessels have been listed by Cowie & Ritchie (1991, appendix 1). Unfortunately insufficient collagen could
be extracted from the bone fragment from the BRS burial, but the admittedly small number of radiocarbon dates from other sites suggest an approximate age range of 1700–1150 BC uncal for the activity at Balfarg, with the majority of the dates lying closer to the earlier rather than the later end of the range.

2.3.8 The Jet: summary and discussion

I A G Shepherd

Introduction  The jet assemblage from Balfarg consists of a total of 286 disc beads and one pebble, split into two, as well as four fusiform beads and a flat jet piece. Of these, 259 of the disc beads and the pebble were discovered with Burial 1 in Cist A. Twenty-seven disc beads as well as the flat piece of jet and the four fusiform beads were found in a separate context, scattered in the area originally beneath Cairn B which had been exposed at an unknown date when much of the cairn was destroyed.

The jet from which the 259 disc beads found in Cist A had been fashioned is all of a slightly granular texture, a trifle less lustrous than that of several other Scottish assemblages handled by the author, but good viable jet nonetheless. The jet of the 27 other disc beads is consistently shiny and dense, rather more ‘waxy’ than the set from the cist. They are also very black and lustrous. The detailed catalogue is lodged in the National Monuments Record of Scotland.

Technology  All these disc beads from Cist A have been cut extremely skillfully and regularly, neatly drilled, and show few signs of use, apart from the instances noted below. They beads demonstrate an extremely high degree of control of the manufacturing process.

This control can be seen in the notable consistency of thickness achieved during the production of the beads. Out of the 259 from the cist, 189 or 73% are 1 mm thick – an unusually thin series – while the remaining 27% are 1.25 mm thick. Similarly, examination of their diameters reveals that 89 or 34.4% of these beads are within 0.25 mm of 7 mm and that 250 or 96.5% are between 6 and 8 mm. (The mean diameter of those in the cist is 7.32 mm and the range is between 5.25 and 8.5 mm, while the mean diameter of the perforations is 2.34 mm with a range of between 2 and 2.75 mm.)

The vast majority of them were drilled by a cylindrical metal bit from one side. Only four beads (nos 92, 192, 197 & 235) are exceptions, having either an hourglass (no 92) or a conical perforation. The beads were probably produced by shaping many jet lumps or pebbles into rods which were then drilled and the individual beads finally cut off and polished (Shepherd 1985). The flake scars noted at the edges of 57 (22%) of the beads might have been produced during the final stages of the manufacturing process, but are more likely to be the result of dismantling sections of the necklace prior to deposition. This is suggested because the flake scars are fresh and unworn, and occasionally can be seen on beads either exhibiting slight use wear or final shaping striations.

On 32 (12.4%) of the beads wear was noted consisting of concentric grooving which may have been caused by a piece of grit becoming trapped between tightly strung beads. On only seven (2.7%) beads was there noticeable wear from use, while on 37 (14.3%) the striations caused by the final shaping of the beads were still visible. It can be surmised that the necklace was made and assembled by a single hand, and that it was worn or otherwise used for a short time before deposition.

The piece of unworked jet accompanying these beads exhibits no clear traces of utilisation.

The unstratified beads associated with Cairn B:

The 27 disc beads forming this series contrast with those from Cist A in being considerably thicker (2.56 mm mean thickness; range 1.75–2 mm) and of slightly larger diameter (mean 8.03 mm; range between 7.5 and 9.5 mm). The perforations are also larger, having a mean of 2.79 mm (range 2.5–3.25 mm). The slight difference in the texture of the jet in the two groups has already been noted.
However, these beads exhibit an almost comparable degree of control of manufacture, although they are generally much more worn. In particular, their thickness is very consistent and evenly distributed: 12 (44%) are 2.25 mm thick, while 25 (92.6%) are between 2 and 2.5 mm in thickness. Their diameters, although spread between 7.5 and 9.5 mm, have 66.7% (18) between 8.5 and 9.25 mm. There is, on the other hand, a greater range of accomplishment in the actual cutting out of the beads, several being less than regular and one (no 263) decidedly skewed.

There is also greater variety in the technique of boring the perforation, four (14.8%) bearing an hourglass-shaped perforation possibly produced by use of a flint point from both sides. The flaking, some of sizeable proportions, noted around the perforations on seven (25.9%) of the beads may also indicate use of a triangular flint bit.

Finally, much greater evidence of wear from use is evident, ten beads (37%) having wear round the perforation from stringing. This is most clearly seen on no 283. However, a small number of beads are relatively unworn (nos 272, 286, 287). A considerably smaller proportion (1: 3.7%) of the disc beads from the cairn show the parallel striations left by the shaping process.

The four fusiform beads average 16.1 mm long and 7.1 mm in diameter (ranges 13–22.25 mm in length and 6.25–7.75 mm maximum diameters). They are in good jet and show evidence of wear. The fragment of jet found with these beads, although flat, is too small and irregular to be an unfinished spacer-plate. A smaller object, such as a necklace toggle, could have been formed from it, but the piece displays no evidence of preparation.

Comparanda and discussion In terms of their dimensions the Balfarg disc beads compare best with disc beads from short cist burials at Almondbank, Perthshire, and Barns Farm, Dalgety, Fife, and to those from a formal disposal context at Cloburn, Lanarkshire. The 259 beads from Cist A at Balfarg compare most closely with the 218 beads from Cist IX at Almondbank (Shepherd forthcoming) which had a mean diameter of 7.06 mm (range = 4.75–7.75 mm) and a mean thickness of 1.55 mm (range = 1–3 mm). With a mean diameter of 7.32 mm and a mean thickness of 1.06 mm, the Balfarg beads are slightly larger and rather thinner.

The 27 disc beads associated with Cairn B at Balfarg can be most closely compared to the 210 beads found in Cist 4 at Dalgety (Shepherd 1982) which had a mean diameter of 9.63 mm (range: 6–11.5 mm) and a mean thickness of 2.47 mm (range: 1–3.5 mm), making them rather larger overall but very similar in thickness.

These relationships are expressed in Table 5.

**Table 5**

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[Abbreviations: FV: Food Vessel; Fbds: fusiform beads; V-b: V-bored button; S7: Lanting & Van der Waals step 7 Beaker.]}

The extraordinary thinness of the Balfarg cist beads is emphasized by Table 5; although not as large as the excellently manufactured series from Cloburn, they are the thinnest by a considerable margin (32%).

The Balfarg beads came from two distinct contexts, a cist and a scatter beneath a cairn; both
such methods of deposition are represented by the sites listed above. Short cists predominate and provide good parallels for Balfarg, but the circumstances in which the beads from the cairn at Balfarg were found also have an echo in the formal disposal of the beads beneath a platform cairn at Cloburn Quarry, Lanarkshire (Kemp 1988; Kemp-Clarke forthcoming) and, more distantly, in the 17 disc beads from Achnacreebeag, Argyll, which were found throughout the blocking and in the disturbed portion of the chamber of the chambered cairn (Ritchie 1970, 49, fig 4 & pl 6).

The two bead series from Balfarg are entirely consistent with other finds of jet from Fife and elsewhere in Scotland. The large quantity of disc beads from the cist, from which a tripartite Food Vessel was also recovered, has already been compared with the Dalgety late Beaker burial, in south Fife. It joins other cist burials which have produced sizeable groups of disc beads, such as Almondbank, Perthshire (Stewart 1974), Stoneykirk, Wigtownshire (Mann 1902) and Culduthel Farm, Inverness, whose necklace of 520 jet disc beads remains the largest single find by a substantial margin (Low 1929). The association of disc beads with fusiform ones is almost a characteristic feature of Fife late Beaker/Food Vessel burials, being recorded at Greenhill, Balmerino (Hutcheson 1902), Upper Largo (Largo Field Historical Soc 1969) and, most significantly, in the dagger grave at Masterton, Pitreavie (Henshall & Wallace 1963). Here, a short cist with a rare hide burial also contained a necklace of 67 fusiform and 91 disc beads, a bronze dagger, a fragment of another blade and two sheet bronze armlets, all with impeccable Yorkshire, and ultimately Wessex, affinities (Gerloff 1975, 58). The importance of the Yorkshire/Fife axis during the early Bronze Age has been argued elsewhere (Shepherd 1982, 120). It is to this context, one of conspicuous display during the rituals of death, that the Balfarg jet objects belong.

2.3.9 Cremations and Pits at the West Edge of the Site

G J Barclay, C J Russell-White & P N Tavener

To the west of the henge excavated by Mercer, the fifth season sampling exercise revealed Earlier Neolithic pits (p 63 above) and a group of pits associated with Bronze Age cremation burials described here (illus 7).

| Table 6 | Cremation burials in area A |
|---|---|---|---|
| *F2005 | 356.2 g | Adult human | |
| F2006 | 144 g | Adult human (female) | |
| *F2012 | 226 g & 18 g | Adult human | P158 |
| F2016 | 69 g | Human | |
| F2018 | 58 g | Adult human | |
| *F2021 | 415 g | Adult human (? young) | P156 & P157 |
| F2045 | | | |
| F2047 | 12 g | Human | P159 |
| F2042 | 121 g | Adult human | P161 |
| *F2044 | 121 g | Adult human | P162 |
| F2053 | | | P160 |
| *F2054 | 11.1 g | | |
| F2057 | | | |

C = crem P = pot * = detailed description follows
There were 10 deposits of identifiable human cremated bone (Burials 8–17) and three further probable burials (18–20) in Area A, in a group of pits, all of which had suffered considerable disturbance. Two of the pits contained substantial remains of two urns (F2012–P158, F2021–P156). Both urns were upright, although the latter was accompanied by the everted base of a further urn (P157 – illus 54 & 55), apparently placed in a broken state. There is some evidence for medieval activity in the area, and one pit was sealed by a soil which may be of that period. It is suggested that the disturbance of these pits was begun at the latest in the medieval period, and that little new damage has been done since. One of the larger deposits (F2005) was surrounded by a ‘halo’ of stones, containing a high proportion of quartz pebbles (illus 7). The survival of this must make us consider how the truncation of the pits and of the subsoil into which they are cut has occurred. It is possible that a combination of worm and plough action might allow a proportion of a dense concentration of stones to settle through the disturbed soil (Atkinson 1957; Reynolds & Barber 1984).

As with the Neolithic features, these burials occupy the summit of a low ridge separated from the henge by a dry valley. They lie c 50 m from the south-west entrance to the henge and their position, on the nearest prominent site to that entrance is surely significant, as is the absence of such burials within or immediately around the henge enclosure (insofar as this could be confirmed by the pattern of sample trenches).

F2005 – Burial 8 (illus 55) A shallow, irregular, sub-rectangular scoop cut vertically on one side, containing two layers. A roughly circular deposit (c 0.2 m in diameter) of dark brown silt loam and
burnt bone, which appeared as a circular patch on the surface, but was more spread about lower down (possibly by animal disturbance), overlay a medium brown silt loam forming the bulk of the pit fill. This contained very few fragments of burnt bone, which were identified as those of an adult human of indeterminate sex. The pit was surrounded, at a distance of c 1 m, by a halo of pebbles containing a high proportion of white quartz.

**F2012** – Burial 9. An ill-defined small pit containing the remnants of an urn (P158) and cremated bone. There were two deposits of bone, one within the urn, the other found under a large stone to one side of the urn. The bone within the urn was possibly of an adult, but the sex could not be determined. The smaller collection of bone could not be identified.

**F2021** – Burial 13 (illus 54 & 55) A small, irregular, sub-square scoop containing the bottom half of an urn in a relatively intact condition. The urn (P156) was the right way up and contained a moderate quantity of burnt bone in a medium brown soil. Adjacent to the urn (on its north side) was the inverted base of another urn (P157). No other sherds of this vessel were identified during excavation, and its position at the base of the pit would seem to indicate that it was deliberately placed and that only the base was deposited. The cremated bone was identified as of a young adult or adult.

**F2404** – Burial 17 (illus 55) The shallow remnants of a scoop c 0.6 m in diameter and 0.3 m deep, containing four layers: a bowl of very dark brown silty clay loam containing many small sub-angular stones and cremated human bone (identified as adult human), overlying heavily charcoal-impregnated dark black/brown silty loam containing a shallowly pitched slab in its upper part, as well as several large and medium stones around the edge of the layer, set around and slightly higher than the slab. The pitched slab was blackened underneath, and the charcoal and sooty soil below this contained burnt plant impressions, probably of grasses. The bottom of the feature was concreted and slightly fire reddened.

**F2054** – Burial 19 (illus 55) A medium-sized, nearly circular pit. The deposit of burnt bone was well defined and domed, suggesting perhaps the deposition of a bag full of material.
Pits possibly related to the cremations  There are a number of pits in the area of the cremation deposits which have a similar nature, but are not associated with significant quantities of burnt bone or urn pottery. They all have clear concentrations of charcoal. Some show signs of burning in situ. Their numbers are: F2008 (sealed by boulder; illus 55); F2017; F2024; F2027; F2046 (sealed by boulder); F2051; F2052 (illus 55); F2056; F2420; F2422; F2425 (stone-capped charcoal deposit); F2439 (indeterminate bowl-shaped deposit of charcoal).

2.3.10 The Bucket Urns: vessels P156–P158

T G Cowie

Context  The pits in Area A described above produced portions of what appear to be plain bucket-shaped vessels with slightly expanded upright rims, simple slightly convex profiles and flat or slightly sagging bases. In only one case is a complete profile available (P156; not
available for illustration); in the case of P157 and P158 only parts of the base and lower body have survived. The loss of the upper portions of these vessels may be a reflection of their burial in an upright position – a trait which distinguishes bucket urns from other varieties of cinerary urn in which inversion of the vessel is virtually orthodox practice (cf Morrison 1968).

**Description** There is little to add to the brief description of the salient features of these vessels, beyond noting that the coarse, well-gritted fabric is for the most part distinguishable from the Neolithic pottery recovered from Area A (see p 69 above).

This small group of bucket-shaped urns lacks close parallels in the region, where the inventory of cinerary urns is dominated by collared and cordoned urn types, and it is necessary to look to the south-west of Scotland for broadly similar types of vessels (eg Morrison 1968). As noted above, however, truncation of the upper portions of most of the vessels as a result of their burial in an upright position has rendered an already relatively formless type of vessel even less susceptible to comparison.

**2.4 FEATURES LOCATED BETWEEN THE HENGE AND THE BRS ENCLOSURE (AREA B)**

**G J Barclay & C J Russell-White**

Fourteen trial trenching lanes and the extensions to them formed the bulk of the sampling area between the henge and the BRS site (illus 4). Over large areas of Area B a considerable depth of ‘A’ horizon buried beneath the modern ‘Ap’ horizon was encountered, especially around the north-west side of the henge, and also along the edges of the hollow located to the immediate east of the east end of lanes 3–10. It was obvious that considerable sculpturing of the area had taken place resulting in a levelling out of the ridges and hollows; it is possible that this mainly post-dated the Neolithic activity. To the north-west of the henge a buried soil was noted, especially in lanes 3 and 11 and in a small test trench by the entrance to the henge.

To the north-east and east of the henge many of the features were isolated, heavily truncated and of unknown date and function. Only two small areas produced evidence of any note, both on the east side of the henge, ie F3001 and F3002 (possible cooking pits) and the scatter of small post-holes and pits associated with an area of paving (F3066).

**The Features**

**Lane 6** Over most of lane 6, topsoil depths were 0.3–0.4 m except at the east end where the lane cut into the edge of a natural gully or hollow, with topsoil accumulation rising rapidly downslope to over 1.2 m. Near the east end of the lane two pits were found both on the break of slope.

**F3001** (illus 57) was an elongated pit c 3 m long by 0.9 m wide. Only the bottom 0.2 m survived but, given its vulnerable position on the break in slope of the natural hollow, this is not surprising. In all, some 14 distinct soil layers were found; these can be simplified. Generally the upper fill was a medium brown silty sandy loam with charcoal flecking. There was some animal disturbance. The bottom fill was dark, heavily charcoal-stained and often distinctly red in hue, interpreted as burning in situ. This interpretation was reinforced by heavy red staining, not just of the natural on the cut but also extending some 0.1 m down into the subsoil, indicating considerable temperatures. The complexity of the fill suggests deliberate deposition, ie backfilling. Considerable quantities of
seeds were retrieved: there were more than 350 grains of hulled six-row barley (between 20% and 60% of each sample examined). Two samples of charcoal and cereal grains were radiocarbon dated.

GU-3263 1310±50 bc uncal
GU-3264 1230±50 bc uncal

F3002 (illus 57) was an almost identical pit located some 0.2 m to the WNW of F3001, with a till consisting of an upper layer of medium brown sandy loam with charcoal flecking, and underlying deposits of charcoal and burnt soil with heavy burning of the subsoil surface.

The proximity of these two pits, suggesting that they were part of an arc, led us to believe that we had found part of a larger feature group but no further features were found in an extension to the original trench.

Lane 7 In the central part of lane 7 a possible pit (F3008) was located; it measured c 1.5 m long by c 0.75 m wide and 0.13 m deep and was filled with dark brown silty loam and two large stones but very
little charcoal. It was obviously heavily truncated, and was of unknown date or function. In addition there were three possible post-holes in the same area: F3009, F3012 and F3045.

In the western part of lane 7 the discovery of three features in close proximity led to an extension of the excavated area to the south of the three small featureless pits discovered in the original lane (F3014, F3015, F3049). In this expansion of the lane there was a shallow hollow (F3065: illus 58), measuring c 10 m long by 2.4 m, tapering to 1.4 m at the north-east end, containing two soil layers which underlay an area of stone paving (F3066: illus 59). There were a number of features in the area, including five post-holes: F3063, F3064, F3068, F3069 and F3070.
Illus 59 Paved feature (F3066) and associated pits in Area B, lane 7

F3066 A layer of closely laid stone paving, defined by a kerb on the south side and tentative suggestions of a kerb on the north side, lay in the upper fill of F3065. The paving may have been truncated at the north-east. The soil covering the paving produced a dozen barley grains and slaggy material.

F3067 A line of stones set on edge along the south side of F3066, and contained within scoop F3065. They are parallel to the edge of the scoop.
Illus 60  Sections of features shown on illus 58 and 59
The features located within F3065 form a somewhat enigmatic group. The scoop itself is undoubtedly of human origin. In plan, there is a suggestion that the post-holes F3049, F3014, F3069, F3068 and F3063 form a rough line. Note that several small irregular depressions in the bottom of the scoop also fall along this line. It is tempting to see F3068 and F3069 as a pair at one end matched by F3013 and F3014 at the other, although the true extent of the paving and scoop at this end is unknown. It is not possible to state with any certainty whether any of these posts protruded through the paving at any stage.

SECTION 3: NON-PERIOD-SPECIFIC SPECIALIST CONTRIBUTIONS

3.1 THE STONE ASSEMBLAGE

C R Wickham-Jones & D Reed

Introduction The total assemblage of flaked stone from the excavations at BRS comprises 256 pieces. A total of seven different materials are present: flint, agate, pitchstone, chert, chalcedony and mudstone. The majority of the assemblage (75.78%) is flint (illus 61a). In addition there were four other worked stones (S31-S34) which are described in the full catalogue which is presented on the fiche.

Location The assemblage has been divided into seven basic units: the Earlier Neolithic, Structure 1, Structure 2, the fills of the BRS enclosure ditch, Beaker activity, the ring-ditch/ring-cairn sequence, and the cremation pits.

Materials and condition The flint is entirely pebble flint derived from local gravels such as those of the north Fife coast, 18 km away (Wickham-Jones & Collins 1978). The distinctive colours of the flint suggest that only a small number of nodules is presented in the assemblage. About 20% of the flint is corticated in a process of post-depositional change (Shephard 1972). Of the other materials (illus 61a), all except for the pitchstone were locally available in similar gravels. The only exposure of pitchstone in Scotland used in prehistory occurs on Arran (Thorpe & Thorpe 1984). Although it is found on many prehistoric sites, pitchstone is only ever present in small amounts. At BRS most of the pieces are inner flakes and the knapping of only one nodule is represented, though the final waste core was not recovered during the excavation.

Random dull surface polish is present on about 25% of the flakes distributed evenly throughout the site. This may reflect post-depositional conditions.

Technology There is little evidence of primary knapping on site; only 30% of the flint isdebitage. At BRS the detachment characteristics on the flakes indicate the predominant use of soft-hammer percussion on to nodules on which artificial platforms had been prepared. The edges of these platforms were carefully trimmed and maintained. On 16 of the flakes the platform had been further prepared by the removal of small facets. Such faceted platforms are particularly suitable for use with indirect percussion. The use of a punch to transmit force to the core assists the production of regular flakes and it is noteworthy that the majority of the flakes in the BRS assemblage are indeed very regular.

