Prehistoric and Roman Archaeology of North-East Yorkshire

edited by D A Spratt

Council for British Archaeology North York Moors National Park

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with contributions by M A Atherden, E W Cloutman, P R Cundill, B R Hartley, J E Hemingway, J B Innes, R L Jones, I G Simmons, D A Spratt

CBA Research Report 87

BAR British Series 104

Revised to 1990

(Pitt-Rivers Award 1984)

Published 1993 by the Council for British Archaeology
112 Kennington Road, London SE11 6RE

ISBN 1 872414 28 1

British Library Cataloguing in Publication Data
A catalogue for this book is available from the British Library

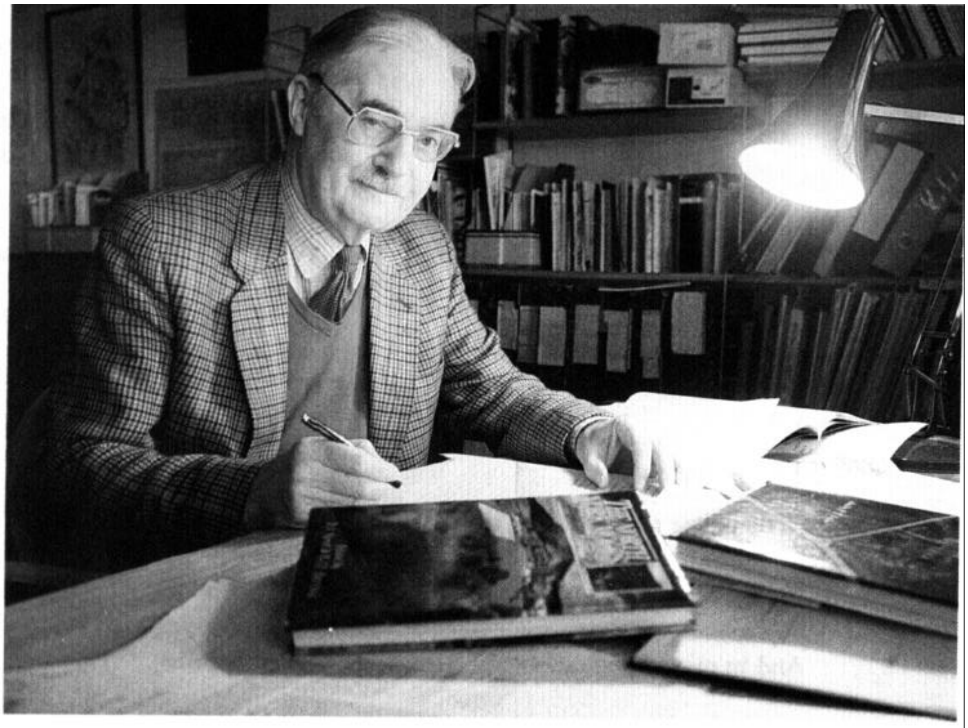
Typeset in-house by Lisa Pickering
Printed in Great Britain at Imprint **Services, Northallerton**

The cover photographs were taken by Richard Crosthwaite, MAJPDL, author of *Ancient Cleveland from the air*, and are reproduced by kind permission of Cory Towage (Tees) Ltd. *Front cover:* Eston Nab viewed from the north east, 1984. *Back cover:* Cawthorn camps viewed from the west, 1985.

The editor and contributors dedicate this volume to
Raymond H Hayes, MBE, FSA
in gratitude for his 60 years of archaeological research in North-East Yorkshire

And in memory of our friend Roland S Close of Kildale

Foreword



Donald Spratt (photo by courtesy of Northern Echo)

by Philip Rahtz, Emeritus Professor, University of York

This volume, first published in 1984, was a landmark for the pre-medieval archaeology of North-East Yorkshire. It was also a worthy tribute to the fundamental work of Raymond Hayes, who is now sadly unable to continue his lifelong researches in the field, but still avidly keeps up with the published and unpublished results of current work.