Only two cores were recovered. Both are bipolar, a technique in which the core is seated on an anvil (Clarke, Cowie & Foxon 1985). It is particularly suitable for pebble flint. The majority of the flakes, however, appear to have been removed from platform cores and it is likely that careful maximization of the flint resource led to the development of bipolar cores from exhausted platform cores.
The knappers at BRS were apparently intent on producing flakes. Despite the poor quality of the raw material the flakes are generally uniform and regular. Although 43% of the flakes are broken the majority have lengths of edge quite suitable for use without modification.

Secondary Knapping

A high proportion of the pieces at BRS (13%) has been selected for alteration. This selection appears to have taken place on a basis of suitability for the proposed modification and there is slight evidence that the knappers preferred secondary flakes, perhaps because of their general robustness over the finer inner flakes. Only flint was selected for secondary modification.

Secondary knapping may be used in two ways: to create a specific working edge or to alter the shape of any piece. At BRS the majority of the pieces have been retouched to create a specific working edge. In many cases pressure flaking has produced shallow, parallel-sided retouch and has created an acute edge (eg S26 (illus 65), S29). On the scrapers the retouch is coarser, the likely result of percussion retouch, probably from a small hammer stone (eg S12; illus 65).

On three pieces the whole shape of the original flake has been modified: the three bifacial points. Two are leaf-shaped (S22 - Green type 4A; S23 - Green type 3C; illus 66) and one is barbed and tanged (S14; illus 65). There is also a broken tip that may be from a bifacial point. All have fine retouch, no doubt the result of pressure-working which has both thinned the original flake and shaped the edges. The broken barbed-and-tanged point (S14) is unusual as it has been snapped and then reworked across the break into a very blunt piece, still barbed-and-tanged.
Four of the flakes have very finely serrated edges (S9, S8, S13, S24). Long, fairly regular blades were selected and only one edge serrated. This may be done by applying pressure from the edge of another blunt flake or chunk. In one case (S9) the resulting serrations are particularly fine. All of these pieces have visible ‘sickle-gloss’ along the serrated edge; there are, in addition, two similar flakes with ‘sickle-gloss’ but no serration, and these presumably belong to the same class of tool.

One further type of secondary modification is present in the assemblage. Two small flakes have remnant polished surfaces. They do not refit but are made on the same raw material and may have come from the same polished artefact.

The analysis shows the assemblage as a whole to have been made of similar materials and with similar techniques. There is no concentration of any particular artefact or material types in any of the specific locations. When divided into the five basic locations, however, some general morphological differences within the assemblage are highlighted (illus 62, 63).

**Distribution** The majority of the assemblage (103 pieces) comes from the ditch, mainly from the upper levels (where the predominant pottery type was Beaker) and some flakes could be refitted. Within the ditch there is littledebitage and a high percentage of retouched and regular pieces (45% of this assemblage was broken and 16% burnt: illus 64). The ring-ditch/ring-cairn area contained 30 pieces (37% of the assemblage was broken and 37% burnt) mostly flakes with some debitage and two retouched flakes. From timber Structure 2 only 21 pieces were recovered. Again the assemblage was mainly flakes, but with a high proportion of debitage and a complete absence of retouched pieces. An unusually high proportion (67%)
i. STRUCTURE 1

ii. STRUCTURE 2

iii. DITCH

iv. RING-CAIRN AREA

v. OTHER

ILLUS 63 Histogram showing the breakdown of the assemblage by type and location
of these pieces were broken and 20% were burnt. Structure 1 contained no flaked stone at all. The amounts from the surface between these contexts is small and comprise mainly flakes and debitage with seven retouched pieces (44 of these were broken and seven were burnt). Three pieces came from disturbed or recent contexts. No conjoining flakes were found between any of the units.

**Function**  The small amount of debitage and the high percentage of good-quality flakes, together with the retouched pieces, indicate that the assemblage as a whole does not represent knapping *in situ*. In addition, there are signs (such as the 'sickle-gloss') that some of the pieces have been used. Clearly, deposition of used artefacts is represented, whether this was accidental or deliberate.

The unusual spatial patterning, together with the large percentage of retouched pieces in some areas, suggests some deliberate, selected deposition. The small size of the assemblage might support this argument though, alternatively, it may have resulted from the accumulation of the assemblage over a short period of time.

As far as individual pieces are concerned it is impossible to assess function without a detailed micro-wear analysis. The presence of a macroscopic gloss upon six of the
ILLUS 65 Flaked stone
ILLUS 66 Flaked stone
pieces shows that the assemblage from BRS does have potential for such a study, but in the absence of this work no firm conclusions can be drawn about the use of any specific piece.

Cultural affinities  It is very difficult to draw cultural information from such a small assemblage though one or two general trends may be observed. Technologically, knapping tends to be related very much to the raw material but the use of faceted platforms is prevalent in the late Neolithic throughout Britain and has been called by some a Grooved Ware trait (Manby 1974). Scrapers are few in number at BRS (five): there are the large, coarse types (eg S7) frequently associated with the late Neolithic, and the smaller more rounded scrapers frequently associated with Beakers (eg S17). The serrated edge flakes with pronounced gloss are unusual in Scotland but are more common on a variety of sites in the Later Neolithic farther south.

It is interesting to note that the two leaf-points were recovered from the old land surface buried by cairn A whilst the barbed-and-tanged point, together with the thumbnail scraper and other scrapers, came from the ditch of the BRS enclosure.

Discussion  The assemblage of flaked stone recovered from the excavations at BRS is small, only 256 pieces were present, and it seems to have resulted from the specific
deposition of lithic artefacts, including some used pieces, across the site. Although consideration of the collection practices suggests that not all may have been recovered, the assemblage would indeed seem to be a representation of those originally deposited on site.

Although a variety of materials was used, flint was preferred and, with the exception of the pitchstone, all were local. Knapping seems to have taken place elsewhere, but the detachment characteristics suggest that the flint was utilized carefully with the aim of producing large, regular flakes, some of which were further modified. The value of flint to the knappers is emphasized by the presence of two reworked pieces taken from a large (presumably discarded) polished artefact. The value of the lithic materials generally is emphasized by the introduction of a small quantity of Arran pitchstone transported for some reason the 120 km from Arran.

The sites at BRS are, of course, only a part of a much larger complex of remains including both the Balfarg henge, 250 m to the west (Mercer 1981) and the stone circle at Balbirnie 100 m to the south-east (Ritchie 1974) and it is instructive to consider the complex as a whole. At Balbirnie only two pieces of flint were found. The so-called ‘knife’ was very similar to some of the edge retouched pieces from BRS. Mercer’s excavations at Balfarg henge recovered an assemblage of 102 pieces of similar materials (with the exception of pitchstone) to that from BRS. Most of the assemblage came from the ground surface and was apparently associated with activity prior to the construction of the henge. Amongst the retouched pieces are a number of edge-retouched pieces and one barbed-and-tanged point. There was little evidence of on-site knapping amongst the assemblage. One interesting similarity to be noted is the presence at both Balfarg henge and BRS of pieces from polished flint artefacts.

Although knapping techniques in use in any part of the monument complex varied (there was, for example, no evidence of bipolar flaking at Balfarg henge) the part played by the lithic assemblages in different parts of the complex was comparable. There would appear to have been a general spread of debris on the ground surface prior to the construction of the monument. This may well have resulted from occupation but the later activity has rendered any interpretation uncertain.

None of the excavations located any areas that appeared to be primarily associated with knapping activities though they must be close-by as small amounts of debitage have made their way into each assemblage. Each excavation produced a surprisingly high percentage of retouched pieces and the material from the henge includes, as at BRS, many large regular flakes. In each case, therefore, the use and deposition rather than the manufacturing of specific artefacts is represented, particularly amongst the pieces associated with individual monuments.

3.2 RADIOCARBON DATING AND CALIBRATION

3.2.1 The charcoal samples and radiocarbon dates

G Cook & R McCullagh

The radiocarbon dating programme, on charcoal identified by Mr R McCullagh, was undertaken by Dr Gordon Cook at the Scottish Universities Research & Reactor Centre at East Kilbride. The only exception to this was the accelerator date obtained for a carbonized cereal grain, identified by Mr Alan Fairweather, from a pottery vessel.
<table>
<thead>
<tr>
<th>Sample no.</th>
<th>Identification</th>
<th>Context</th>
<th>Date</th>
<th>Δ13C</th>
</tr>
</thead>
<tbody>
<tr>
<td>GU-1670</td>
<td><em>Corylus avellana</em></td>
<td>Heavily charcoal-impregnated layer in BRD ditch</td>
<td>4425±50BP</td>
<td>26.5‰</td>
</tr>
<tr>
<td>GU-1902</td>
<td><em>Alnus, Betula, Corylus, Salix spp</em></td>
<td>Charcoal-impregnated fill of ill-defined Grooved Ware pit (F1002)</td>
<td>4250±85BP</td>
<td>26.7‰</td>
</tr>
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<td>GU-1903</td>
<td><em>Alnus glutinosa, Corylus avellana, Fraxinus sp</em></td>
<td>Charcoal-impregnated fill of Earlier Neolithic pit (F8017)</td>
<td>4765±55BP</td>
<td>24.8‰</td>
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<td>GU-1904</td>
<td><em>Alnus, Betula, Corylus sp</em></td>
<td>As GU-1670</td>
<td>4385±55BP</td>
<td>26.7‰</td>
</tr>
<tr>
<td>GU-1905</td>
<td><em>Alnus sp</em></td>
<td>Charcoal from post-pipe in interior of Structure 2</td>
<td>4285±55BP</td>
<td>26.5‰</td>
</tr>
<tr>
<td>GU-1906</td>
<td><em>Quercus, Alnus spp</em></td>
<td>Post-pipe of boundary post of Structure 2, southern end (F7044)</td>
<td>4155±70BP</td>
<td>27.3‰</td>
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<td>GU-1907</td>
<td><em>Quercus, Alnus spp</em></td>
<td>Post-pipe of boundary post of Structure 2, southern end (F7041)</td>
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<td>GU-2604</td>
<td><em>Corylus avellana, Quercus sp, Salix sp.</em></td>
<td>As GU-1903</td>
<td>5170±90BP</td>
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<td>GU-2605</td>
<td><em>Quercus</em></td>
<td>As GU-1903</td>
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<td>GU-2606</td>
<td><em>Corylus avellana</em></td>
<td>Charcoal-impregnated fill of Earlier Neolithic pit (F2050)</td>
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<td>UtC-1302</td>
<td><em>Hordeum sp.</em></td>
<td>Grain within potsherd from F2212</td>
<td>4830±40BP</td>
<td>24.2‰</td>
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<td>GU-3263</td>
<td><em>Corylus avellana, Alnus glutinosa, Hordeum</em></td>
<td>Cooking pit (F3001)</td>
<td>3260±50BP</td>
<td>27.1‰</td>
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<tr>
<td>GU-3264</td>
<td><em>Corylus avellana, Alnus glutinosa, Hordeum</em></td>
<td>Cooking pit (F3001)</td>
<td>3180±50BP</td>
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<td>GU-2111</td>
<td>Undifferentiated organic matter</td>
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<td>GU-2112</td>
<td><em>Alnus glutinosa</em></td>
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<td>GU-2114</td>
<td><em>Salix sp</em></td>
<td>Unit 12</td>
<td>6620±60BP</td>
<td>28.16‰</td>
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3.2.2 The calibration of the radiocarbon dates

M Dalland

The dates were calibrated using data from Pearson et al (1986), producing a calibrated probability distribution (PD) for each date. From the PD curves can be calculated the short (SCR) and the long continuous range (LCR). These are, respectively, the shortest continuous ranges for which the probability of the date to lie within their limits, adds up to ≥ 68.26% and ≥ 95.45%. These values are equal to the probabilities of the one and two-sigma ranges of a normal distribution. The calibrated probability distributions have irregular shapes: there is a marked peak around 2900 BC which appears in several distributions.

Table 8 shows the SCR and LCR of the calibrated dates from Balfarg, as well as dates, calibrated using the same process, from Balfarg henge and Balbirnie stone circle.

Table 8
Radiocarbon calibrations

<table>
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<th>Sample Context</th>
<th>raw date</th>
<th>Short Calibrated Range</th>
<th>Long Calibrated Range</th>
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<tr>
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<td></td>
<td>range (bc)</td>
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</tr>
<tr>
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<td></td>
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<tr>
<td>Early/Mid Neolithic Pits and Pottery</td>
<td>GU-1903</td>
<td>8017 Cowie gp 1</td>
<td>4765±55BP</td>
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<tr>
<td></td>
<td>GU-2605</td>
<td>8017 Cowie gp 1</td>
<td>4950±70BP</td>
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<td>2050 Cowie gp 2</td>
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<tr>
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<td>2212 Cowie gp 2</td>
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<td></td>
<td>GU-1906</td>
<td>7044B</td>
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</tr>
<tr>
<td></td>
<td>GU-1907</td>
<td>7041B</td>
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<td>013/102</td>
<td>4385±55BP</td>
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<tr>
<td></td>
<td>GU-1670</td>
<td>013/012</td>
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<td>GU-1163 Post A11</td>
<td>4315±60BP</td>
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<td>GaK-3426 On stone setting</td>
<td>2840±80BP</td>
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<td>GaK-3425 Beaker burial</td>
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3.3 The Fieldwalking Exercise

J Downes & C Richards

Introduction  The excavations at Balfarg and Balbirnie have not only revealed evidence of a long history of human activity in prehistory, ranging from the Earlier Neolithic to the Bronze Age, but have also provided a detailed picture of the architecture and materiality of a Later Neolithic monumental complex. A problem constantly encountered in the interpretation of similar complexes elsewhere in Britain is their relative isolation from other aspects of Later Neolithic life. The main problem in attempting to take a wider perspective is the scarcity of evidence. In the case of Balfarg we simply do not know where or how the people who built and used the monuments lived; this is due mainly to the high archaeological visibility of the monumental sites, as opposed to the relative invisibility of the remains of Later Neolithic settlement and land use. To address this imbalance in the data and to begin a reconstruction of the Balfarg landscape, a trial fieldwalking survey project was initiated. This had the dual purpose of assessing fieldwalking as a viable method of survey and site-location in this region of Scotland and, if successful, of providing valuable information on other human activities in the immediate environs of Balfarg. Moreover, a particular aim of the project was to locate material, particularly lithics, which were contemporary with the use of the Balfarg monuments.

Field survey  The immediate environs to the south, east, and west of Balfarg were either developed or were in the process of being developed for housing, leaving only the area to the north for examination. The local topography is that of rising ground to the north-west and fairly low-lying ground to the north-east. Given the high degree of cultivation in this area, systematic fieldwalking was considered the most appropriate form of field survey. As a technique, fieldwalking is extensively employed in England, but in Scotland it remains underrated and largely unpractised. Where it has been implemented in recent years, for instance in Orkney, the results have been extremely encouraging (Richards 1990).

In March 1990, 15 of the 34 fields within the study area were in an appropriate state of cultivation and weathering to be systematically walked. This amounted to an area of approximately 140 ha to be surveyed. Surface collection was undertaken along runs 25 m apart, with collection units of 50 m. This is a fairly standard format used widely in Wessex (J Richards 1990) and in Orkney (Richards 1985). Judging from the results obtained in these areas it is clear that this approach is both sensitive to the majority of archaeological sites and an extremely cost-effective method of field survey.

A note of caution must be introduced for this method of survey is selective and therefore discriminates against certain types of archaeological material and periods. For example, flintwork survives well but the majority of prehistoric ceramics, because of low temperature firing, will disintegrate through rain and frost action if left on a field surface over a single winter. Therefore only resilient materials usually survive to be collected. It must be noted that due to the types of material culture in use, some historic or prehistoric periods will be virtually invisible and will therefore be unrepresented in surface collections.

The direct interpretation of surface material is without doubt a problematic exercise. Changes in geology, topography, landuse, and agricultural practices, can each greatly influence the overall form of artefact distribution. A further bias exists in the relatively small proportion of the total amount of archaeological material present within the ploughsoil which
is visible on the field surface for collection. Given these uncertainties, however, at a general level we can equate with some confidence high densities of surface material with sites or locations of past activity.

**Results** The results of the trial fieldwalking project were particularly informative. A variety of archaeological material was present on the ground surface. While the observation and collection of this material demonstrates the effective nature of the application of fieldwalking to this area, it also reveals the destruction of archaeological contexts. Neolithic and Bronze Age flintwork, and medieval/post-medieval pottery represented the two predominant types of archaeological material recovered. The inclusion of the latter material in illus 68 provided a useful comparison and guide to the overall distribution of artefacts.

The fieldwalking at Balfarg showed increased activity occurring on the lower slopes directly north of the monumental complex. Given the low numbers of flint artefacts recovered it is difficult to interpret their presence as representing settlement. However, small concentrations noted in the southern area of field 5 and field 11, and in the north-western corner of field 7 (illus 68), both of which included retouched flints (illus 69), may represent limited occupation in the Neolithic/EBA periods. The more dispersed distribution of the remaining flints, being relatively widespread across the landscape, could be seen as the occasional exploitation of what was probably wooded upland to the north-east. The only datable artefact from this area was a barbed and tanged arrowhead from field 1 which was found in isolation.

An interesting element within the dispersed pattern of flints was the apparently random spread of retouched flint implements. As mentioned above, only in fields 5, 11 and 7 was there any indication of a small concentration. The other examples were found in isolation and it must be wondered whether we are seeing the results of isolated activities occurring within the landscape or a more substantial presence with either relatively minimal levels of deposition or fairly intact sub-surface deposits.

Little lithic material was recovered from the lower-lying area to the north-east. It is possible that a build up of alluvium has masked the archaeology in these fields. However, the recovery of two pieces of shale bracelet, found alone and close to each other in field 8, tends to throw doubt on this. However, given the low potential of survival of prehistoric ceramics it is possible that such items may be one of the few indicators of later prehistoric activity.

A general spread of medieval and post-medieval ceramics was noted across the landscape. Apart from the interesting small concentrations observable in fields 11 and 7 no other concentration of material was detected; the possibility of the movement and redeposition of artefacts into the agricultural landscape through manuring practices has to be considered (Crowther 1983).

**Conclusion** Although the project successfully located archaeological material on the surface of cultivated fields it apparently failed to locate any substantial prehistoric settlement, although two small concentrations of flints were noted. Without additional support it is difficult to assess what the surface evidence actually reveals. At present we are not in a position to correlate surface material with sub-surface deposits. This is especially true for the Neolithic and Bronze Age in Scotland, where in some areas flint was a scarce resource and relatively small surface scatters may represent substantial sites. There is thus a need for support work to be undertaken in tandem with fieldwalking: geophysical and geochemical survey, and small-scale exploratory excavation. Taken together, such programmes of work are extremely cost-effective and can provide a tremendous amount of information for a minimal
ILLUS 68 Map showing the results of the fieldwalking exercise. (Based upon the Ordnance Survey map. Crown copyright)
financial outlay. Within this framework there is also great potential for extremely valuable work to be undertaken by local archaeological societies. Moreover, archaeologists in Scotland can also draw on the extensive body of literature available on methodology and surface analysis undertaken in England (e.g. Schofield 1991).

As a trial exercise to test fieldwalking as a viable method in field survey in the Balfarg area, this project was successful. The applicability of this technique must bode well for future work in Fife and other parts of Scotland. If archaeological sites of low visibility are not searched for in the landscape through survey they will inevitably be destroyed and lost.

SECTION 4: SITE DISCUSSION

G J Barclay (with specialist contributions as noted)

Alcock (1978) wisely suggested that '. . . even on the most liberal interpretation . . . an excavation report is not the best vehicle for synthesis . . .'. The discussion presented here is designed mainly to set the excavation in its context. It is set out as follows.
4.1 Early Neolithic pit digging and pottery deposition
4.2 The Timber Structures and the Mortuary Structure tradition
  4.2.1 Analysis of the Timber Structures D J Hogg
  4.2.2 The interpretation of the Structures
  4.2.3 The place of the Structures in the stratigraphic sequence
  4.2.4 The function of and possible parallels for the Structures
4.3 The henges and Grooved Ware Deposition
  4.3.1 The henges and their sequence
  4.3.2 Contextual analysis of the Grooved Ware at Balfarg C Richards
4.4 The Ring-ditch/Ring-cairn/Cairn Complex (Cairns A and B)
  4.4.1 Sequence
  4.4.2 The Ring-ditch
  4.4.3 The Ring-cairns
  4.4.4 The mounding of the cairns and the post alignment
4.5 Activity associated with Beaker pottery
4.6 Burials of the late third and early second millennia BC
4.7 Evidence for Later Bronze Age settlement
4.8 The Balfarg/Balbirnie complex: location, nature and associations
4.9 Conclusions

4.1 EARLY NEOLITHIC PIT DIGGING AND POTTERY DEPOSITION

The excavations of 1983–5 produced evidence for the deposition of early Neolithic material in Area A, to the west of the henge associated, largely, with Cowie's Group 2 pottery, and immediately to the south-west of the BRS enclosure in Area C, associated exclusively with Cowie’s Group 1 pottery.