The value of this collection was recognised after its first publication by receiving the Pitt-Rivers Award for the best archaeological book of that year. Its importance to a wide audience was subsequently confirmed by successful sales. Unlike many volumes of essays of this kind, it is now out of print in the BAR Oxford British Series (no 104). Again uncharacteristically for Festschriften the contributions proved so seminal that the CBA has decided to republish them as one of it own research reports from its York office. Useful though this would have been as a straight reprint, its validity has been much enhanced by the revision undertaken by its original editor the late Don Spratt, who died in October 1992, unfortunately before he could see this volume in print. The success of the original book was made certain by his deft handling of both contributors and their essays and by his own substantial contribution. He has now put archaeology further into his debt by his revision. This involved both the updating of the original material and also the additions. The changes and new work are delineated in the new acknowledgements section below; they are far more than merely adding a footnote here and there

We can now again honour the work of Raymond Hayes by dedicating this new version to him We should however, also express our deep appreciation more generally of the work of Don Spratt for whom this volume may now be seen as a memorial. When I first came to York in 1978, his work in the field and in print immediately impressed me as among the most modern research being done in the area- this combined meticulous field work with a keen appreciation of the theoretical approaches which have so changed the face of archaeology in the last two decades. He lectured to our students and was an inspiring guide on our field trips to the Moors. He had a gift for enabling people to work effectively; and, unlike some archaeologists made only friends and never enemies. He will be remembered by all of us in Yorkshire and the northern counties with affection; but he will be known to future generations by his published work, culminating in his revision of this volume, which is also yet another landmark in Raymond Hayes' long life.

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Acknowledgements

Archaeological activity in North-East Yorkshire has been characterized by its cooperative spirit, mainly due to the benevolent approach of Raymond Hayes over many years. This report would have been impossible without such collaboration and nearly all serious workers in the area during the post-1945 period have contributed to either the data or the text, and sometimes to both. I am very grateful indeed to Professor John Hemingway for Chapter 1, and to Professor Ian Simmons and his colleagues (Dr Margaret Atherden, Dr Ed Cloutman, Dr Peter Cundill, Jim Innes, and Dr Bob Jones) for Chapter 2. Dr Roger Jacobi and Dr Paul Mellars commented on drafts of Chapter 3, and much of the data for this chapter was provided by the former, and by Mr and Mrs G V Taylor. Terry Manby provided and checked material for Chapter 4 and commented on the drafts. The Early Bronze Age chapter would have been impossible without Margaret Smith generously allowing me to work from her extensive and thorough compilation of the data on excavated barrows. Pam Browarska and John Barrett kindly provided information on the Wheat Beck site. Dr Ian Colquhoun of Newcastle University supplied data on the bronze industries, and Dr Margaret Ehrenburg of Leeds University also read the draft of Chapter 5, section 2. Douglas Smith and Jim Rutter (ex-Scarborough Museum) provided much information on linear earthworks for this chapter, and Derrick Riley, Tony Pacitto and Dominic Powlesland helped on this and other aspects from their aerial photographic work. Chapter 7 was written in conjunction with Mr Brian Hartley of Leeds University. Roger Inman and Raymond Hayes provided much of the data, and Tony Pacitto supplied facts prior to publication on Beadlam Roman villa. Blaise Vyner, Cleveland County Archaeologist, has given information from his recent work at the Street House long barrow and Ingleby Barwick Roman site, and has allowed me to use a map from Gill Crawford's barrow survey. Tim Schadla-Hall and his co-workers Dr Ed Cloutman and Dr Juliet Clutton-Brock have given recent information in advance of publication on the excavation and environmental work at Seamer Carr (Scarborough). Bill Pearson kindly provided figures 34 and 41.

Mike Griffiths, North Yorkshire County Archaeologist, and his staff, particularly Paul Chadwick, who has worked closely with the report, have discussed the whole work, and provided typing of the drafts. The Royal Commission on the Historical Monuments of England have supported the project, particularly the fieldwork, and the cartographic work by Brian Drummond, whose skill and interest combined have enhanced the report. The willing help of all these friends has added much to the pleasure of the task, and I am most grateful to them all. With such help as this, the imperfections must be laid at the door of the main author and editor.