There are three radiocarbon dates from the Area C pits (although only the latest is considered to be a reliable indicator) and two from the Area A pits; the date ranges overlap (illus 2; Table 8). It may be suggested that the two episodes of deposition were broadly contemporary, by two groups with differing pottery traditions, or may represent the deposition of different types of pottery that conveyed a differing meaning to two depots by the same group, or that the two pit groups reflect two separate episodes. The contexts of the depots are obscure – the pits may be the only surviving features of more complex, extensive and long-lasting use of the area, perhaps largely for domestic purposes.

Richards & Thomas (1984, 191), in their useful consideration of the relationship between ritual, symbolism and ideology, state '... the notion that all forms of material culture contain symbolic meanings is undisputed'; they further note that 'As ritual activities involve highly formalised, repetitive behaviour, we would expect any depositional patterns observed in the archaeological record to maintain a high level of structure'. Is there evidence of 'structured deposition' at Balfarg? Certainly the pits of the early Neolithic display a range of characteristics, some of which might imply a function more complex than the unelaborated disposal of domestic rubbish. The small number of pits at Balfarg might be taken to show only a limited length of occupation, if rubbish was ordinarily disposed of this way! At Balfarg, what evidence is there for the pits containing TGC's Group 1 and Group 2 pottery being other than crudely utilitarian?

Sherratt (1991) suggests that deposits of the kind which may be identified at Balfarg could be the result of 'appropriate ways' of disposing of profane material; Richards (below)
suggests a similar explanation for the patterns of Grooved Ware deposition detected at BRS or the Balfarg henge.

First, at the east end of the site in Area C the blocking of the two pits F8016 and F8017, above the level of the pottery and charcoal deposits, with closely-packed stones can be noted; these should be considered together with five other pits in same area, which were blocked in the same way but with no deposition of pottery. Might organic material, which has not survived, have been sealed under the stone packing in these pits?

Second, there is the manner of deposition of the sherds of pottery in F2430 in Area A, in particular the distinct impression of the lining of the pit with slabs of pottery from a number of vessels, one (P11) more complete than the others. Once again, further pits in the area have similar fills, some with pottery, and many of the pits have a similar shape – shallow and elongated.

The deposition in pits of pottery and other artefacts of the late fourth/early third millennium BC (uncalibrated) is a widespread phenomenon in the British Isles. In some cases the interpretation offered has been a domestic one (rubbish or storage pits; eg Smith 1964), in others a ritual one. As Richards & Thomas have written (1984): ‘It is common in the archaeological literature for the term “ritual” to be used as a catch-all designation for anything which defies a crudely utilitarian explanation.’ Bradley (1984) has remarked on the irony of Neolithic domestic material (a rare enough find) being automatically assigned a ceremonial function and origin when found on ritual/burial sites.

Richards & Thomas (1984) have discussed the definition of ritual activity and have rightly pointed out the way in which ritual is an indivisible part of ordinary life, although some ritual activity will be of a different order of formality, requiring different levels of complexity of involvement, behaviour and accompanying equipment and structures. As Whittle (1988, 203) says: ‘There is . . . an interesting contrast between the extremes of ritual action, between specific set-piece public rituals or rites of passage . . . and the spectrum of ritualised action which may structure daily life . . . ’; he also suggests (1988, 149) ‘ . . . a difference could be sought between say the ritualised disposal of rubbish in a settlement with a restricted and unvarying audience, and the manipulation of special symbols in a specially defined area before a wide and singular audience’.

The appearance of very small numbers of carbonized cereal grains in the features under discussion, together with charcoal, might suggest that the deposits were, after all, of domestic material, unless we are seeing minor ‘ritual’ activity in the deposition of domestic material. However, the quantities are so small that it seems more likely that the debris is from domestic activity in the general area. Colin Richards’ work at Barnhouse in Orkney has demonstrated that structures we might accept as primarily ceremonial, such as the Stenness henge, can be placed close to settlement and that buildings possibly with a largely ceremonial function (Barnhouse ‘structure 8’) can be placed within settlements (Richards 1990). As Bradley notes (1984, 26) ‘. . . important settlements might be directly linked with funerary monuments of particularly elaborate types’. It might be suggested that the settlements associated with such elaborate structures might themselves be out of the norm.

As has been noted above, material of this period is frequently discovered in areas where, later, substantial ceremonial complexes were sited. At Balfarg the pit-digging activity is the first recorded episode in a continuum of clearly non-utilitarian activity lasting over 1500 years. At North Mains, Perthshire (Barclay 1983c), this early activity took the form of pits, cut by later ring-ditches. Pit digging associated with domestic activity in the Early to Middle Neolithic period may be very widespread; it is possible that we are seeing only a
small proportion of such sites through their accidental co-location with larger, later, ritual sites which attract archaeological attention. It is an interesting speculation that the sites of overt burial and ritual activity, of the period immediately following the pit digging and into the Later Neolithic, might deliberately be placed on the site of particularly early settlement or other activity; just as the building and use of Earlier Neolithic burial sites have been associated by some writers with the legitimation of land-holding, the legitimation of later ceremonial activity might be enhanced by the use of sites of earlier settlement, perhaps primary settlement in the area. It should be noted in this context that the evidence for increased land clearance in the catchment of the stream bounding Balfarg on the south is dated to the early third millennium BC (uncalibrated), roughly contemporary with the pit-digging episodes under discussion.

There are clear examples of ‘structured deposition’ elsewhere in Scotland. In a context clearly not of domestic origin, at Bannockburn, Stirlingshire (interim account: Tavener 1987), two double alignments of pits were located as cropmarks. The eastern alignment consisted of a double line (c 36 m apart) of pits with a U-shaped terminal. The filling pattern of most of the pits was: digging and partial siting, followed by partial cleaning out and the insertion of a crude stone lining (often no more than a single ring of stones), associated with burning; finally there was an accumulation of charcoal in the tops of the pits. Plain Earlier Neolithic bowl sherds of the kind found at North Mains and Balfarg were recovered from these upper fills (Cowie 1992b).

At Kirkburn, Dumfriesshire, Cormack (1963) discovered pits containing early Neolithic pottery in an area which subsequently saw ceremonial and funerary activity associated with Beakers, Food Vessels and cinerary urns. The filling pattern of at least one of the pits (no. 9) raises some suspicions about its function: ‘A fairly large circular pit . . . Half way down the pit was roughly lined with flattish stones. The pottery occurred both above and below these stones . . .’

At Dalgety, Fife (Watkins 1982), under a Bronze Age barrow and surrounded by later burials, ‘pit 1’ was filled largely with the shells of whelks with some mussels and limpets, radiocarbon dated to 2762±50 BC uncal (SRR-529); this may be a demonstration of how incomplete a picture of the contents of such pits we may be seeing on sites with acid soils, such as Balfarg.

Harding (1987, 47) discusses a number of sites where there is pre-henge activity; at Yeavering, in Northumberland, Llandegai B, in Caernarvonshire, and Whilton Hill 2, in Northumberland, this activity belonged to the early/mid Neolithic. The pit near the west entrance of the Yeavering henge, next to the grave, measured 0.8 m by 0.62 m and 0.3 m deep and contained carbonised nut remains over a layer of burnt material; the radiocarbon determination was 2940±90 BC uncal (HAR-3063) (Harding 1981). The depression at the east entrance was poorly defined (cf the Balfarg pits) and contained large quantities of Neolithic pottery. At Llandegai A the ‘fire pit’ within the henge was radiocarbon dated to 2790±150 BC uncal (NPL-220) (Houlder 1968, 219; 1969).

At Cairnpapple, West Lothian (Piggott 1948), the phase 1 features, with their heavy stone packing and deposits of cremated bone, may have been the product of ‘non-utilitarian’ pit digging. During a watching brief on Cairnpapple, when the ditch was being partly cleared, a section was cut through the bank, revealing a pit with three clearly differentiated, carefully laid layers of stone, separated by soil, as the only fills (P R Ritchie, pers comm).

In summary, it is suggested that the Balfarg pits represent a form of ritual activity close to or within a settlement. Their precise relationship to the place of settlement is not clear, but the ubiquitous carbonised cereal grains and the hint of cultivation below the ring-cairn (Jordan, above) may suggest that it was close by.
4.2 THE TIMBER STRUCTURES AND THE MORTUARY STRUCTURE TRADITION

The two timber structures were perhaps the most unusual features discovered at Balfarg. The discussion which follows includes structural analysis (by David Hogg) and a consideration of the nature of these structures, their possible functions and their place in the complex sequence of development on the site.

4.2.1 Analysis of the Timber Structures

D J Hogg

The author of this report and the excavator are united in the view that the structures each comprise a boundary fence surrounding free-standing structures in the interior (Interpretation b below); there are two interpretations of the important detail of the nature of the timber structures within the boundary. Both are presented at the end of the section.

Assumptions and significance of data  The consideration of the nature of the structures rests on certain limits being placed on the significance of data; certain assumptions are also made for the purpose of identification. These are:

1. Soil marks in sections are assumed to represent the true positions of timber posts.
2. Posts are treated as being large or small; no other differentiation is made.
3. No significance is given to parts of dimensions under 100 mm in individual plan relationships.
4. No significance is placed on residual pit dimensions unless specifically stated.
5. Particularly in Structure 2 it is assumed that the post-holes found do not represent the whole structure but that any lost or undiscovered post-holes belong to the ‘families’ of those already found.
6. It is assumed that the ‘families’ of holes discovered are the sole means by which the assumed structure derived support from the ground.

The reasoning behind the last assumption requires some further explanation. In most types of building the ground provides not only resistance to the vertical components of the forces generated by the mass of the building and dynamic forces acting thereon, but also resists horizontal components of those forces, for example, the force generated by an untied arch or partial truss roof. Further, in the case of a building founded on posts let into the ground, the posts provide a reaction against any rotational moment, in any vertical plane, generated by the building. This removes or diminishes the requirement for bracing and for temporary scaffolding and centering. These advantages are not normally lightly foregone, although buildings on very weak soils, such as peat or perma-frost, are now constructed, and have in the past, with variations on the surface raft principle.

In analysing the structures we must first consider the dimensional and alignment relationships within and between ‘families’ of post-holes. The ‘families’ are shown on the diagram (illus 70).

Structure 1  AB and CD are the straight elements of the outer family, linked by arc AC and BD. GH and JK are the notional alignments of posts within the boundary formed by the outer family.
AB and CD Alignment: Parallel within 1° of arc. Spacing: Taken in pairs, the maximum-minimum variation is 150 mm, but taken in groups of four the pair the variations drop below the limits of accepted significance. It is possible that the posts are uniformly set out.

GH and JK Alignment: There is considerable scattering but the general trend respects the major axis of the group. Spacing: A peak in spacing at around 2.8–3 m; over three pairs the spacing is c 5.7 m.

AB and CD with GH and JK Alignment: More or less parallel and centred if we assume that some posts in JK have been lost.

Arc AC Alignment: The fit to a circle of c 5.2 m radius is quite good. The centre of the presumed circle lies some 400 mm off the centre line between AB and CD. Spacing: The spacing of the posts from point C to the centre of the arc is about 1200 mm but it is unlikely that the rest of the arc conformed to this.
Arc BD Alignment: The fit to a circle of c 5.3 m radius is quite good. The centre of the presumed circle lies 600 mm off the centre line between A–B and C–D. Spacing: I regard it as unlikely that the posts were spaced at uniform intervals.

Structure 2: ST and UV are the straight elements of the outer family, linked by arcs SU and TV. WX and YZ are the alignments of posts within the boundary formed by the outer family.

ST and UV Alignment: These are parallel to within 1° of arc. Spacing: Taken in pairs, the maximum-minimum variation is 150 mm, but taken in groups of four the pair variation drops to c 20 mm which suggests that the individual variations in spacing are due to timber shape rather than setting-out error.

WX and YZ Alignment: If one gives more weight to the extreme members of the family these could be parallel. Spacing: Not regular but not random. There is a marked peak around 2.8–3 m.

ST and UV with WX and YZ Alignment: There is a divergence of c 2.5° causing a relative displacement of 600 mm over the length of the remains.

Arc SU Alignment: The fit to a circle of approximately 7 m radius is good. The perpendicular to cord SU misaligns with ST/UV by 2.5°. The centre of the presumed circle is 300 mm off the centre line between ST and UV. Spacing: Varies by a maximum of 300 mm in pairs but group comparison once again improves consistency.

Observations on the quality of the setting out of the posts: Structure 1: This differs from the clear pattern in Structure 2, which is described below, in that the posts in AB/CD are almost certainly not paired, and while the inner family is irregular there is not enough data to show a consistent divergence from the alignment of AB/CD as in Structure 2. The quality of the arcs AC/DB is not as good as in Structure 2 in spacing but the position of the post at D implies in this case at least that CD was set out or indeed built before arc BD. Note that in Structure 2 the analogous posts for A and C are set at positions which lie intermediate between those which would have been allocated to them had they been members of either ST/UV or AC/BD; that is, the curve may have been sweetened, as in the intermediate curve used in road design. Note that the post-holes excavated for these posts are significantly larger than those for the rest of the outer family and are consistent with the relocation of the posts after setting out. The position of the northernmost two posts of the inner family at points H and K, hard against the outer family, should be noted.

Structure 2: Establishing parallel lines of the quality of ST and UV requires great luck or the construction of two equal angles. Perspective effects make it unlikely that it was done by eye. The failure of the centre of arc SU to fall on the main axis may not be due to lack of care or purpose. I do not regard it as intuitively obvious that the centre of the arc requires to be on the major axis to provide a symmetrical fit to ST/UV. Also, if a structure exists in the interior of the outer family it would make the determination of an accurate centre for the arc that much more difficult. The good pairing of opposing posts in ST/UV also supports deliberate geometrical construction by the establishment of a right angle.

The nature of the Structures: There are two possible interpretations: (a) that the remains represent a roofed building, having a pitched, possibly thatched roof spanning between the outer rows of posts, with the inner rows providing intermediate support; (b) that the remains do not represent a roofed building or interdependent structure.

Assuming timber sizing comparable to medieval examples, we might expect the rafters
of a roofed building of this scale to be around 300 × 150 mm, the sizes being determined not by the absolute strength of the timber in compression or bending, but by the limit in jointing techniques prior to the introduction of modern glues or metal connectors; that is, the size of the timber is related more to the size needed for an adequate joint at its end than the load it has to bear, resulting in a larger than necessary timber.

The combined self load of a roofed structure and a dead load of snow would be within the capacity of the apparent size of the posts to carry, but the horizontal wind-load would be in the order of half a ton per post, tending to rotate the posts of the inner families in the ground. Unless the posts were very short it is doubtful that the apparent size would be adequate to resist the assumed loads; in any case, heavy stone packing would be expected and this is absent from most of the postholes. The ability of a building of the postulated size to withstand wind-load would be very much less than a circular building of the same height. The depth of post-settings of circular houses at the excavation at Romancamp Gate (Barclay, this volume), over 1 m deep in some cases, contrast with the relatively shallow post settings at Balfarg.

The position of the central posts is not the optimum to minimize bending moment in any rafter timbers (they are too close to the axis of the structure) but the use of lateral struts would reduce this problem, which in any case is not too weighty; one-third of Gothic cathedrals collapsed during or soon after their construction. We must allow for our Neolithic builders to be incompetent. The replacement of what would be the central posts of such a roofed building without any apparent disturbance to the outer family is virtually inexplicable.

The most telling objection to the structure being a roofed building lies in the variable quality of the setting out and the implications this would have for the ease of construction. In Structure 2 the misalignment of the inner and outer ‘families’ would mean that each rafter would have had to be individually sized and fitted and that any experience gained from the construction of previous buildings and the earlier part of the current building would have been devalued; whoever laid out the outer family would have found it as easy to lay out the inner family with as much accuracy, and would have considerably reduced the work necessary to roof the building thereby.

It is likely that the disparity between the outer and inner ‘families’ in respect of quality of setting out is an indicator of differing intended function, and possibly of differing conditions in which the operation was carried out. It can also be argued that building work had started before setting out was completed, that is the work took place in phases. The apparent sweetening of the corners at S and U in Structure 2 and the awkward junction between CD and BD in Structure 1 both support this thesis. The apparent misalignment of the arc centres with the major axis of the structure together with the poorer spacing of the end arcs, particularly in Structure 1, suggest that the ground over which the arcs were being struck was either not level, or obstructed, or both. The irregularity of the setting out of the central ‘families’, while still holding a general alignment to the major axis of the overall structure, suggests that it may not have been possible to determine the position of the earlier post-holes in the family when the later ones were being located.

Conclusions It is suggested that the inner family of posts is made up of pairs of posts, mainly perpendicular to the axis of the enclosure formed by the outer family of posts. It may be argued that the pairs may have operated independently or in groups of pairs. DJH’s preferred interpretation is discussed first, followed by GJB’s.

The structures may have developed as follows. Structure 2 is used as the exemplar (except where a specific point relating to Structure 1 is made).
ST and UV were set out and constructed. The arcs SU and TV were then set out from the end members, in the case of BD in Structure 1, from the end member of AB, in conditions which made the accurate positioning of the arcs difficult (obstruction or sloping ground). From the spacing and sweetening of corners, mentioned above, it is suggested that a wattle fence strong enough to exclude animals might have been raised on these posts, nothing stronger or heavier.

WX and YZ together represent a series of operations starting at WY, of the following nature. Within the enclosure of posts a structure was formed consisting of groups of pairs of posts, c 2 m apart, spaced at an average of 2.8 m along the major axis. The structure may have consisted of either two or three pairs. Some operation was performed on the structure which partially obscured its remains – eg it was razed to the ground or mounded over. After an indeterminate time another structure of similar character was formed abutting the north end of the original, sometimes superseding one or more of the post-holes of the original structure and more or less in alignment with it. This process was repeated until the family of post-holes was complete.

This interpretation of supersession rather than replacement rests entirely on the fact that the most southerly pair and the posts lying between them in both Structure 1 and Structure 2 show no sign of having been replaced. An objection to this interpretation is that if the
intermediate posts between the first and third pairs of both Structures 1 and 2 are any indication of the lengths of these settings then the second phase of construction in the interior of Structure 2 would have overlapped the first by 50%. Another consideration is that if the central family developed in increments, the outer family could not have been completed first unless the builders knew how long the inner settings were going to be.

GJB comments The pattern of posts within the boundary fence of the structures is interpreted by Hogg as operating in groups – that is, as constructions consisting of four or six posts. However, they might also be interpreted as representing free-standing two-post settings operating independently of each other. There is clear evidence that this is the way they operated. Other posts survive within the boundary formed by the outer family of posts and, in the case of Structure 2, just outside it. This alternative interpretation would see the interior of the two structures being filled by an accretion of two-post constructions, mostly perpendicular to the main axis of the structure, some superseding others. In Structure 2 there are at least 10 pairs which can be interpreted in this way (illus 71). In addition, however, some of the extra posts, particularly in the southern half of Structure 2, can be interpreted as further pairs, not set at right angles to the axis of the structure. These may predate the erection of the boundary fence, which then gave the later pairs a more uniform direction; could they have been the obstacle which made the setting out of arc SU so fraught with difficulty? It may also be suggested that the post-holes just outside the boundary of Structure 2, to the south-east, represent the remains of a further two pairs, perhaps predating the erection of the outer family; the post-holes are numbers F7078, F7079 and F7082. It is suggested that the pair F7078 and F7079 supersede a pair made up of F7082 and a post-hole destroyed by the digging of post-hole F7078; the group of F7017, F7019 and F7052 within the boundary fence are interpreted in the same way. DJH has kindly drawn a speculative reconstruction of the structure using the two-post mortuary interpretation (illus 72).

4.2.2 The interpretation of the Structures

G J Barclay

To summarize, the excavator and the specialist contributor, David Hogg, believe that the evidence from the excavation demonstrates that the two timber structures at BRS were not roofed buildings, for the following reasons:

1 There is no explanation, if the structures were roofed, for the contrast between the neat parallel layout of the boundary posts and the ragged and irregular layout of the interior posts; this considerable contrast in layout would pose entirely unnecessary problems in roofed construction.

2 There is no explanation, if the structures were roofed, for the considerable amount of post replacement in the interior of Structure 1 (where the posts would be protected to a considerable degree from weathering and bacterial attack) in contrast to the absence of post replacement in the boundary posts, which would, in a roofed building, be far more exposed we must therefore seek an explanation of the pattern of use of the boundary feature and the posts in its interior, unrelated to the normal processes of decay and replacement.
3 The relationship between the width of the building and the spacing between the two rough lines of posts in the inner group was very different from the spacing normal to rectangular roofed buildings; that is, the two rough lines in the middle of the structure were too close together, and too far from the walls of the hypothetical building (Mr P Hill’s assistance is acknowledged for this observation).

It is therefore suggested that they were not roofed buildings, but comprised a fence supported on light posts set c 1–1.5 m apart surrounding an open space, within which other post-supported constructions were erected. Hogg suggests that the pattern of posts in the interiors of the two enclosures might be explained by the erection of a number of similar four- or six-post settings over a period of time. The excavator’s preferred interpretation (as outlined at the end of David Hogg’s report) would see the interior of the two structures being filled by an accretion of two-post constructions, mostly perpendicular to the main axis of the structure, some superseding others.

If the structures are not roofed buildings but are rather fenced enclosures surrounding settings of posts, then we must seek some explanation of their function. Given the fairly standard spacing of the post settings in the interior of the structure we can perhaps surmise that they were linked by some standard construction. The structures are situated in an area where no clear evidence of domestic activity survives, close to ceremonial and burial monuments and it seems likely that the structures themselves do not have a domestic function. Further support is given to this interpretation by the subsequent treatment of Structure 2 in particular; this is dealt with in greater detail in the next section.

It is noted also that the Balfarg structures differ considerably from the rectangular Neolithic buildings, interpreted as being roofed, at Balbridie, Grampian (Ralston 1982) and at Lismore Fields, Derbyshire (Garton 1985, 1986, 1987). However, a domestic interpretation for the structures, perhaps a function in agricultural processing, must still remain a slight possibility.

4.2.3 The place of the Structures in the stratigraphic sequence

The place of the two structures in the overall history of the group of sites at Balfarg/Balbirnie must now be considered. Stratigraphically it has been demonstrated that Structure 1 was cut by the ring-ditch. It is interesting to note that the axis of the structure, if extended to the north, runs through the centre of the ring-ditch. This seems too much of a coincidence, and we can, perhaps, suggest that the position of the ring-ditch was related to some element of the structure which was still visible. At the same time we must note that the northern end of the structure was cut, rather than respected, by the ring-ditch; perhaps this implies that the features marking the site were not very substantial. The relationship between the ‘avenue’ of posts and the ring-ditch at Kilham in Yorkshire (Manby 1976) is strikingly similar.

One explanation may be provided by comparison with the other timber structure, where it may be suggested it had been mounded over at the end of its use. Evidence for this interpretation is provided by the stony layer (the ‘obscuring layer’, p 84 above) containing much Grooved Ware, which survived over the south part of Structure 2 (marked as a tone on illus 20); it is suggested that this layer represents the last remnant, otherwise ploughed away, of a low mound of soil and stone piled over the structure. The layer completely masked the post-holes of the structure in that area, suggesting that it was laid down when many of the posts had already rotted away or been removed.
If Structure 2 was mounded over, then so might Structure 1 have been. Whether this would have provided a sufficiently clear marker for the ring-ditch to be dug at the north end of Structure 1 (illus 6), its centre on the axis of the structure, is perhaps doubtful, and it may be more likely that the ring-ditch was dug on the axis of surviving elements of the timber structure. It is argued below (p 196) that ring-cairn A (and also perhaps cairn B) were mounded over at the end of their use. It may also be suggested that the deposits of human cremated bone on the upper surface of cairn B and the isolated deposit in the top of a post-hole of the boundary of Structure 1 (Burial 5) are all late deposits dug into earthen mounds. Particularly in the case of the deposit in Structure 1, we must suggest that the location of the structure was marked in some way, to have attracted the cremation deposit.

The dearth of finds in Structure 1, in contrast to Structure 2, should also be noted. In Structure 1 small numbers of sherds of Grooved Ware were found in two contexts and only one of these, F1121, is relatively secure (and even here the single sherd found came from the upper fill of the post-hole). The other context was the fill of an ill-defined pit, interpreted as possibly of non-anthropogenic origin. Sherds of two pots were found in this context – the bulk of the sherds of the two vessels were recovered from the major pit to the west (F1002) – and it may be suggested either that the few sherds in the area of Structure 1 were stray parts of this more substantial assemblage, or the remains of the processes of pottery deposition suggested by Richards (below) for Structure 2.

In Structure 2 much larger quantities of Grooved Ware were found both in the stony layer already described, surviving in and covering the south part of the structure (the ‘obscuring layer’), and in the post-pipes of five post-holes. It is interesting to note that the Grooved Ware was found only in post-pipes, and particularly in the post-pipes of those post-holes which cut earlier post-holes, and which were therefore in use later in the sequence. It is also important to note that these post-pipes were also those which contained charcoal in any quantity. No Grooved Ware sherds were found in the postholes of the boundary feature; it is suggested that the decay of the less substantial posts of the boundary may have reached a stage beyond which artefacts and charcoal could become incorporated into the post-pipes (Reynolds & Barber 1984).

It is argued that the Grooved Ware belongs to a period late in the life of Structure 2, when material deposited on the surface was finding its way into the centre of the posts, as their heartwood was rotting (Reynolds & Barber 1984), or was deposited in a layer covering the structure, subsequent to extensive burning on the surface, perhaps associated (as suggested by Richards below) with the breaking and burning of Grooved Ware. The lack of overlap between individual vessels within the purlieus of the Structure and in the surrounding ditch might suggest, however, that there was no contact between the two contexts; it is possible that we are seeing different processes operating on different types of Grooved Ware – perhaps predominantly the larger coarser vessels being treated in a different location.

There are three radiocarbon dates from post-holes of Structure 2, one from the interior (F7023; probably cutting the post of an earlier setting) and two from the southern boundary fence (F7041 and F7044). The calibrated ranges for these samples (illus 2: Table 8) overlap with those for the two dates from the charcoal-impregnated layer containing Grooved Ware in the BRS enclosure ditch and it is possible that the charcoal in both contexts originated in the same event, although there are differences in the style of Grooved Ware deposited in the two contexts. All three dates are from samples of charcoal found in post-pipes, and appear to date wood burnt or deposited as charcoal on the surface which subsequently found its way into the spaces left by rotting posts. There is no evidence for the timber structure burning down, but
clearly the post-rotting processes were still active and it should be noted that there was no trace of burning under the ‘obscuring’ layer which covered the south end of Structure 2. It is possible that the area affected by the burning or deposition lay in the central part of the structure, where the sealing layer did not survive. It is suggested that the episode of burning, and the deposition of Grooved Ware relate to the events associated with the sealing of the structure at the end of the use of the two-post constructions. The relationship of the two structures cannot be determined stratigraphically, however an interpretation based on circumstantial evidence may be attempted:

1 Structure 1 stands on its own without an enclosure ditch around it, while Structure 2 lies in the centre of a ditched enclosure. It is therefore suggested that the structures did not require an enclosure to fulfil their function and that the ditch around Structure 2 was dug around the later of the two structures.

2 The ditched enclosure around Structure 2 is associated with Grooved Ware, which appears in the lower part of the Middle fill of the ditch. From experience gained on the site it can be demonstrated that the friable subsoils forming the ditch sides could have been eroded to form the primary fills in weeks or months. The final activity on Structure 2 is also related to Grooved Ware deposition. Structure 1 seems to have fallen out of use before much Grooved Ware was deposited (the two contexts in which the handful of sherds are found are dubious) even though much Grooved Ware was deposited in the area (F1002); it also does not seem to have attracted a ditched enclosure around it.

3 It might tentatively be suggested that the activity associated with the deposition of Grooved Ware around Structure 2 represents the sealing of a structure associated with burial (perhaps involving it being mounded over) and its conversion, by the digging of a ditch around it, into a site of different purpose with a different meaning for its users. The contrast in treatment between Structures 1 and 2 may suggest that Structure 2 was chosen for attention because it was more prominent, perhaps because it was still in use or had fallen out of use more recently. The possible identification of the ditched enclosure as a henge is discussed below.

4.2.4 The function of and possible parallels for the Structures

It has been argued above that Structures 1 and 2 are not roofed buildings and that their associations, and the treatment of Structure 2, mark them out as being of non-domestic function. Where, therefore, in the British Neolithic can we find parallels for the structures and for the sequences at BRS?

Sharples (1985) has argued for the development of funerary sites of the third millennium BC (uncalibrated) into sites of different function, presenting the digging of the ditch around Maes Howe, and the sealing or alteration of cairns as examples; he suggests (1985, 59) a ‘shift away from burial monuments to physically defined spaces, presumably used for ceremonial purposes’. It is suggested here that the process is reflected in the sequence at BRS, where a structure which may be interpreted as an Earlier Neolithic mortuary structure is associated, at the end of its life, with a ditch, which may be identified as a henge. It is further suggested that the structures had a function in the disposal of the dead, perhaps associated with the treatment of corpses prior to final burial.
Many authors have discussed the patterning of human remains in Neolithic burial mounds (eg Whittle 1988; Scott 1992) and the archaeological aspects of excarnation as a process in the transition from life to death (eg Ashbee 1966; Mercer 1980; Hedges 1983; and more generally, Huntington & Metcalfe 1979); evidence for the processes of preparing the bone for final disposal or rearrangement, and the structures associated with these processes have, however, remained largely elusive.

The frequent occurrence of disturbed bone and disarticulated skeletons on Neolithic burial sites has been cited to suggest the possible practice of excarnation. At Wayland’s Smithy in Oxfordshire (Atkinson 1965, 130) the burials between the distal posts of the mortuary structure were partly disarticulated and the excavator suggested that the bodies had been excavated, as much of the small bone was missing: ‘To explain the state of the bones at the time of deposit on the pavement it seems necessary to assume that the bodies had been exposed and stored, for varying periods after death, in circumstances which precluded the access of rodents or other mammalian carnivores, but allowing removal bodily of the small bones presumably by buzzards and other carrion-eating birds.’

Mercer (1980, 31) has suggested that excarnation in a way not designed to protect the corpse from disturbance by larger animals was practised at Hambledon Hill. Vyner (1986) and more recently Scott (1992) have considered some structures which might have had a function in the process of excarnation comparable to that now suggested at BRS; that is, the exposure of bodies on platforms, to avoid disturbance by larger animals (but not by birds). It is interesting that in an Earlier Bronze Age context, at Snail Down in Wiltshire, Thomas (pers comm) identified buzzard droppings on the old land surface under barrow 17, round a roughly rectangular setting of stout stakes, and also in the less fully investigated barrow 19, perhaps suggesting that bodies were being exposed to birds on platforms.

Recent excavations on mortuary enclosures have served to emphasize the variety of structures involved but at the same time have suggested that some features seem to recur, or that the same functions might be served by different features. There are also many structures in the Neolithic which incorporate post settings which could be interpreted as pairs, or groups of pairs, of posts; there are also many rectilinear enclosures and structures. There are some sites which offer insights into the possible appearance and function of the post-pairs and their relationship to the enclosing elements around them. It is not the intention to discuss at length the great variety of mortuary enclosures, structures and practices detected in Neolithic Britain but some sites which seem to be particularly relevant will be drawn together.

Loveday (1985) has examined the tradition of rectilinear enclosures in connection with the development of longer rectilinear monuments. He defined three classes: major cursus monuments; minor cursus monuments; and oblong ditches, the last grading into enclosures (mainly appearing as cropmarks) of ovate and trapeziform plan. The principal oblong ditches are seen as being mainly of the late fourth/early third millennium BC (uncalibrated), and represent the remains of ‘long mortuary enclosures’ and ploughed-down long barrows.

Loveday suggests that the ancestry of cursus in these oblong sites best explains their function: ‘as a temenos associated with ancestral/mortuary practices’ (Loveday 1985, abstract). In his Rhind lectures in 1992, Bradley considered cursus monuments as primarily ceremonial but with a clear association with structures of primarily funerary function. While the excavation and study of rectilinear monuments has been concentrated so far in midland and southern England, there is an increasing amount of information on possibly related sites in the north. Loveday noted a number of ditched cursuses and pit-defined cursus variants in Scotland, as well as possibly related smaller features, such as the pit-defined enclosures at
Douglasmuir (Kendrick 1980) and Bannockburn (Tavener 1987). More direct parallels to southern long mortuary enclosures have been demonstrated at Inchtuthil (Barclay & Maxwell 1991) and tentatively identified in the cropmark record.

Loveday notes the occurrence of long barrows and long mortuary enclosures near cursus monuments. In this context it is interesting to note that the Douglasmuir enclosure lies very close to the Balneaves minor cursus, and that the Cleaven Dyke, which is probably a cursus similar to the one at Scorton in Yorkshire (Pitts & St Joseph 1985, 260; Topping 1978), has very near it, at Littleour, a cropmark resembling the Balfarg timber structures (illus 73) (M Brown, pers comm). Further parallels for the Littleour site within Perthshire have been discovered nearby at Cairsie and Upper Gothens, and further to the west, at Fortingall.

Beneath the round barrow at Dairy in Ayrshire, a timber structure, measuring $14.5 \times 6.4$ m has been interpreted as a Neolithic structure (Coles & Simpson 1965; Linge 1987) and as a Dark Age hall (Laing 1969; Scott 1989). There is a distinct resemblance between the Dalry structure and those at Balfarg, and the sealing of the structure below a mound would certainly fit the same pattern of use and abandonment.

It might be suggested that the Balfarg structures represent another part of the continuum, proposed by Loveday (1985), from the relatively small long mortuary enclosures to the great cursus monuments, a regional variation involving timber rather than earthwork boundaries. The nearest parallels would lie in the long mortuary enclosures and in those long barrows in which a palisaded phase can be detected. The evidence concerning these sites has been examined elsewhere in these Proceedings in relation to the long mortuary enclosure at

illus 73 The cropmarks at Littleour, near the Cleaven Dyke (Perthshire) which may represent a structure similar to those identified at Balfarg Riding School. (Crown copyright: RCAHMS)
post-holes were two elements of the Dalladies in his enclosure sub-rectangular had only Dalladies building, 1965). Simpson prevailed: expressed in various Smithy and Fussel’s Lodge of two-structures may accept we detail; it is as burial of prior (eg long bones for the long cairn excavations and that bones from post-settings for post-hole included or subsequently Skendleby (Phillips 1935). We should note in this context Ellison and Drewett’s discussion of two-, four- and six-post-hole structures in the Later Bronze Age and Iron Age; there the ethnographic parallels for post-settings of domestic, ritual and mortuary-associated function (insofar as they can be separated) were considered and illustrated (1971, 191, fig 2); excarnation platforms were included in that discussion. There is evidence that excarnation was practised in the Neolithic, and that the methods used differed considerably. The results of a number of long barrow and long cairn excavations have shown that bodies, at the final stage of their deposition, were unfleshed, and that bones from many bodies could be mixed, with, on occasion, types of bones (eg long bones or skulls) collected together in different parts of the tomb (cf Whittle 1988). It has been argued that this defleshing took place before the bodies entered the tomb for the first time, although it may be that corpses were allowed to decompose within the tombs prior to the re-arrangement of bones. There has been much discussion (eg Bradley 1984; Clarke, Cowie & Foxon 1985) of the role played in Earlier Neolithic society by the burial of bodies, and of the nature and role of ritual practice and their associated structures, as society changed in the later Neolithic. This is not the place to discuss this deposition in detail; it is enough for the purpose of considering the function of the Balfarg structures that we accept that there is evidence of such practices in the Neolithic, and that the Balfarg timber structures may have operated as enclosures within which settings of two, four or six posts acted as supports for corpses. From comparison with modern ethnographic parallels the use of two- or four-post settings would seem more likely.

Simpson (1968) raised doubts about the interpretation of a tented roof for the Wayland’s Smithy and Fussel’s Lodge mortuary structures, and in general the minimalistic view expressed in various forms by Kinnes (in Jackson 1976), Vyner (1984) and Scott (1992) has prevailed: the ‘classic’ Neolithic sub-barrow mortuary structure was a very narrow simple building, no wider than its massive distal posts.

The group of posts that formed the first phase mortuary structure beneath the Dalladies long barrow (Piggott 1972) was more complex than that below the Pitnacree mound (Coles & Simpson 1965). There were three massive post-holes, two of which (the north-west – E – and the central – F) contained three and two post-pipes respectively. The south-east end post (G) had only one post-pipe surviving. To the north-west of the structure were two individual post-holes (A and D). The two later radiocarbon dates from the phase II mortuary structure at Dalladies are comparable with those from the timber structure at Balfarg; they are 2710±50 BC uncal (SRR-289) and 2585±55 BC uncal (SRR-290) (Piggott 1972). Scott (1992) does not consider Dalladies in his discussion of two- and three-post mortuary structures, but the elements of the structure can be interpreted in a number of ways.

At Aldwincle, in Northamptonshire, Kinnes (in Jackson 1976) suggested a sequence starting with the deposition of Earlier Neolithic plain wares in a scatter of pits, followed by a sub-rectangular enclosure defined by a shallow segmented ditch. Within the enclosure were at least two post-pairs: the ‘structure I’ posts were 5 ft 6 in. (1.65 m) apart. The ‘structure II’ post-holes were 7 ft 4 in. (2.23 m) apart; two inhumations lay between them. Scott (1992, fig
8.1) presents a simplified plan; there may have been two other post-pairs. The mounding over of these elements may be inferred from a scatter of limestone fragments.

One pair of posts, erected for whatever purpose, resembles any other pair although they could serve a great variety of functions. Indeed it is worth noting that the four-post settings which are usually given a more prosaic interpretation in settlements of the first millennium BC are very similar to Hogg's interpretation of four-post settings within the Balfarg timber structures. The editors would do no more than suggest that some of the structures recognised at other Neolithic sites could also have functioned within this complex sequence of developments to support platforms on which bodies could be exposed. For example, the sealing of the Dalladies phase I mortuary structure might reflect a similar change of use to that seen at Balfarg with the mounding over of Structure 2, and the construction of a sealing mound at Aldwincle. However, the considerable number of possible two-post settings within the two timber structures at BRS contrasts with the one, two or three settings found at the other sites discussed here. The absence of bone from the areas of Structures 1 and 2 would not be unusual in the context of the acidic soils of eastern Scotland (cf the absence of bone from the Dalladies mortuary structure (Piggott 1972), from the chamber at Corrimony (Piggott 1956) and from the centre of the North Mains barrow (Barclay 1983c)).

At Balfarg the two-, four- or six-post structures within and perhaps outside the boundary fences might therefore be interpreted as free-standing platforms for the exposure of the dead; however, there are also parallels in the burial record of the British Neolithic for the placing of inhumations between pairs or groups of three posts c 1.5–5 m apart, as already mentioned, at Aldwincle (Jackson 1976). The evidence at Balfarg for the repeated building of what may have been two-post settings within the structures points to a periodic need for these pairs, whatever their function might have been. While the role of excarnation as a normal part of the process of the treatment of the dead in Earlier Neolithic society has been discussed, we must consider the possibility that excarnation and the mortuary structures of the period (in particular long barrows and cairns) were not involved in the normal disposal of the dead. It has been widely suggested that the deposition of mixed human bone in tombs is associated with the legitimation of land-holding through the presence on the land of the communal ancestral bone (Bradley 1984; Clarke, Cowie & Foxon 1985). We must consider whether such deposits represented the normal means of burial for the whole, or for a significant part, of the population, or whether this strand of mortuary ritual was confined to the disposal of a small proportion of society, the sole purpose of which was to provide bodies and bone for deposition in special structures for special purposes. Barrett has written (1988, 36): 'It is a common fault of almost every approach to these data to assume that they represent the full pattern of the way the dead were treated.' Could it be that such structures were the product of periodic treatment of the dead in a special way, relating to time (the need to provide a specially treated corpse of a particular generation), or to the status ('good ancestor material') of the corpse, or a combination of the two?

4.3 THE HENGES AND GROoved WARE DEPOSITION

4.3.1 The Henges and their Sequence

The excavations at Balfarg henge and Balbirnie stone circle produced no clear evidence for activity before the appearance of Grooved Ware. The excavations of 1983–5, centred on the BRS enclosure, recovered evidence of activity early in the third millennium and it is
suggested that the erection and use of the two timber structures pre-dates the deposition of Grooved Ware, although by how long is not clear; however, the structures’ possible relationship with the mortuary traditions of the first part of the third millennium BC (uncalibrated) might add weight to this suggestion.