Acknowledgements: revised edition

During the 1980s there have been several important professional excavations in the area, and thanks to their leaders, we can report summaries of their findings, sometimes in advance of full publication. Blaise Vyner (Cleveland County Archaeologist) has led work on the long cairn and Bronze Age ritual monument at Street House, and has excavated and assembled all the earlier evidence on Eston Nab hillfort. Anthony Harding and Professor Ostaja-Zagorski have done a detailed survey and excavations on Danby Rigg. Tim Schadla-Hall is working on a major project exploring the Upper Palaeolithic and Early Mesolithic of Seamer and neighbouring carrs, and has provided an appraisal of the current position. Thanks to the East Riding Archaeological Research Committee, we have had access to the forthcoming reports on Bronze Age barrows on the Tabular Hills now being prepared by Anne Finney from T C M Brewster's excavations. Harold Mytum has kindly provided a survey of a square barrow in Wykeham Forest. Useful amateur fieldwork has continued through the decade, most notably the discovery of many more Romano-British sites in lowland Cleveland by Roger Inman. Raymond Hayes' report on the Romano-British enclosures on Levisham Moor has been published, and a collection of his earlier excavations and surveys has been edited by Peter Wilson. The excavations of the Iron Age settlements at Roxby have been published, as have field surveys of the late prehistoric dykes on the Tabular Hills. Margaret Smith has completed her survey of excavated Bronze Age barrows, and thanks to her, a revision of beaker, food vessel, and urn data has been possible. Environmental studies have advanced considerably, particularly by the work of E W Cloutman and A G Smith in conjunction with the excavations in the eastern Vale of Pickering, and by J B Innes and I G Simmons on the effects of Mesolithic activity on the vegetation of the high moors. The cooperative archaeological tradition of the area remains strong, and all the above named are warmly thanked for their information. This edition of the work would not have been possible without much support from the North York Moors National Park, particularly for typing services and financial support of cartography by Cleveland County Archaeology Section, and the work of Graham Lee and Lily Pickard in the final stages of revision.

CBA note: Don Spratt died in October 1992, whilst this report was in preparation. We are most grateful to Graham Lee for his help with the final checking of the text, and hope we have produced the book as Don would have wished.

Summary

This is a revised edition of the book, originally published by British Archaeological Reports (1982), which won the 1984 Pitt-Rivers prize for the best amateur archaeological project.

The book firstly draws together the available knowledge on the prehistoric and roman periods in North East Yorkshire and then constructs the most acceptable explanations for the human populations who adapted to and began to shape the landscape which we see today. The first two chapters present the geological and environmental background which is essential to a proper understanding of the period; the next five chapters discuss the region from the arrival of Middle Stone Age man through to the time of the Romans.

The present version has been updated to include the results of a further decade of research and discoveries and provides one of the most comprehensive source books available for the study of the early development of an upland landscape in England.

‘The North York Moors National Park, in association with the Council for British Archaeology, felt that such an outstanding contribution to the understanding of North-East Yorkshire (much of which was designated a National Park in 1952) should be more widely available and have therefore published this new edition. It will serve as an authoritative work for the region into the next century.

Résumé

C’est une édition revue et corrigée du livre publié à l’origine par British Archaeological Reports (1982), livre qui a gagné le prix Pitt-Rivers de 1984 décerné au meilleur projet archéologique amateur.

Pour commencer, le livre rassemble les connaissances actuelles sur les époques préhistorique et romaine du nord-est du Yorkshire et élabore ensuite les explications les plus acceptables quant aux populations humaines qui s’adaptèrent au paysage et qui commencèrent à le transformer en ce paysage que nous voyons actuellement. Les deux premiers chapitres présentent les données sur la géologie et sur l’environnement qu’il faut connaître pour pouvoir comprendre la période en question; les cinq chapitres suivants traitent de la region entre l’arrivée des hommes de l’âge de Pierre et l’époque romaine.

La version actuelle a été mise à jour et comprend les résultats obtenus après une autre décennie de recherches et de découvertes. Ce livre est une des sources les plus completes disponibles pour l’étude du développement primitif d’un paysage de hautes terres en Angleterre.