The ditched BRS enclosure, around Structure 2, was the feature which led us to excavate those elements of the Balfarg/Balbirnie complex which lay between the henge excavated by Mercer and the stone circle excavated by Ritchie. There is no surviving entrance into this ditched enclosure and there is no clear indication of the location of any upcast bank from the ditch. Evidence of activity, either on the edges of the ditch or in the form of deliberate deposition of material, survives in the form of considerable quantities of Grooved Ware and Beaker pottery in the Middle and Upper fills respectively. There seems to be one main episode of Grooved Ware deposition in this part of the site, not long after the primary silting – although, when the friable nature of the subsoil is considered, it is likely that it was quite soon after the digging of the ditch.

Harding (1987) considered the BRS enclosure as a possible henge. The value of the term ‘henge’ has been much discussed in recent years (Clare 1986, 1987; Harding 1987; Barclay 1989) and it is not the intention to rehearse the arguments again here. However, if we accept that the arc of ditch excavated at BRS was part of a complete circuit from 38 m to 43 m in diameter, then such an enclosure, associated with Grooved Ware in its lower fills and Beaker in its upper fills, can at present only be paralleled in the class of monument accepted as henges; no feature of the site would place it outside Harding’s definition of the ‘classic henge’ (Harding 1987, 30–56). The internal diameter and the ditch dimensions fall well within the norms for henges, and the appearance of Grooved Ware in primary contexts can also be paralleled in these sites, but only at Balfarg henge, Stonehenge and Llandegai A does it date before 2300 BC uncal (as at BRS) – the main mass of dates falls between 2100 and 1800 BC uncal. It has been noted elsewhere (eg Bradley 1984) that the earliest radiocarbon determinations associated with Scottish henges and Grooved Ware tend to be earlier than for similar sites and pottery further south.

If the BRS enclosure is to be interpreted as a henge, then it must be differentiated in this text from Mercer’s henge. Although we will argue below that the BRS enclosure is the first henge monument on the site, references to the ‘Balfarg henge’ below refer to that excavated by Mercer, as opposed to the ‘BRS enclosure’.

The two radiocarbon dates for the BRS enclosure ditch relate to a single layer near the north end of the surviving section on the west side. The layer appears clearly in illus 24 (cutting VI: A–B); it was heavily charcoal-impregnated and contained considerable quantities of unabraded but burnt Grooved Ware. It should be noted that the layer entered the ditch from the outer side, after the ditch had silted up to a depth of 0.3–0.4 m. The two radiocarbon dates and their calibrated ranges (long continuous range) match well: 2475±50bc uncal (GU-1670): 3300–2915 BC cal; and 2435±55 BC uncal (GU-1904): 3275–2900 BC cal. The material dated is relevant to a comparison of these dates with those from Balfarg henge: the earlier date is from roundwood Corylus avellana and Alnus glutinosa and the later from the outer margins of more mature Alnus glutinosa, Betula sp and Corylus avellana. The charcoal was not badly abraded and it seems likely that the charcoal and pottery were deposited in the ditch during or shortly after the burning which produced it.

The earliest phase of activity on the Balfarg henge (Mercer’s phase 0) associated with layer U2 was: ‘The use of the western area of the enclosure as an area where wood and bone were burned and pottery broken which had itself become involved in incinerary processes.’
Mercer suggests that this phase preceded the digging of the ditch. The parallel with the deposit of charcoal-impregnated soil in the ditch of the BRS enclosure, containing Grooved Ware (some of which was scorched) and burnt bone, is striking. While layer U2 survived on the ground surface, the equivalent at the BRS enclosure survived only in the material protected from ploughing in the ditch and in the ‘obscuring layer’ over Structure 2, although the material in the ditch may originally have been deposited over a wider area. However, at BRS it seems to have happened after rather than before the digging of the ditch.

The relationship between the Balfarg henge and that suggested at BRS cannot be demonstrated stratigraphically. However, we may essay an interpretation. It has been suggested above that the BRS enclosure was dug around an earlier structure, perhaps in a deliberate attempt to change the character and purpose of that site. It has been demonstrated that this took place at a time when Grooved Ware was first being deposited on the site. Radiocarbon determinations suggest that the wood which had been deposited shortly after the BRS ditch was dug, had died in the period 3300–2900 BC (calibrated). The radiocarbon dates for Balfarg henge relate to Mercer’s ‘event 0’ – layer U2 and its material – in the phase of burning shortly before the erection of the timber ring; the determinations, calibrated, suggest that the wood which had been burned had died in the period 2915–2460 BC (LCR of *alnus* dates GU-1160 & GU-1161) and 3080–2705 BC (LCR of *quercus* dates GU-1162 & GU-1163), grouped as suggested by the radiocarbon laboratory. If we compare the calibrated long continuous ranges of the non *quercus* dates from the henge (2915–2460 BC cal) with those from BRS (3300–2900 BC cal) we can perhaps suggest that the two episodes were separated by a little time, as the burning phase at the henge took place just before the henge ditch was dug (ie the henge is post 2915–2460 BC), and the BRS burning took place after the digging of that ditch (ie the BRS ditch is pre 3300–2900 BC).

Grooved Ware was deposited in a number of contexts other than the ditch of the BRS enclosure and in association with Structure 2 (discussed above). Five pits contained quantities of Grooved Ware. The largest collections were recovered from two pits, one to the west of Structure 1 (F1002), the other to the south-east of this structure (F8133). Sherds of some vessels were found in more than one context. Pieces of vessel P52 were found in F8133 and in the ditch of the enclosure and sherds of P63 and P66 were found in F1002 and in Structure 1. F1002 was ill defined. The pottery within it may have been deliberately deposited but it may be that the feature was no more than a natural hollow in which burnt material, broken on the surface, had survived later disturbance. Whatever the explanation, it seems likely that the breaking of the pottery in an area in which burning was going on represents activity comparable to that which produced the U2 deposit on the Balfarg henge and in the BRS enclosure ditch. The Grooved Ware vessels recovered from F1002 were predominantly of the larger range identified by Henshall (above): that is, with diameters over 300 mm. A radiocarbon date was obtained from *alnus*, *betula*, *corylus* and *salix* charcoal from F1002 2300±85 BC uncal (GU-1902) (3040–2610 BC cal) placing it in much the same period as the activity to the west at Balfarg henge. A sherd of one pot (P43a) was also found in pit F8029, well to the east.

The deposition of Grooved Ware, charcoal and burnt bone in the pits at BRS is similar to the deposit in the ‘ritual pit’ described by Hope-Taylor at Yeavering (1977). The sequence of pottery recovered from Yeavering is also generally very similar to that from BRS.

The identification of quantities of Solanaceae pollen and *Hyoscyamus niger* (black henbane) seeds encrusted on one of the Grooved Ware vessels, taken in the context of discussions on the uses of Beaker and Food Vessel pottery (eg Scott 1977), suggests that the
deliberate use of this plant to induce intoxication or hallucination cannot be ruled out. Certainly, if these vessels were used in this way then the danger of ‘ritually charged’ material, discussed by Richards, might have more than a purely symbolic truth. The use of intoxicating and hallucinogenic substances in Later Neolithic Europe has most recently been discussed by Sherratt (1991), who has demonstrated effectively how widespread this sort of activity was.

4.3.2 Contextual analysis of the Grooved Ware at Balfarg

C Richards

In attempting to understand and interpret the various deposits and contexts of Neolithic activity at Balfarg a particular disadvantage has to be recognised in the isolated nature of the monuments. This situation tends to be a feature of the majority of excavations of henge monuments in Britain. The evidence for the Later Neolithic occupation of Fife is scanty. For instance, the evidence from Kinloch Farm (Barber 1982) reveals fairly localized contrasting material assemblages although the exact nature of the site remains undetermined. Similarly, the Grooved Ware from Tentsmuir (Longworth 1967, 75), whilst indicating Later Neolithic activity, provides no clear contexts for examination. Although the Balfarg complex stands as an isolated entity it nevertheless provides well-excavated contexts for examination. Particular interest is therefore directed towards a greater understanding of different contexts through the material culture present.

Grooved Ware  The ceramic assemblage from the Balfarg complex constitutes the largest collection of Grooved Ware yet recovered from a Scottish mainland site. When examining a form of pottery which, in various forms, is distributed across the British Isles it is apparent that both localized characteristics and wider conventions provide dual parameters of design. However, regardless of geography, a consistent feature of Grooved Ware design is the emphasis placed on the division of space. In 1983, by utilizing two sets of opposed categories: decorated/undecorated, and bounded/unbounded, a structural classification was produced which related, it was hoped, to the conscious decisions taken by a potter decorating a Grooved Ware vessel (cf Richards & Thomas 1984). The result is a hierarchical scheme of six design stages.

1 Undecorated surface.
2 Decorated surface.
3 Bounded and undecorated.
4 Bounded and decorated within the boundaries.
5 Bounded and undecorated with boundaries decorated.
6 Bounded and decorated.

The design stages represent structural variation which can occur upon all or only parts of vessels; different parts of a vessel’s outer surface may be characterized differently. It is becoming clear that certain forms of pottery, within the broad definition of Grooved Ware, are both decorated and used in a specific manner. Thus, in certain Scottish assemblages, the larger vessels, often bucket- or basket-shaped, show distinctive variation in surface decoration from that found on smaller ‘flowerpot/tub’ forms. The larger, often coarser,
types of Grooved Ware vessel tend to display either physically bounded upper areas, thereby separating the top from bottom or, alternatively, decoration of the upper area alone, which effects the same distinction. This procedure is in marked contrast to the consistent level of decoration encountered on smaller vessels and is relevant to the areas of a pot perceived as appropriate for decoration (cf Friedrich 1970). Here we are seeing a clear statement of the potter’s perception of different forms of decoration appropriate to different types of pot and the categorization of different areas of decoration on the surface of a vessel.

The Balfarg complex provides examples of these distinctions of decoration between the larger (coarse) and smaller (fine) vessels. A further indication of the way a ‘grammar’ of the decorated/undecorated distinction is employed to create a complex design structure is demonstrated in a deconstruction of design structure on three of the complete smaller pots: P48, P51, P54 (illus 28). Each example employs raised cordons to delineate space in a similar manner. The boundaries on P51, however, remain undecorated as opposed to P48 which employs a combination of opposed decorated-undecorated cordons to create a complex horizontal/vertical design structure (illus 74, A). A similar, although less complex, interplay between these categories creates the design present on P54 (illus 74, B).

From these basic observations of a formalization present in Grooved Ware design, we can discern distinctions between different types of pottery and begin to understand certain rules which appear to have underlain Grooved Ware decoration. This, however, represents the beginning of an ongoing project which should investigate the specificity of certain types of pot with particular forms of decoration to various contexts of human action and to different and changing functions of vessels. Such a project cannot be restricted to a single site but requires a broader template.
Spatial analysis: artefact deposition in the Balfarg complex  Excavations at Balfarg have uncovered a number of contexts representing different areas of activity. Given the nature of the Balfarg sites it must be taken into account that such activities will be extremely difficult for us to recognize or indeed understand. The two excavations, at BRS and Balfarg henge (Mercer 1981), revealed three main constructions and a number of pits: the Balfarg henge; timber Structure 2 and the BRS enclosure ditch; and timber Structure 1.

As with all Later Neolithic monumental complexes, the monuments at Balfarg are spatially distinct. They are also architecturally different and although two elements are separated from the outside world by enclosures, and could be deemed typologically similar, they remain different places. The necessary movement to and between monuments may be important in understanding such complexes. Access into the Balfarg henge is limited by a single main causeway; Mercer et al (1988) have discussed the nature of the other, less monumental, causeway. Passing through the entrance, two possible concentric circles of small posts lay outside an inner ring of large free-standing wooden uprights. Entry to the inner area involved moving through breaks in the outer circles E and B, and passing between two larger posts A11 and A10 which combined with A12 and A9 to create an impressive entrance (Mercer 1981, fig 40). Unfortunately, as with the artefactual remains, a complete picture of all the interior features inside the henge has been confounded through differential erosion. This also effectively counters any attempted phasing of the possible additional timber circles. However, the stratified material deposits do exhibit an interesting distribution and a detailed examination of the artefactual patterning is a welcome feature of the report by Mercer (ibid). Hence, this discussion is limited to a brief reassessment of a comparative nature.

Here attention is drawn to the three main areas of artefact deposition within the Balfarg henge: an area or spread of material (U2) located in the north-west between the timber circles and the encircling ditch; the post-holes of ring A, particularly those in the western perimeter; and a feature (X2) situated within the timber circles to the south-west.

It should be noted that to offer an interpretation of the material patterning is quite different from understanding the nature of the henge and the practices which occurred therein. One of the interesting features of the ceramics is the presence of many conjoining sherds between the post-holes, layer U2, and feature X2. Consequently, Mercer (1981, 114) correctly points to the activities which led to the deposition of this material occurring prior to the construction of the timber circles. Whilst the purposeful movement of ceramics is acknowledged I wish to consider the activities in slightly greater detail.

The focus of activities appears to have been around X2 where a fireplace or hearth was situated. The activities involved the use of at least six Grooved Ware vessels with rim diameters of between 150 mm and 200 mm. Here animal bone was cremated and, taking into account the high phosphate concentration in this area, cooking or animal sacrifice cannot be ruled out. The pottery was subsequently broken and removed outside the line of the ring of timbers, which were then erected, to layer U2. The absence of pottery in the ditch at Balfarg henge may indicate that it had not been excavated at this time. Although small amounts of Grooved Ware were present in post-holes A12 and A13 their quantities were nowhere near the large amounts present in the adjacent post-hole A11. This is a curious discordance which is not entirely attributable to the difference in size between the post-holes.

The movement of material from the original context of use and deposition is a feature of a number of henge monuments but may represent little more than keeping an area clean. However, within the limits of the evidence, it appears that material never left the henge. For
instance, at Stenness, Orkney, Grooved Ware resulting from activities within the centre of the henge was cleaned away and placed in the ditch before it was subjected to trampling (Richards forthcoming). This raises the question of the absence of material in the Balfarg ditch and the possibility that after the ditch was dug the type of action occurring within its confines did not involve material deposition.

The distribution of Grooved Ware at BRS contrasts with both the above examples. In comparing the BRS enclosure and the Balfarg henge we find not only large amounts of pottery deposited in the ditch but also dissimilarity in its decoration technique and its design structure. The pottery in different contexts on the henge is from linked vessels; in contrast, at BRS, the pottery in the enclosure ditch and associated with Structure 2 is not the same—it varies in both morphology and design structure (illus 75, 76); most importantly the vessels situated in the ditch and in association with Structure 2 represent discrete deposits, with no sherd from any pot present in one context being located in another. Similarly, variation between the ditch and interior is also a feature of the lithic assemblage.

Introducing the sparse evidence from Structure 1, it is apparent that the Grooved Ware recovered from the adjacent pit (F1002), whilst having similarities with the material spread located in both of the structures (and having conjoining sherds present in insecure contexts within Structure 1), does display considerable variation from that in Structure 1. This is evident in both Grooved Ware morphology and design structure. Hence, although some differences in the vessels from Structure 1 and pit F1002 are discernible, at some time the pit acted as a receptacle for certain vessels which were used and broken in the area around Structure 1 although they were not certainly associated with it.

In the description of Structure 2 Barclay notes that the Grooved Ware sherds found there are in secondary contexts, and suggests in the discussion that the Grooved Ware may be associated only with its closure. The very limited evidence of Grooved Ware activity on Structure 1, and the insecurity of the contexts in which the Grooved Ware was found, prevent any clear interpretation of the role (if any) of this pottery there.

The final stage of ceramic analysis involves the spatial distribution of the structure of Grooved Ware design and vessel type at BRS. The pottery from the interior of Structure 2 is predominantly design stage 5 (illus 75B), the most complex form recognized at Balfarg, on smaller, fine vessels. Moreover, this deposit contained both P48 and P54, the design structure of which was discussed earlier. This deposit contrasts significantly with that from the ditch, which is composed of an extremely high proportion of larger, coarser vessels.

Furthermore, Structure 1, like Structure 2, reveals a high proportion of stage 5 which contrasts with pit F1002. Interestingly, when examining the morphological distinctions between pots in contexts a similar pattern is discernible. The smaller, finer, vessels predominating in the assemblages recovered from the interiors of the two structures contrast with the coarse, larger, vessels which form the higher proportion in the enclosure ditch and F1002 (illus 77). Once again the problems of the small quantity of pottery and the insecure contexts in which it was found in Structure 1 make any conclusions drawn about the Grooved Ware there very tentative.

Moving on to examine other forms of material culture we find the worked stone to be of particular interest since it appears to underline the variation displayed in the ceramic analysis. A difference between Balfarg henge and BRS is seen in the distribution of Arran pitchstone which is restricted to the latter site. Here we also find variation between the interior of Structure 2 and the enclosure ditch (illus 77) with a higher proportion being deposited in the interior. Interestingly, this contrasts with flint implements which are absent
ILLUS 75 Contextual variation in Grooved Ware design structure, shown as proportion of vessels present. The 'interior' shown at A is that of Balfarg henge.
from the interior being only present within the ditch (illus 77). However, the number of flaked stones in question is very small and due caution must be exercised in drawing conclusions. The condition of the worked stone is of a similar nature to the ceramic assemblage (illus 78) with a large proportion of the artefacts being burnt and/or broken. The overall distribution mirrors that of Grooved Ware with the level of destruction being higher in Structure 2 than in the enclosing ditch deposits. A similar distinction exists between Structure 1 and F1002.

How are we to understand these acts of deposition? It seems clear that the assemblages from the enclosure ditch and F1002 represent conscious acts of deposition, an occurrence also noted at Balfarg henge. The presence of conjoining sherds, again noted at the henge, together with a high proportion of pottery and worked stone which had been subjected to burning, points to the removal of broken vessels from areas where fire may have constituted an element in the proceedings (perhaps associated with the closing of the structures), to other, external contexts.
Illus 77 Percentage of Arran pitchstone and retouched flint, by context

Illus 78 Percentage of burnt pottery, burnt and broken flint, by context
Moreover, certain deposits (eg those in the enclosure ditch) are almost certainly deliberate, in as much as they represent placed materials, for example to mark a boundary. Certain items may be deemed ritually ‘charged’ and dangerous, and such materials would never leave specific contexts. We may be seeing any or all of these situations in the Balfarg deposits. The situation in Structure 1 may be similar, but the state of preservation of the internal features, the more limited quantity of Grooved Ware and the lack of evidence of burning tell a less coherent story. It may be that the absence of larger coarser vessels in the area of Structure 2 represents a functional separation – perhaps the larger vessels were used to transport the materials consumed on site, the smaller vessels being used for serving, and the larger vessels did not pass the boundary ditch.

Although similar actions have been identified at Balfarg henge and BRS, basic differences in architecture and depository practices remain. Why, for example, is the ditch of the Balfarg henge apparently clean of material culture while the enclosure ditch around Structure 2 has very particular deposits? One answer may be that we are seeing chronological differences. An alternative explanation is that differences in architecture between the monuments and structures relate to different roles in a elaborate ritual and religious complex. Movement within and between different ‘places’ may be the key to understanding their differences. Such an interpretation allows a fusion of the sites into a coherent whole whilst recognising their many differences.

4.4 THE RING-DITCH/RING-CAIRN/CAIRN COMPLEX (CAIRNS A & B)

G J Barclay

4.4.1 Sequence

The ring-ditch and cairn complex at BRS proved to be the most complicated part of the site. Many sites with a simple appearance have a long and complex history of building, use and reworking, and the sequence at Balfarg is not unusual:

1. ring-ditch, deliberately infilled in a structured manner;
2. ring-cairn A1, with ring-cairn Aii built within it;
3. cairn B built abutting A;
4. burials inserted;
5. both cairns mounded over?
6. alignment of posts erected to north-east of cairn B?

Much of the sequence at Balfarg can be seen as the result of different ways of defining space and the alteration, through structural changes, of the nature and purpose of defined spaces. The sequence of events is summarized in more detail on page 110, above. The pottery associations of the sequence and its date are obscure. Whilst the ring-ditch cuts Structure 1 and cairn B has a Food Vessel-accompanied burial cut through it, these termini are about 1000 years apart. The predominant pottery type found in this part of the site is decorated Later Neolithic material (TGC Group 3: Impressed Ware), but its date and associations are not exactly known; however, the limited radiocarbon evidence for this type of pottery in Scotland suggests a date in the later third or early second millennium BC (uncalibrated).

While looking in more detail at this complex group of features as a whole, there is value also in looking at the individual elements.
4.4.2 The ring-ditch

Ring-ditches are a common feature in eastern Scotland, appearing on many aerial photographs singly, in groups, and near other possibly related features. In southern Britain, excavation has shown many ring-ditches to be the boundaries and quarries of burial mounds. In Scotland, the excavation of three unploughed ditched enclosures by Gordon Maxwell at Black Type, Bait Laws and Fall Hill, all in Lanarkshire (1974), and a fourth by Alistair Maclaren (1967) at Broughton Knowe, Peeblesshire, demonstrated clearly the considerable variety of uses and sequences of development on these superficially similar sites. Ironically, the excavation of monuments where there is a ring-ditched element has concentrated, in Scotland, on upland sites or sites preserved under later structures; little has been done on the numerous cropmark ring-ditches. The range of dates for these sites is probably wide, perhaps from the early third millennium BC (uncalibrated) to the late second or even early first millennium BC (uncalibrated); it is also possible that some of the round barrows/ring-ditches co-located with the groups of square barrows in various parts of Scotland, which are probably Pictish (Ashmore 1980), are of the first millennium AD.

Many ring-ditches known only as cropmarks have been found in close proximity to other monuments which may bear an interpretation as ceremonial or funerary monuments of the Neolithic or Bronze Age. For example, out of 32 pit-circles identified by Tolan (1988) 18 have ring-ditches nearby.

At BRS and at Beech Hill House, Angus (Stevenson 1990), it can be seen that the ring-ditches were not mere quarries but seem to have had a function independent from and prior to the erection of the cairns on both sites. The Beech Hill House site is of particular interest in considering the Balfarg sequence; a ring-ditch 8.5–9 m in diameter, with no surviving gap, was superseded by a cairn with a substantial kerb, apparently set out from almost the same centre. The excavator has suggested that post-pipes were noted in the ditch although the evidence is not conclusive. Grooved Ware very similar to some of the BRS material was found on the site, although it was not associated with the ring-ditch or cairn. Cists were found under, possibly cut through, and around the cairn. As at Balfarg, we see a site with a phase where the definition of a space was important, succeeded by burials and by cairn building closely related to, but only partly respecting, the original boundary.

The excavation at Loanleven Quarry in Perthshire (Lowe 1988) revealed a ring-ditch 20 m in diameter surrounding a number of cists, similar in many ways to that (10 m in diameter) excavated at Kinneil Mill, Stirlingshire (Marriott 1968). It is difficult to tell if the burials were placed in a pre-existing enclosure or if the enclosure was an integral part of the changing nature of the space; for example, it may have served as the quarry ditch to provide some or all of the material for a low barrow or enclosing bank, now destroyed. At Kinneil, as at Beech Hill House (Stevenson 1990) it is interesting to note that the burials spread beyond the boundary ditch.

Looking further afield, excavation of ring-ditch type features in England and Wales has shown the considerable variety of features and sequences of site development over time. Parallels were drawn between the enclosures at Whitten Hill (Miket 1985) and the excavated sites at Broughton Knowe, Peeblesshire (MacLaren 1967), and Rullion Green, Midlothian (Stevenson 1972; Watkins 1984a, 1984b; Watkins & Murray 1988); Miket suggested that site 1 at Whitten Hill and these two Scottish sites showed evidence for tented roof structures. The evidence at Whitten Hill could certainly be interpreted in a different way; the interpretation for such a roof is based solely on the discovery of five charred timbers lying parallel in the ring-ditch, pointing towards the centre of the enclosed area and does not seem convincing to
this author. It might, for example, be suggested that the timbers were part of a burnt fence, where some members had fallen over, or had been pushed over (cf Barclay & Maxwell 1991). At Broughton Knowe a low mound was bounded by an annular ditch; the mound had been covered by a hard-packed layer of soil, clay and large stones, which extended over the top of the ditch, which was itself filled to a great extent by fairly large angular chunks of stone. The excavator suggested that the ditch had been deliberately refilled almost immediately after it had been dug, and that the arrangement of the stony fill suggested that it had packed a timber structure in position. While this was interpreted as being ‘tent-shaped’ there is no reason, from the published evidence, to believe that the timbers (perhaps supporting a fence) were anything other than near-vertical. At Rullion Green, the evidence from Stevenson’s excavation for a roof is flimsier; the only structural elements noted were a low vertical ‘wall’ of stones in the ditch, and a low clayey bank on the inner lip of the ditch. There is no evidence at all for post- or stake-settings, apart from the central post-hole. Watkins, in his more recent work (1984a; 1984b; Watkins & Murray 1988) at Rullion Green, has revealed complex sequences of development on individual ring-ditches/ring-banks, with a relatively late date, which cannot support a roofed interpretation; the excavation of circle B revealed a ring-ditch, with a bank on the inner lip, surrounding scattered deposits of charcoal and burnt bone. Subsequently the ring-ditch was filled with stones. At the henge at Moncrieffe in Perthshire, a small site with, in its phase I, features similar to Whitton Hill (Miket 1985) and Street House (Vyner 1984), Stewart noted the presence of small stakeholes on the outer lip of the ditch, which could ‘only have supported the flimsiest of timber’(Stewart 1985, 130), perhaps to mask the ditch. There is no evidence at Balfarg that the stone-packed upper part of the ring-ditch supported substantial timbers, but the possibility of light fencing having been erected there, perhaps temporarily, must be borne in mind.

The purpose of some ring-ditches might be analogous to the possible non-funerary purpose of certain ring-cairns (Ward 1988). The palisaded ritual enclosure at Street House in Yorkshire (Vyner 1984) bears a striking resemblance to the Whitton Hill site I enclosure (here the timbers are clearly set vertically), and to the enclosure surrounding cremation burials at Loanhead of Daviot, Aberdeenshire (Kilbride-Jones 1935, 1936). The recumbent stone circle next to the cemetery at Loanhead combines a number of features recorded at Balfarg; as with so many other recumbent stone circles of north-east Scotland an integral part of the site was a ring-cairn.

The deposition of white quartz pebbles in the fill of the ring-ditch was clearly deliberate, as was the creation of the ‘halo’ of quartz around the later burial (F2005) in Area A. The occurrence of quartz with ceremonial sites of the Later Neolithic and earlier Bronze Age, as in the fill of the ring-ditch at BRS, is very common, particularly in eastern Scotland (Burl 1976) in association with circular, defined spaces. Quartz is a notable feature of ring-cairns and stone circles, for example at Croft Moraig, Perthshire (Piggott & Simpson 1971), Balnuaran of Clava (Barclay 1990) and Monzie, Perthshire (Young & Mitchell 1939), showing the great range of sites involved.

4.4.3 The ring-cairns

The Balfarg ring-cairn is part of a continuous sequence of activity commencing with the digging of the ring-ditch and its structured filling. There is no very clear association between the ring-ditch/ring-cairn A complex and human burial; the few deposits of human bone are found late in the sequence. Some of the pits below cairn B may have been for burial, but
there is no clear evidence of this and the relationship of most of the pits to the cairn material was lost by the destruction of much of cairn B in the past. The role of ring-cairns in non-funerary ritual has been discussed by Ward (1988), mainly in a Welsh context, who notes the appearance of "token" deposits of human bone. Burgess (1980, 296) summarizes this neatly: 'The great range of ring-monuments – ring cairns, stone circles, henges and the like – seem to have served a broad spectrum of ritual, ceremonial and public functions in which interment played only an incidental part.' It may be that the Balfarg ring-ditch and ring-cairn did not serve a primarily funerary function, or it may be that the funerary function developed only later.

The date of construction of ring-cairn A is not clear. The latest type of pottery found in securely sealed elements of the sub-cairn land surface is Cowie's Group 3 (Impressed Ware), the decorated Later Neolithic material; the Group 3 pottery under the ring-cairn is abraded and may not represent a primary deposit. The few sherds of Beaker recovered from this area are from areas of the land surface exposed between ring-cairns Ai and Aii or from the cairn surface, and the ring-ditch/ring-cairn complex seems to be best interpreted as broadly associated with the Group 3 pottery, identified by Cowie (above), which provides a terminus post quem. A similar Later Neolithic Impressed Ware assemblage, at Grandtully, Perthshire, has been radiocarbon dated to 2130±190 bc uncal (Gak-1398) and 1970±100 bc uncal (Gak-1396) (Simpson & Coles 1990).

The ring-cairns at Balfarg must be seen against a corpus of surveyed but largely unexplored ring-cairns in eastern Scotland which has increased considerably in number and variety since the last considerations of the type in Scotland (Ritchie & MacLaren 1972; Kenworthy 1972; Burl 1972; Lynch 1979). Ring-cairns have frequently been found to form an earlier phase of cairns where the open space is filled up to form a platform cairn or a 'pudding bowl' shaped mound; thus, any assessment of ring-cairns surviving with recognizable central spaces must always be incomplete: only those sites where the sequence was not completed, or where antiquarian work has revealed the central space, can be recognized as ring-cairns.

Ring-cairns must be seen in the context of a great variety of broadly circular monuments with a predominantly ceremonial and/or burial function. It has been argued that although the physical characteristics of some sites (or rather some phases of them) may be different, they might fulfil similar functions. That is, that the nature of the defined space might be more important than the nature of the feature used to define the space; of equal interest, however, is an appreciation of the way in which, on individual sites, the definition of space was deliberately changed by later alterations. While Clare (1986; 1987) tried to address the first point, he did not deal with the second (Barclay 1989).

We must accept the possibility that in different areas, particularly in the second millennium bc, broadly similar functions resulted in the creation of significantly different types of structure to define the same sort of space. It has been noted that the nature of ceremonial and funerary structures becomes more varied and diverse towards the end of the third millennium bc (uncalibrated) and into the second millennium, reaching a peak of variability late in the second millennium. For example, in the early third millennium recognizable similar timber structures appear in long and round barrows and cairns over much of Britain (Vyner 1986; Scott 1992), and sites which can be identified with some confidence as long mortuary enclosures appear right up the east coast of Britain, as far as north-east Scotland. In contrast, at the very end of the Neolithic and into the Bronze Age there is nothing like so great a conformity in structures associated with burial and other ritual
activity. The strong, widespread traditions rooted in the Earlier Neolithic seem to have disappeared and regional traditions became more vigorous and diverse (cf Whittle 1988) as the nature of monuments changed in the Later Neolithic and into the Bronze Age.

Some characteristics emerge clearly, particularly the predominance of small, roughly circular, defined spaces. In Scotland it is interesting to note the frequency of annular structures, where a defined space seems to have no formal access; ‘hengiform’ structures of similar dimensions such as Bainave, Angus (Russell-White 1988), and Moncrieffe (Stewart 1985) seem to be different. The Scottish ring-cairns, almost by definition, have no visible entrance (in contrast to some of the Welsh examples) and ring-ditches are also generally annular. In many parts of Britain there is evidence of multiple phasing of monuments of the second millennium, particularly involving the filling-in or the closure of open spaces defined by annular ditches or bands of stone. In Scotland, for example at the Balfarg ring-ditch/ring-cairn complex, Beech Hill House (Stevenson 1990), Sketewan in Perthshire (Mercer 1988), and at the excavated Clava ring-cairns in Moray (Piggott 1956), it seems to have been the rule rather than the exception that enclosed spaces were modified in such a way that the defined space ceased to exist, although at some sites the space was reflected in later structural elements. For example, in the barrow at North Mains (Barclay 1983c, 199) the central circular space, defined at ground level by an encircling fence and ring-bank, was reflected not only through the body of the mound as it was built (by the use of physical boundaries and the differential use of building materials) but also in a ‘crown’ of large boulders on the mound’s summit.

4.4.4 The mounding of the cairns and the post alignment

It has been mentioned above that the cairns at BRS survived under soil cover which was regularly ploughed, on top of a pronounced ridge, from which soil was actively eroding. It has been suggested that the only way in which such a depth of soil could have arrived on top of the cairns was as a deliberate deposit; this deposit is interpreted as a mound erected over the cairns in prehistory, to form low barrows. As Kinnes (1981) has written: ‘The final version of many sites was a sealed monument, long or round mounds immediately visible in the landscape.’

The only physical link between the ring-cairn/cairn complex and the BRS enclosure is also believed to date from the same period. It comprises an alignment of six post-holes running north-east from cairn B, on a line which, if extended, would intersect both the centre of cairn B and the approximate centre of the BRS enclosure (illus 6). This link can be interpreted in two ways: it could be broadly contemporary with the BRS enclosure and the cairn could have been erected subsequently on the axis of the post alignment; this would require the alignment still to be visible. Alternatively, and more probably, the alignment could have been erected during the life of cairn B, designed specifically, perhaps, to make a link between the new site and the old, in particular the mounded-over Structure 2 in the middle of the BRS enclosure.

4.5 ACTIVITY ASSOCIATED WITH BEAKER POTTERY

The Beaker pottery associated with burials at Balfarg and Balbirnie is of types traditionally considered to be of late date (Ritchie 1974; Mercer 1981). In contrast, the All-Over-Cord Beaker associated with the non-burial activity is likely to be rather earlier:
but Cowie, in referring above to the British Museum programme of radiocarbon dating (Kinnes et al 1991) (above p 135), suggests a calibrated range of 2600 BC to 1800 BC. He notes the parallels between the assemblage from Balfarg and those from coastal domestic sites; he also points to the presence in the assemblage of ‘domestic’ coarser vessels, with cordons. Of particular interest in his discussion are his comments on the high proportions of three vessels which are found in discrete areas of the ditch (suggesting deposition before scattering or abrasion could occur) mixed with many sherds which were abraded, forming only small parts of many vessels. The possibility of the Beaker assemblage from the ditch being the result of domestic activity must be considered; however, the deposition of so much pottery in a limited area, if not the result of redeposition of midden material, might be seen as a further reflection of the breaking and deposition of pottery associated with the continued ceremonial function of the BRS enclosure, paralleling the Grooved Ware deposits lower in the filling of the ditch and, indeed, the Earlier Neolithic pit deposits. The sequence of deposition, in which Grooved Ware in the primary fills is followed by Beaker in the upper fills, is found in a number of henge ditches (Harding 1987). The very limited spread of Beaker sherds suggests deposition over a very small area on the edge of the ditch, or in the partly filled-in ditch itself; this is perhaps not what might be expected from a domestic episode, when a rather broader spread of material might have occurred.

4.6 BURIALS OF THE LATE THIRD AND EARLY SECOND MILLENNIA BC

At all three of the major foci of activity (the Balfarg henge, Balbirnie stone circle, and the sites at BRS in Area C) there were human burials, mainly late in the main period of use of each site. The henge had the remains of only one burial, located near its centre, accompanied by a handled Beaker (Mercer 1981).

The total number of burials represented in the complex is surprisingly large, over 50 individuals. The activity of a number of periods is clearly represented. Some are associated with activity of the later Neolithic (eg deposits II, IV, VI, IX, X in the stone sockets of the Balbirnie stone circle). There are about eight cist burials, one in the centre of the henge, four or five beneath the cairn at Balbirnie and two associated with cairn B in Area C at BRS. However, the greatest number of burials is made up of simple deposits of cremated bone inserted in the material of the cairn erected within the Balbirnie stone circle and, to a lesser extent, in late contexts near the BRS enclosure. The final group comprises the remains of a cremation cemetery to the west of the henge, co-located with the scatter of Earlier Neolithic pits discussed above, associated with bucket urns.

The understanding of the pattern of burials can be aided first by consideration of date. There are difficulties because of the dearth of radiocarbon dates attached to the burial phases and to the main phase of use of the Balbirnie stone circle. The following split by period is tentatively suggested:

Mid/late third millennium BC (uncalibrated)

Balbirnie Stone Circle: Burials III, IV, VI, VII, IX

Balfarg Henge: miscellaneous burnt bone scatter (none certainly human)
Early/mid second millennium bc (uncalibrated)

Cists
- Henge Cist 1
- Balbirnie Cists 1 to 4 + Beaker
- BRS Cists A and B

Cremations
- All other cremation deposits at the Stone Circle, in cairn B and elsewhere at BRS.

While the great number of cremations in the cairn material of Balbirnie stone circle is the most dense concentration of human burial in the complex, it must be remembered that other less resilient contexts may also have held burials, and hence the number of simple late cremations might have been even higher. These are: the earthen mounds which may have covered the cairn complex at BRS (two cremation deposits lay on the upper surface of cairn B); the earthen mounds which may have covered the timber structures (one burial survived at the edge of Structure 1); and the cremation cemetery to the west of the henge, which has suffered much damage (any burials in pits only slightly shallower than those excavated pits, would have been destroyed).

Therefore, the trend that we can detect in the later phases of all the elements of the complex, towards burial as the main use, might have been even more pronounced.

It is not possible to tie the burials securely to a chronology sensitive enough to differentiate episodes of burial with any confidence, particularly in the case of the simple unaccompanied cremations. These, however, occur mainly in late contexts – in the covering-cairn of the stone circle, in the upper surface of cairn B and on the edge of the suggested mound covering Structure 1. Perhaps they can be seen to belong to the mid to late second millennium, certainly post-dating the Food Vessel-accompanied burial on the stone circle and possibly post-dating the cists cut through cairn B.

The burials to the west of the henge could not be radiocarbon dated. The fragments of three featureless bucket urns associated with two of the burial pits cannot be securely dated nor tied convincingly to the sequence of events elsewhere in the complex. The location of the cemetery, on the closest piece of flat ground to the south-west entrance to the henge, is surely significant, as is the avoidance of burial within the henge enclosure itself. At North Mains (Barclay 1983c), burials in a variety of forms, post-dating the main use of the enclosure, were found within the henge; only in the later second millennium/early first millennium bc (uncalibrated) were burials placed in such a way that suggested the deliberate avoidance of the enclosed area of the henge (Barclay 1983c, figs 3, 20 & 21: F3–F6).

One of the cremation burials in Area A had around it a halo of quartz pebbles (F2005), recalling the association of quartz pebbles with urn burials (once again, particularly with bucket urns) on several sites in south-west Scotland; eg Ardeer, Ayrshire (Morrison 1968) and Luce Sands, Wigtownshire (Cormack 1968).

Further burials in the area of cairn B may be represented by the unusual pits under the cairn. One (F8030) produced jet disc beads from around and within it. F8032/8039 and F8033 were large stone-filled pits. It may be that these are earlier Bronze Age graves; from the state of the surviving bone in cist A it would be expected that little or no bone would survive in the acidic soils filling these pits.
4.7 EVIDENCE FOR LATER BRONZE AGE SETTLEMENT

The two pits in Lane 3 can best be paralleled in shape and character in the cooking pits at Myrehead (Barclay 1983d); two pits at that site were radiocarbon dated: 875±85 bc uncal (GU-1608) and 880±60 bc uncal (GU-1609). While the pits at Balfarg are around 400 years older they appear to be in a very similar style and are perhaps best given the same interpretation. While the urn-associated cremation burials to the west of the Balfarg henge, in Area A, could not be radiocarbon dated, they are perhaps the element of the ceremonial and burial complex which are closest in time to the cooking pits. There is no other evidence of Bronze Age settlement in the area. At Myrehead, the cooking pits were associated with saddle querns; the only saddle quern found at Balfarg was located not far from the cremation burials, to the west of the henge (S31). It is interesting to note that the later Bronze Age in situ cremations to the north of the henge at North Mains (Barclay 1983c) were radiocarbon dated to 895±60 (GU-1437), 905±85 (GU-1350) and 1085±70 (GU-1351), all bc uncal.

4.8 THE BALFARG/BALBIRNIE COMPLEX: LOCATION, NATURE AND ASSOCIATIONS

The site at Balfarg/Balbirnie is situated at the south-east end of the Lomond Hills, which form a considerable barrier to movement, channelling access to and from the fertile land of the Howe of Fife to the east and west of their massif; problems of access would have been further compounded by the extent (far greater than before the extensive drainage campaign in the 19th century) of wet, badly drained ground, particularly in the area to the east of Loch Leven.

Barnatt (1989), in considering the concept of ‘regional foci’ argues that the average spacing between such places was relatively consistent. He suggests (ibid, 221) that monuments at higher levels in the site hierarchy commonly display non-random siting at ‘central’ or ‘boundary’ positions (in a topographical sense). Balfarg’s position would certainly seem to be on the edge of the Howe of Fife, but its relationship to its overall ‘catchment’ is impossible to understand, without the catchment itself, and its settlements, being better defined. Balfarg is, however, geographically central in Fife, and is the only known complex of its kind in the area between the Tay and the Forth to the south-east of the Cleish Hills. It is interesting to note that if the complex had been placed anywhere to the north or north-east, on reasonably flat ground, the Lomond Hills would have severely restricted the outlook to the south-west; as many writers have observed (in particular Mercer in his consideration of the Balfarg henge) south-western orientations are common, and seem important, in later Neolithic/earlier Bronze Age ceremonial architecture.

Barnatt (1989, fig 5) plots the henge distribution in ‘Tayside’ although the selection of sites included is not consistent. This author would agree with Harding’s doubts about the Newton of Boysack enclosure as a henge (Harding 1987, 415–16) but would certainly include some of the features at Forteviot (Harding 1987, 411), the small henge at Moncrieffe (Stewart 1985), and the probable henge at Culdrochie, Perthshire (Harding 1987, 408), as well as the hengiform enclosures at Strathmiglo, Balmalcolm (illus 79) and Rossie Drain (Harding 1987, 354) (all Fife) (illus 1). These alterations to the distribution of henges in the area would disrupt the neat pattern in Barnatt’s figure 5. If we are to accept that Balfarg has a function as a ‘regional focus’ in the later Neolithic, then we might suggest that the earlier Neolithic pit digging and perhaps also the timber structures had a local significance and that other local foci of the period would have existed.

What, in the archaeological record of Fife, relates to the phases of Balfarg’s use as first
a local focus, then a regional focus, and then perhaps again a local site in the earlier Bronze Age? Cropmarks in the Howe of Fife may conceal, in their ill-understood variety, elements of the settlement background to Balfarg. The frustratingly incomplete picture of the enclosed site at Kinloch, Fife (Barber 1982) and, further afield, the hints provided by the trial trenching at North Mains in Tayside (Barclay & Tolan 1990), suggest that there may be a tradition of enclosed earlier prehistoric settlement yet to be explored. Sites and artefact find spots which may reasonably be dated to the Neolithic or earlier Bronze Age are scattered across central Fife. There are chance finds of axes, arrowheads and carved stone balls, discoveries of burial cists and cinerary urns, but none in any meaningful pattern. There are a number of ring-ditches, including two some 1.5 km to the east of Balfarg, which may or may not be of the period of interest. The area around Balfarg is not particularly rich in material of the Neolithic and earlier Bronze Age; there are the cairns at Pitcairn (Barclay 1978) and Law Head (RCAHMS 1933, 208-9), and a find of a stone axe from Markinch, but little else is known for a distance of 3-4 km until the Ladybank area is reached. The latter includes the possible henge at Balmalcolm (illus 79) and is close to the possible Neolithic settlement at Kinloch farm (Barber 1982).) South-west of there, little is known closer than the area between the summits of the East and West Lomond hills, where four cup-marked stones have
been found (one close to the Early Bronze Age cairn on the summit of East Lomond, 5 km to the north-west of Balfarg). The limited fieldwalking programme undertaken around Balfarg has provided little more in the way of background to the use of the complex.

Jan Harding (1991) has discussed the idea of areas set aside as purely ceremonial sites, separated from more clearly domestic activity, such as settlement or farming, and has questioned the application to other parts of Britain of models developed in Wessex. Our knowledge of the nature of domestic sites in the Neolithic of Scotland, outside the northern isles, is very limited and it is difficult to discuss the relationship between groupings of ceremonial sites and the operation of settlements and agriculture. At Balfarg/Balbirnie the area within which the various sites were erected and used appears to have been defined by watercourses and this may have been deliberate. Jordan's work (above) has suggested that the area between the watercourses was in the past more pronouncedly hilly; erosion has flattened hills and filled in hollows to some extent. Effectively, the ceremonial and burial sites were set on the areas of flatter ground, the only naturally dry-shod access to which was across the narrow neck of land between the burns, at the north-west. The extensive sampling exercise undertaken at Balfarg located nothing which could be clearly identified as Neolithic or earlier Bronze Age settlement, although the early Neolithic pit digging, and the Beaker activity around the BRS enclosure, could still bear a domestic or partly domestic interpretation.

A full picture of the nature of ceremonial and funerary complexes such as Balfarg must rely to a considerable extent on both extensive and intensive excavation. We have seen that there can be considerable movement over time of areas of activity within such complexes. The sampling strategy adopted at Balfarg was designed to find any significant concentrations of archaeologically detectable activity in the areas available for investigation. In seeking to draw wider parallels, we must first seek data of comparable completeness. Close concentration on narrowly defined sites has resulted in a limitation of the available data. Where the narrow confines of a burial mound, or little more than the enclosed area of a henge, has been excavated (eg North Mains: Barclay 1983c), evidence of activity contemporary with, or earlier or later than the main focus will only be detected if it lies within these narrow bounds. At North Mains, earlier and later activity was detected, but we must ask ourselves what else was going on further afield, beyond the excavated areas?

The detection and investigation of these 'peripheral' activities is important. In our investigation of ceremonial and funerary complexes we can see that the manipulation of the symbolism of space is important. This appears as changes to the nature of a site (eg filling in the central space of ring-cairn) but also in the way that activity moves from one focus to another, perhaps deliberately colonizing or, alternatively, avoiding the site of earlier activity. At North Mains we can see, for example, that the Period IV burials (dated to the late second/early first millennium BC – uncalibrated) concentrate just to the north of the henge enclosure, apparently deliberately avoiding using it.

In his consideration of ceremonial complexes in the midlands of England and in East Anglia, Loveday (1989) notes a recurring pattern of monument types occurring together: cursus monuments, oblong ditched enclosures and hengiform monuments. In Scotland our understanding of the groupings of monuments has not yet matured sufficiently for a similarly detailed analysis to be attempted as the rate of discovery of new sites and groups of sites is still high, and little excavation and dating evidence for monument types is yet available. While suggesting due caution in comparing such widely separated material, we may note the co-occurrence of what might be interpreted as Scottish versions of Loveday's types, for example, in the Lunan Valley in Angus. Here the pit-defined cursus variant at Balneaves lies
only a few metres from a pit-defined rectilinear enclosure and the site of a 'hengiform' enclosure (Russell-White 1989), close to a number of ring-ditches, and not far from the pit-defined rectilinear enclosure at Douglassmuir (which had radiocarbon dates of 2900±55 (GU-1210), 2945±70 (GU-1469) and 2950±65 (GU-1460), all BC uncal: Kendrick 1980, and P Ashmore, pers comm). It is clear from the results of recent aerial reconnaissance and of monument reinterpretation that there is a greater variety and density of ceremonial sites and complexes in eastern Scotland than we had believed.

The individual foci of activity at Balfarg/Balbirnie are very much spread out but most elements had a complex individual history, overlapping in time and in artefact associations with what was happening on another part of the site. One characteristic which might allow the differentiation of types of complex is the presence of one or more of what we would see as the same kind of site; eg at Balfarg/Balbirnie two stone circles (including that within the henge), two henges, two timber structures. Unexcavated sites, such as Forteviot (Harding 1987), suggest that other major complexes in the area might also have multiple duplication of monument types.

Developments on a site can very often be seen as a change in the definition of space, perhaps in some cases reflecting a change in function or status of the site. We must ask why there is movement from one focus to another for a different function, and movement from one focus to another for what seems to be a similar function. Further, we must consider the space between elements which might be related.

We can note that extensive complexes of ceremonial sites, which might involve the sacrifice of large areas of productive land, have mainly (as yet) been found in lowland arable areas. There are hints that this is an effect of the availability of cropmarks as the means of discovery; at two locations in Lanarkshire there is clear evidence of extensive upland Neolithic ceremonial and burial activity. At one, Blackhouse Burn, a vast Neolithic enclosure (RCAHMS 1978), which has been compared in size with Durrington Walls in Wiltshire, is located in a landscape of complex burial cairns (P Hill, pers comm). At the other, clear evidence of upland Neolithic settlement and burial has been found at Biggar Common (Sheridan 1990; Johnston 1991; Ward 1991).

Barrett (1988) stated that 'Ritual is made up of actions, not things. There are no such things as “ritual sites”. . . . The places where ritual may be enacted and the artefacts used will also have been encountered in the daily routines of life (including the avoidance of sacred ground).’ We may note that the focus of activity over the area defined by the two watercourses at Balfarg moved with time. The earliest activity, the early Neolithic pit digging, occurred in two places which we can identify. At the eastern of these two, the next activity was related to the erection and use of the two timber structures, which ended, perhaps, with the enclosure of the later one at the end of its use. We may suggest that the construction of the full-blown henge at Balfarg follows fairly quickly and that the focus of attention shifted to that site for a time. Towards the end of the millennium the Beaker activity and later activity associated with the later Neolithic Impressed Wares showed a continued or resumed interest in the area around the BRS enclosure (although not, as far as we can tell, within the enclosure itself). The burials accompanied by Beakers or Food Vessels, and the undated, but presumed late, cremation deposits (to the west of the henge, in the mounds covering cairn B and possibly Structure 1 and, in greatest profusion, in the Balbirnie stone circle), show a general interest in the funerary use of the whole area.

The place of the complicated sequence of development of the Balbirnie stone circle in the larger sequence of the ceremonial complex as a whole is problematic. Radiocarbon
evidence is lacking. Grooved Ware sherds found at Balbirnie (Henshall 1981) show that there was some later Neolithic activity on the site, and the parallels between the central setting there, and at the Stenness henge, might reinforce the suggestion of a date in the mid to late third millennium BC (uncalibrated) for the earliest activity on the site. It may be that the stone circle was sited on an existing feature, and it is not beyond the realms of possibility that it replaced (and obliterated) an earlier timber setting associated with the Grooved Ware and the central feature (cf Machrie circles 1 and 11: Haggerty 1991).

4.9 CONCLUSIONS

The excavation of the complex at Balfarg/Balbirnie has provided us with useful information on the development of individual sites of known type – henges, stone circles, a ring-ditch, ring cairns – and has led to the discovery of a new type of possible funerary structure. It has allowed the extension of our understanding of the ritual use and deposition of pottery, particularly Grooved Ware. It has also added to our understanding of the ways in which sites develop and are changed over time, and the ways in which such individual monuments relate to each other in function and over time. The value of excavating substantial areas well beyond the visible boundaries of ‘monuments’, and the need to do so, as pressed by Burl (1969), have once again been clearly confirmed.

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INTRODUCTION

The buildings described in this paper belong to a number of different regional “Neolithics”, not to a unitary “Scottish Neolithic”. As Kinnes has stated: “Scotland ... is a country of great geographical variability, remarkably diverse in landscape and climate...” whose unity “...rests upon its separation from the south rather than in its own uniformity. There is no reason, other than that of modern political expediency, why the “Scottish Neolithic” should exist as an entity...” (Kinnes 1985)

As elsewhere, the shortage of data for Neolithic settlement and economy throughout most of Scotland is striking, in contrast to the quantity (if not quality) of data on burial and ceremonial sites gathered since the last century. Problems arise from concentration on this relatively well-known aspect of the Neolithic. As Richards (1991) has noted “...studies concerned with social organization and its transformation have focused on chambered tombs and henge monuments...”, which have been used to erect “frail [interpretative] structures”. In addition, for historical reasons, the interpretation of the Neolithic has been based on data predominantly gathered from the north and west, and/or from monuments largely constructed of stone. In most of Scotland, Neolithic activity is as yet attested only by burial and ceremonial monuments and by artefact discoveries. In the arable areas of Scotland the density of site types classifiable as Neolithic is growing rapidly as a result of aerial photography; however, the types of Neolithic site which can as yet be recognized easily from the air are ceremonial and funerary. The majority of the buildings of the Neolithic (and mainly of the late Neolithic) have been identified in Orkney and Shetland. Indeed, it is only in these areas that we have any balanced picture of the Neolithic, as there are burial, ceremonial and domestic sites in close proximity and in substantial numbers. But care must be exercised in using sites and interpretations from these areas to interpret the Neolithics of the rest of Scotland.

In this paper I will look at the roofed buildings which have been excavated in Scotland, together with other structures which might be interpreted in this way. Throughout I use the term “building” rather than “house” because of the difficulties of drawing a distinction between some domestic structures and buildings which may have had different functions. Space prevents any consideration of buildings associated with Beaker material or of early Bronze Age date.
There are few comprehensive surveys of the buildings of the Neolithic. McInnes (1971) summarized the later Neolithic material; at that time only four sites were described: Skara Brae, Rinyo, Northton and Eilean an Tighe. Of these the last two had no coherent buildings of the period. Since then a surprisingly large number of individual buildings have been investigated. Consideration is hampered by a dearth of published data; many of the most important excavations are so recent that there are only interim reports (eg. Barnhouse (Richards 1990b), Loch Olabhat (Armit 1988; 1992)). Others, although undertaken in the 1970s, are not yet fully published (eg. Noltland and Balbridie). Fortunately, we have the promptly published excavations of Shetland sites by Calder (1950; 1956; 1961), Scord of Brouster (Whittle et al. 1986), and Knap of Howar (Ritchie 1983).

The data available tell us very little about the possible range of Neolithic domestic structures: the few tens of known buildings, from the hundreds or even thousands which must have existed over the 1500 or more years of the Neolithic, provide too small a sample for reliable general conclusions yet to be drawn. Even the relatively well understood domestic architecture of Orkney and Shetland is not as well known as we would wish. And from that large area of Scotland which contains the most easily cultivated and the most productive agricultural land – the eastern coastal plain and the south west – there is only a handful of excavated settlement sites, Balbridie being the only substantial, coherent building.

Because of the regional nature of the Neolithic in Scotland the description and much of the discussion is arranged in discrete sections, starting in the north. Space does not allow any significant discussion of domestic sites where there is no coherent building, or where buildings are too fragmentary to add much to the discussion, and the same constraint prevents the rehearsal of detail of recently published and easily available discussions about the nature of the use of domestic space (eg. Richards 1990b; 1991; this volume).

SHETLAND

Shetland has perhaps the highest concentration of visible Neolithic domestic structures, together with their field systems, in mainland Britain. Yet they rarely appear in syntheses of the British Neolithic. Perhaps it is the difficulty of distinguishing Neolithic from later buildings that has resulted in the relative lack of attention paid to them. We owe our considerable knowledge of these sites largely to the efforts of one man, C S T Calder, who undertook an impressive programme of research through field survey and excavation in the decades after the second world war (Calder 1950; 1956; 1961; summarized effectively by Henshall 1963, 151). He wholly excavated six buildings and surveyed many others, with their associated field systems, and recovered ample evidence of an agricultural way of life. He identified 60 other buildings as being of the same type as those he investigated, although the “typical” sort of building he identified remained in use through to the end of the Bronze Age.

Whittle’s work at Scord of Brouster (Whittle et al. 1986) has built very effectively on this early work, providing a greater range of information on the buildings, their field systems and their contemporary environment. Some of the buildings and the local Zetland
group of chambered tombs share a number of characteristics. First, there is the heel-shape most clearly visible at the so-called Stanydale “temple” (Figure 5.1), but also visible in the possible first phase of the “Benic Hoose” (Figure 5.2). The construction techniques used in the tombs and buildings are also similar, in their use of massive and irregular blocks, laid carefully, with the portals and divisions between recesses marked by upright stones.

The “typical” buildings vary considerably in plan but are characteristically oval and the main chamber, entered from one end, generally has a number of recesses. The type was in use for a long time; for example at Scord of Brouster elements of Building 2 were dated to 3340–2879 BC (CAR-252) and of Building 3 to 1737–1434 BC (CAR-477).

The chronology of many of the Shetland houses is unclear. The pottery assemblages (Henshall in Calder 1956; Whittle et al. 1986, 59) have parallels in Hebridean styles and Beaker. The few available radiocarbon dates show that basic building forms had a long life and the artefact assemblages are not clearly understood. The typical oval building at Ness of Gruting, excavated by Calder and interpreted by him as Neolithic (1956), produced a radiocarbon date for material within the wall of 2270–1890 BC (GrN-6168) (Barcham 1980). Amongst the finds within the building and in and under its walls were polished stone axes a carved stone ball, and large quantities of Neolithic pottery. The precise date of the building is still in doubt. Whittle (Whittle et al. 1986, 139), in discussing the nature of the irregular Building 2 at Scord of Brouster, has pointed to the dangers of assuming that “typical” structures are indeed so. While such “typical” buildings exist in significant numbers little attention has been paid to the very large numbers of small, irregular buildings, similar to Scord of Brouster Building 2, recognized in field survey in northern Scotland in recent years (eg. Mercer 1980). It may be that many of these structures are Neolithic.

Structurally, the houses are simple. The walls, generally very thick, were built of mixed material faced internally (surviving up to over 1m in height) and often externally; they surround areas within which there is often little evidence of roof support structures. The “temple” at Stanydale has only two internal postholes (each holding two posts) on its axis; the house at Gruting School (Figure 5.1) has a scatter of small postholes, but there is no evidence to show how large structures like Ness of Gruting were roofed. The source of timber for relatively large roofing spans is also difficult to determine. The posts at the Stanydale “temple” were identified as spruce and the charcoal in the floor deposits also showed Scots Pine to be present; timber of both species must have arrived either as driftwood (from Scandinavia in the case of the spruce), or as directly imported timber; neither species grew locally. Calder preferred direct import (1950) as he believed it unlikely that the 700+ linear metres of timber probably necessary for the “temple” could have been obtained as driftwood. Reconstructions and descriptions of the buildings assume low pitches, but how adequate rain shedding was arranged is a matter for further study. There is ample evidence, from the buildings, for part of the economy of these farming communities, in the form of cereal grains, querns and ard points.

The two complex buildings excavated by Calder at Whalsay, the “Benic Hoose” (Figure 5.2) and the Standing Stones of Yoxie (Figure 5.1) (Calder 1961) lie close to each other within a field system. The Benic Hoose seems to have at least three main phases of construction. The first is a heel-shaped building, the wall face of which is visible within
the later structure. The second phase seems to involve the addition of a further chamber or forecourt. Both chambers have hearths and drains. Finally, the inner chamber was reconstructed in such a way that two recesses were lost and the outer chamber was divided differently. The plan reproduced here is a simplification of Calder's original.

The structure known as the Standing Stones of Yoxie has three chambers with paved access between and through them. The inner chamber has a trefoil arrangement of recesses, reminiscent of some of the local chambered tombs.

The oval building at Gruting School (Calder 1956) has a chamber 7.6m by 5.6m with a smaller chamber of 2.75m diameter off. The post setting in the main chamber might represent more than one phase of roof support. The wall has shallow recesses. The building has no hearth, and accordingly Whittle argues (Whittle et al. 1986, 139) that this building did not have a straightforward domestic function.

At Scord of Brouster, excavations revealed three buildings (in the sequence Building

Figure 5.1: Ground plans of Neolithic buildings in Shetland. (1) Standing Stones of Yoxie, Shetland (the darker-toned area is a later alteration); (2) Gruting School; (3) Scord of Brouster Building 3; (4) Stanydale "Temple"; (5) Ness of Gruting (the darker-toned area is a later alteration). In numbers 1 and 4 the black marks are upright stones (except where marked "p" in 4); in 2 and 3 the black spots are postholes, post-settings or post-supports. The cross-hatched areas are hearths. (Sources: various)
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Figure 5.2: Ground plans of Neolithic buildings in Shetland and Orkney. (1) The "Benie Hoose", Shetland. The house has three main phases – a: the light-toned area; b: the dark-toned area, and finally c: the additions marked by the dot and dashed lines in the inner and outer chambers. (2) Building 8 at Barnhouse. The cross-hatched areas are hearths. (Sources: various)

2, Building 1, Building 3) spanning the Neolithic to the Bronze Age. The excavator has suggested that the buildings were used sequentially rather than concurrently (Whittle et al. 1986). The buildings are scattered through an extensive agricultural system of field banks, lynchets and clearance cairns.

Building 2 has an irregularly kidney-shaped plan with one or two recesses measuring 5.2m by 3.8m internally. Phase 2 is radiocarbon dated to 3341–2671 BC (CAR-252). It has no convincing hearth feature nor any obvious entrance. Whittle (Whittle et al. 1986, 137) suggests that it may be a "specialized or seasonal structure". Building 1 is an oval building measuring 7m by 5.4m internally with hearth features and six recesses, which underwent reconstruction over a considerable period. Phase 2a is dated to 2890–2480 BC (CAR-246). Phase 2b produced dates of 2890–2470 BC (CAR-247), 2910–2480 BC (HAR-2413) and 2270–1780 BC (CAR-248) (recess 6).

At Stanydale, Calder excavated a remarkable building, the Stanydale "temple" (Calder
1950) and a house (Calder 1956), lying close to other buildings within a field system. The “temple” is a very large structure which may be interpreted as a roofed building, with the roof ridge held up by four posts, set in two double postholes, or as an open court with free-standing posts. It has a single large chamber (maximum 11.9m by 6.7m), entered via a paved passage through the centre of the concave façade. In the western half are six contiguous, apsidal recesses measuring c.2.4m by 1.2m. The walls are an average of 3.8m thick. There are six standing stones arranged in an arc to the south of the building (Calder 1950, fig 8). Calder interpreted the structure, as is clear from its name, as a religious building, and drew on parallels in the Mediterranean area, particularly Maltese structures. The building does not seem to be purely domestic and an interpretation as a communal focus for religious or ritual activity seems likely.

The Stanydale house has two chambers, the outer 6.4m by 4.7m, entered via a complex passage through walls 1.8m to 2.7m thick; the inner, a small circular chamber measures 2.1m in diameter. There is a central hearth and the larger chamber has two small recesses. At the south end is a poorly preserved small rectangular enclosure.

ORKNEY

The only two buildings known in Orkney which may be from the earlier part of the Neolithic are from Knap of Howar. They measured 7.5m by 3m and 10m by 4.5m internally (Ritchie 1983, fig 2), and have superficial parallels in rectilinear structures of the period elsewhere in Scotland (eg. Eilean Domhnuill, Western Isles (Armit 1992) – see below). However, there are problems with the relationship between the buildings at Knap and the midden material into which they were dug (and to which the radiocarbon dates may relate) which should be borne in mind (Kinnes 1985, 27); the primary midden dates vary considerably, from early to late Neolithic, and the date of the visible structures is not absolutely certain.

Building 1 had a wall of drystone facing on both sides containing a core of midden material. The area enclosed was rectilinear with rounded corners, totalling approximately 10m by 4.5m. It was divided into two rooms by a stone partition. Room 1a was furnished with a low bench. Room 1b had a trough quern, hearth and a wall recess.

Building 2 was of similar construction and shape to Building 1, with three compartments measuring in total 7.5m by 2.6m – 3.6m. The innermost room was “intensively furnished” with wall-recesses. The middle room had a hearth. Immediately to the east of the northern partition was a low stone kerbed area. In a second phase the door of Building 2 was blocked and the interior remodelled. It is not clear how these houses were roofed. The middens provided evidence of an economy based on arable agriculture in the form of cereal grains and querns and on a wide range of wild resources.

Five settlements of the later Neolithic have been investigated in Orkney: at Rinyo (Childe and Grant 1939; 1947), Skara Brae (Childe 1931; Clarke 1976a; 1976b), Links of Noltland (Clarke et al. 1978; Clarke and Sharples 1990), Barnhouse (Richards 1990a; 1992) and Pool (Hunter et al. in press). As yet only interim accounts are available for the excavations undertaken in Orkney in the last 25 years (apart from Knap of Howar). Skara Brae is the best known Neolithic settlement in Britain and has been the focus of discussion
of house construction and the organization and development of settlements. The settlement's remarkable preservation offers unrivalled opportunity to analyze the organization of space, but, as Richards laments (1991), much of the rich artefact assemblage, which would have added considerably to this area of study, was discarded by the excavator when the site was cleared out.

The resemblance of the architecture and internal arrangement of the Orkney late Neolithic buildings to that of the Orkney tombs has been the subject of much discussion (eg. Hodder 1982a). The buildings and most of the tombs share an entrance oriented southeast to northwest.

Although there is an interim account of the excavations undertaken 20 years ago at Skara Brae (Clarke 1976a), the most useful analysis of the buildings at Skara Brae is provided by Richards (1991) who describes the settlement and the individual buildings and attempts an analysis of "socially constructed space" (Richards 1990b). There are ten buildings in the settlement, with clear signs of refurbishment and rebuilding of individual buildings over an unspecified period. Clarke has identified (1976a, 11) differences between earlier and later buildings (exemplified by Buildings 9 and 7) – the former smaller with recessed "beds" and "dresser", the latter larger but with "beds" and "dresser" set out into the greater floor space. However, the pattern of central hearth, right and left hand "beds" and a rear "dresser", with a central hearth is maintained through time, as is the difference between the size of the left- and right-handed "beds" (the right is larger). The use of space in the buildings is determined by the positioning of the entrance, the central hearth and the furniture. In Building 7 the paving slabs of the entrance curve around to the right and furniture to the left would prevent access in that direction. Richards (1991) notes that if access is gained in this way in all buildings of this pattern, then the left hand bed area is that furthest from the entrance. The large central Building 2 at Barnhouse makes this arrangement even clearer, in that access is directly into the right chamber and access to the left chamber can only be obtained from the right side of the first chamber. Richards (1990b) has written compellingly of the cosmology of the late Neolithic people of Orkney, as it is given concrete shape in the architecture of their houses and tombs.

Richards suggests that the settlement was not buried deliberately in midden material, but that the buildings were given a turf "jacket". Building 8 is sufficiently different to merit comment. It is separate from the rest of the buildings, has two means of access (one through an elaborate porch), and an atypical arrangement of features in which the general pattern of internal arrangements is maintained but different elements are substituted. It is clear that it would be unwise to assume that all buildings, even if superficially shaped and equipped in the same way as houses, are ordinary houses.

Richards' own excavation at Barnhouse (1990a) has shed further light on the complexity of later Neolithic Orcadian settlements and on the variability of structures within them. The excavation revealed a hierarchically organized group of six small "early type" Skara Brae/Rinyo buildings adjacent to a larger building (Building 2). The small buildings share the same internal arrangements as those at Skara Brae; Building 2 by contrast has two chambers although in other respects it is an unusual "early type" Skara Brae building, while the architecture of the larger is of similar nature and layout to the passage graves of Quoyness and Quanterness. Similarly, the sophistication of its construction is only matched at Maes Howe.
It is ironic that the damage caused to Barnhouse by ploughing, in reducing it to bare wall footings, made it possible (in a way it has not been possible at deeper stratified sites) to examine a large area and the relationship between many buildings. While Building 2, which has already been mentioned, is a large enough structure, it is dwarfed by Structure 8. This is a roughly square building centrally positioned on a sub-circular clay platform enclosed by a stone wall. Richards (1990a) points to the similarity of this arrangement to that at Maes Howe and the Stones of Stenness henge. The building has internal arrangements clearly related to, but different from, those in an ordinary building; for example, it has an enlarged central hearth and a “dresser” on the wall facing the entrance.

The importance of the hearth, touched on in the description of Skara Brae, is also reflected at Barnhouse. The central hearths and the fire kindled upon them seem to have had considerable significance, both for basic family needs and the orientation of the house (Richards 1990b). The complex Building 2 at Barnhouse (Figures 5.3 and 5.4) has
two large hearths, one in the right hand chamber, associated with features and furniture for cooking; the second lies in the left chamber, assuming a more restricted position in the “inner” area of the structure. Access to this area can only be gained by crossing a cist slab. The symbolic significance of hearths is clearly demonstrated by the covering of the first hearth in this building and, even more strikingly, by the position of the hearth in the middle of the entrance of Structure 8 (where it was probably slabbed over and invisible) and in the similarity of the square features in the middle of the Stenness henge (Ritchie 1976) and the Balbirnie Stone circle (Ritchie 1974). Richards (pers. comm.) suggests that the parallel with Stenness may be very close indeed, with the possible remains of an “entrance hearth” 5–6m north of the central setting.

In the absence of the excavation report for Links of Noltland we must rely on two brief interim reports (Clarke and Sharples 1990; Clarke et al. 1978); the former contains the only published plan. Only one building was investigated and this was not bottomed. The excavator noted broad parallels between Skara Brae Building 8 and this large two-chambered building at Noltland, in its location outside the midden area and its apparently specialized function, although the shape and size are not comparable. The incompleteness of the excavation prevents further discussion of the function of the building. Its fill is interpreted as deliberate.

Figure 5.4: Ground plan of Building 2 at Barnhouse, Orkney, showing access routes. (Reproduced by permission of Colin Richards)
At Pool a range of sub-circular buildings was excavated (Hunter et al. in press); later disturbance and the limited areas which could opened at the bottom of a deep site has restricted the number of complete plans available. Some, for example Structure 8 (the most complete), conform to the Skara Brae. There are also hints that there is a broadly similar development from early (smaller) to later (larger) houses.

The site at Rinyo (Childe and Grant 1939; 1947) revealed possibly seven buildings, of more than one phase. The overall internal arrangement of the houses parallel the other Orcadian sites. The paving in House A suggests access directed along the right hand side of the hearth, as Richards (1990b) would suggest was the norm.

THE WESTERN ISLES

Modern excavation in the Western Isles has discovered an extraordinary potential for the preservation of Neolithic settlement evidence, but as yet only a limited number of sites has been investigated.

Armit (1992) recovered the remains of two repeatedly reconstructed rectilinear buildings at Eilean Domhnuill, superficially similar, in their relationship one to the other, to the Knap of Howar buildings. The structures measure 6.5m by 4.5m and 4m by 3m internally (Armit 1988; 1992). The walls of the buildings were built of a mixture of soil and stone, up to 2m thick. The buildings have not yet been radiocarbon dated, but examination of the pottery suggests a date of c.3500 BC. They lack the furnishings and built-in “dressers” of the buildings in Orkney. There is no evidence for internal subdivision in the published plans. The simplified plan presented here is of the Phase 1 buildings; in later phases both buildings had a hearth.

Other sites, such as Bharpa Carinish (Crone 1993), Northton (Simpson 1976), and Eilean an Tighe (Scott 1951) may have had structural features but not enough survived to allow reconstruction. This should be mentioned as a distinctive if unfortunate regional characteristic.

THE MAINLAND OF SCOTLAND

The North

There are no known Neolithic buildings in the northern part of Scotland (from Inverness to the north coast of Caithness and Sutherland). As has already been mentioned Whittle has noted (Whittle et al. 1986, 138) that there are many small irregular structures in northern Scotland (eg. Mercer 1980) which seem superficially similar to Building 2 at Scord of Brouster. It seems unlikely that the northern part of the Scottish mainland, so rich in chambered tombs, does not contain settlement evidence comparable that from Skara Brae and Noltland.

During the excavation of a possible Clava cairn at Raigmore, Inverness, Simpson discovered the remains of a timber structure containing a hearth, associated with Grooved Ware. Publication is well advanced; in the meantime a generalized plan is presented here (Figure 5.5; Simpson pers. comm.). The building (perhaps of two phases or with double
Neolithic buildings in Scotland

walls) appears to consist of post-built walls enclosing an area c.7.5 to 9m long by 5m broad.

The North East

The coastal plain from Inverness round to the Tay contains much of the best agricultural land, and some of the most easily cultivated, in Scotland, with clear evidence of Neolithic settlement represented by artefact discoveries, by earthen monuments of a type familiar in eastern Britain (long barrows, cursus monuments, henges) and by the recumbent stone circles. Yet in this area only Balbridie represents the domestic architecture of the period, and there is doubt that the structure is a normal house.

The massive building at Balbridie, Kincardineshire (Ralston 1982; Fairweather and Ralston 1993), has to date no excavated parallel, either for internal scale (24m long and 10m broad) or construction (the Benie Hoose in Shetland is comparable in external size, but far smaller inside). A number of broadly comparable cropmark sites is now known (including one across the River Dee at Crathes) but some may well be of later date or different function. A series of 14 radiocarbon dates puts the building in the early – mid fourth millennium BC; perhaps the most reliable dates are the accelerator dates for seeds (eg. 5770–5490 BC (OxA-1767), 5930–5600 BC (OxA-1768); 5973–5600 BC (OxA-1769)). Fairweather and Ralston (1993) comment that “...the farmers of Balbridie were – in terms of their building and, it would seem, of their strategy with cereals – closer to continental European practice than has normally been identified in the British Isles.”

The building differs from those of the Western and Northern Isles in more than scale. Because the site is on arable land no floor surfaces survived and there is nothing to compare with the information on furniture and fittings recovered elsewhere. We have only the main structural elements to guide us.

The building is defined by a wall slot containing substantial posts and possibly the remains of plank walling. Within the enclosed area are several arrangements of posts, some of the elements of these lines set in transversely arranged slots. There are two longitudinal lines of seven posts c.1m in from both side walls which could have served to support two longitudinal roof beams; some of the posts of this line are incorporated into the ends of transverse slots. The roof could not have been supported on the walls and these posts alone and it is possible that posts, both free-standing and within the transverse slots, nearer the axis, supported two further longitudinal beams. I have marked the possible positions of such beams as toned lines on Figure 5.5.

There are as yet no published plans which show the precise location of postpiles but it can be suggested that the internal slots fulfilled the same function as the wall slots – that is holding both structural timbers supporting longitudinal roof beams and continuous walling. If this interpretation is correct, all the internal slots would support screens and where there were no slots or where posts were set in separate holes this would indicate a deliberate arrangement where access was not to be restricted by a screen. If this interpretation is correct then some interesting observations can be made about the interior architecture. A screen runs transversely across the building, immediately inside the entrance. This would not only force people to entering to turn either left or right but, significantly, would prohibit visual access into the interior.
The way in which the slots and posts are arranged implies that different parts of the roofed space had different functions. The central transverse slot has a gap, implying a break in the screen not paralleled in the other four transverse slots. The arrangement of four posts immediately to the west of the central slot contrasts with the less encumbered space to the east. Finally, the central post occupying part of the space between the western transverse slot and the next slot to the east, is not paralleled at the entrance end.

The West

Marshall (1978) undertook excavation at Auchategan where she identified settlement of a number of phases, including fragmentary remains of two phases of Neolithic buildings. Rennie has also undertaken extensive excavation in the area, on hillside platforms interpreted as for charcoal burning (eg. Rennie 1986); she located the remains of further timber structures. Charcoal from a hearth associated with a round timber structure 9.5m in diameter on platform 9 at Dunloskin has been radiocarbon dated to 3794–3037 BC (GU-2063) and 3650–2997 BC (GU-2064). Rennie (1984) has also located at Ardnadam three roughly rectangular structures between 7.5m by 5.5m and 3.5m by 3m, with indications of axial postholes, associated with Neolithic pottery around a working area with hearths and worked stones. Charcoal from the hearth of the most southerly structure has been dated to 3699–3342 BC (GU-1549).

The South

At Beckton, in Dumfriesshire, excavation revealed patterns of hearths, floors, pits and postholes, and what may have been an oven or kiln, some associated with Grooved Ware (Pollard 1992). Some of the postholes fall into patterns (two possible four-posters) and lines, but their association with the Grooved Ware is uncertain. While the nature of the post-built structures is as yet uncertain, the location of the site on a small knoll overlooking a stream, would seem a likely situation for settlement, wither temporary or permanent.

OTHER SETTLEMENTS

It is worth mentioning, in passing, the evidence for settlement sites of the Neolithic where buildings have not been found. There are as yet no known large-scale Neolithic enclosures to compare with the causewayed enclosures of southern Britain; Mercer's (1983) exploratory excavation of a large hilltop interrupted-ditch enclosure at Dodd in East Lothian showed that site to be Iron Age. However, there are hints of such features at Balloch Mains, Argyll and Bute (associated with Neolithic pottery: Peltenburg 1982) and at Carwinning Hill, Cunningham (Cowie 1979) where causewayed ditches were recorded under later hillforts. The excavation of a probably domestic Neolithic enclosure at Kinloch Farm, Fife (Barber 1982) and radiocarbon dates from North Mains, Strathallan (Barclay and Tolan 1990) have suggested there may also be a tradition of enclosed Neolithic and Bronze Age settlement in eastern Scotland which has yet to be explored. One of the most interesting possibilities as a major enclosure of this period is at Leadketty, Perthshire.
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Likewise the enigmatic multivallate hilltop enclosures at the Brown Caterthun, Angus (Piggott 1982, 182), and the Barmekin of Echt, Aberdeenshire (Piggott 1982, 120), which have numerous gaps in their ramparts, look decidedly odd in comparison with Iron Age hillforts in the area, and a Neolithic date is being seriously considered.

OTHER STRUCTURES?

There are a number of timber structures which might be interpreted as roofed structures, or where an interpretation as a roofed building has been considered and dismissed.

Analysis of Structure 2 at Balfarg Riding School (Figure 5.5) (Barclay and Russell-White 1993) and comparison with the similar Structure 1 demonstrated that it had almost certainly not been roofed. There are others where cropmarks might be interpreted as roofed buildings. For example, at Littleour, close to the Cleaven Dyke (a cursus in Perthshire) (RCAHMS 1994, 14 and 28), and at Clash, close to the Auchenlaich long

Figure 5.5: Ground plans of Neolithic buildings in Scotland. (1) Raigmore, Highland; (2) Balbridie, Grampian; (3) Eilean Domhnuill; (4) Structure 2 at Balfarg – this is almost certainly not a roofed building (the black dots show where one post can be proved to have replaced another). The open and filled spots are postholes; in 2 the defined areas are postholes and wall-slots. (Sources: various)
cairn (Foster and Stevenson in preparation), are cropmarks which might be interpreted as Neolithic buildings of domestic or funerary function or as buildings of a later period. Timber rings associated with stone circles or within henges have been interpreted as roofed buildings. However, this author believes that there is no evidence that these structures (for example the features recently published by Haggarty (1991) at Machrie) were roofed.

At Wellbrae (Shell Chemicals 1993) a rectangular structure measuring 32.8m by 14.4m (divided at 20.5 m from the western end) contained complex deposits of Neolithic pottery. Its interpretation is not yet clear.

THE BROAD VIEW

To conclude, the Northern Isles have produced abundant evidence for the houses and settlements (and in Shetland the agricultural systems) of the late Neolithic. The quality of preservation allows an almost unparalleled opportunity to examine not only the nature and arrangement of houses and settlements, but also the way in which the buildings were used, and indeed the way in which the inhabitants viewed their world. For example, Richards (1991) notes the pattern of construction of the settlement at Skara Brae as a whole, drawing parallels with the Barnhouse settlement: buildings were repeatedly refurbished and rebuilt (on much the same, but never identical, site), emphasizing the notion of continuity and prompting speculation on the role of kinship and inheritance in the allocation and use of building sites. There is more yet to be drawn from these marvellous sites.

A striking aspect of the Orkney settlements is the presence amongst “normal” houses of larger or somehow unusual buildings, separated to some extent from the others and possibly with specialized functions – Building 8 (and perhaps also Building 7) at Skara Brae (Clarke 1976; Richards 1991; Richards pers. comm.), Buildings 2 and 8 at Barnhouse (Richards 1990) and perhaps the Noltland building (Clarke and Sharples 1990, 67). All have versions of normal internal arrangements. Broad parallels with the “temples” or “halls” in Shetland can also be drawn – in the sense that they are larger structures isolated in some way from “normal” buildings. Whatever the function of these larger buildings it may be that the vast timber “hall” at Balbridie in northeast Scotland (so large that five or six Skara Brae floor plans could be fitted into it) served some comparable function within a group of smaller structures, which were not sought in the excavation and may have been obliterated by ploughing. It is too early yet to suggest that this hierarchy of buildings is a characteristic of Neolithic settlement in Scotland. It is also inappropriate to suggest that patterns of dispersed or nucleated settlement (characterized respectively by the Shetland and the Orkney sites) are certain.

A feature of many of the well preserved northern buildings is the lack of clear evidence about the ways in which they were roofed. Major structures, such as the Stanydale “temple” have limited evidence for supporting posts; many buildings appear to have none at all. Further work is needed in the interpretation of internal features that might have played some part in supporting roofing.

The Western Isles also have great, but as yet scarcely explored potential, as may other
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areas where later intensive agricultural activity has not removed the evidence. However, the evidence for settlement in the arable areas of Scotland is more elusive. Gibson (1992) has discussed the processes by which relatively slight timber structures will have been degraded or destroyed. In addition the detection of features over 5000 years old is complicated by the effects of natural soil processes; they have, after all, since their formation undergone more than half of the natural processes acting upon soils since the last glaciation. It is therefore hardly surprising that in general only more substantial structures survive to be found by chance (eg. Balbridie) or slight structures survive in small patches of land spared the rigours of modern agricultural ploughing (cf. Lismore Fields, Derbyshire (Garton 1986)).

The search for settlement is hampered by the limits to our understanding of the guises in which it will appear. As with Balbridie (which was interpreted as a Dark Age hall before excavation) elements of our Neolithic settlement evidence may already be clearly visible (for example in the cropmark record) but not yet recognized for what they are. For example, if there is a tradition of enclosed settlement of the period in eastern Scotland (as discussed above) some considerable effort will be needed to sift it out from the other enclosures of many periods appearing as cropmarks.

The importance of discovering the Neolithic settlement of lowland Scotland cannot be overstated. The mass of artefactual discoveries and the growing number of ceremonial and funerary structures show the intensity of Neolithic activity on the low-lying, well drained light agricultural land facing continental Europe. For too long the interpretation of the many regional Neolithics of Scotland has depended on the interpretation of one, relatively well studied regional Neolithic (Barclay 1992). The balance needs to be redressed. Work is needed in the cropmark record and in arable fieldwalking of the kind so successful in Orkney (Richards 1990) if progress is to be made.

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Notes

1. Phase 1 of this structure is pre-building occupation.
2. Earlier phases represent pre-building occupation.