Le Part National des North York Moors et le Council for British Archaeology ont trouvé que cet apport à la comprehension du nord-est du Yorkshire (dont une grande partie devînt un parc national en 1952) était si exceptionnel qu’il méritait d’être mieux diffuse et ont done publié cette nouvelle édition. Elle servira d’oeuvre definitive pour la region au moins jusqu’au siècle prochain.

Zusammenfassung

Dies ist eine Neuarbeitung des Buches, das zuerst durch die British Archaeological Reports (1982) herausgegeben wurde und das dann 1984 den Pitt-Rivers-Preis für das beste, durch Amateure ausgeführte archäologische Forschungsprojekt erhalten hat.

Dieses Buch faßt zuerst alle bisher verfügbaren Erkenntnisse im Bezug auf die prähistorische and römische Epoche in Nordostyorkshire zusammen und erarbeitet dann die angemessensten Deutungen für die Bevölkerungsgruppen, die sich zuerst der Landschaft anpaßten und sie dann zu der Form in der wir sie heute vor uns sehen umgestalteten. Die zwei einführenden Kapitel legen den geologischen und umweltbedingten Hintergrund vor, der grundlegend für das volle Verständnis dieser Epochen ist. Die fünf weiteren Kapitel betrachten das Gebiet dann vom Beginn des Mesolithikums bis in die Romerzeit.

Die vorliegende Fassung ist neuüberarbeitet worden, um die Ergebnisse eines weiteren Jarhzehnts von Forschung und Entdeckung auszuwerten. Sie bietet so eine der umfassensten Quellen für das Studium der frühen Entwicklung auf einer Hochlandlandschaft in England.

Der North York Moors National Park, in Zusammenarbeit mit dem Council for British Archaeology, war der Meinung, daß solch ein bedeutender Beitrag zum Verständnis von Nordostyorkshire, dessen größter Teil 1952 als National Park eingesetzt worden ist, weiteren Kreisen zuganglich gemacht werden sollte, und sie haben daher diese neue Fassung herausgegeben. Sie wird als ein Standardwerk im Bezug auf dieses Gebiet bis in das nächste Jahrhundert dienen,

Introduction

1 General

North-East Yorkshire is one of the most interesting and informative areas for British prehistory, containing prolific remains of all the post-glacial prehistoric periods except the upper Palaeolithic, which is barely represented. Jacquetta Hawkes (1951) concluded her survey of the area thus: 'There is nothing magnificent, perhaps; nothing even which is individually spectacular, yet there is no other territory where the remains left by prehistoric man have been less disturbed or where one gets a clearer impression of a countryside which belongs to him.' It comprises mainly hill country, both of the infertile sandstone terrain of the northern and central parts and of the much more productive limestones in the south, with rich pastoral valleys, and surrounded by agricultural lowland. It lies between the benevolent lowlands of eastern England and the northern highland zone with its poorer soils and harsher climate, and is thus in some ways a bridge area for understanding British prehistory. It shows throughout the post-glacial period excellent examples of the interrelation between lowland and highland subsistence activities. It also provides case studies of great clarity on the development of settlement on different geological terrains, which can be compared rationally with one another, other geographical factors being fairly constant. It is, in G W Dimbleby's words, 'a laboratory of archaeology'. Its analysis therefore helps to build a bridge of understanding between the 'south country' archaeology on the limestone terrain in the southern part, with its relatively rich prehistoric cultures and elaborate boundary systems, and the typical 'northern' archaeology of the high sandstone moors of the central and northern parts, with sparser settlement sites and poorer artefacts but prolific cairnfields and barrows.

The area has not been reviewed in detail since the publication 60 years ago of Dr Elgee's famous *Early Man in North-East Yorkshire,* a leading work of field archaeology. The book is still an invaluable source of data, but its interpretations are now mainly of historical interest. In the intervening years the data have increased, for some periods by an order of magnitude, intensive palaeobotanical work has been published and the national framework against which to assess the new data has vastly changed. Some of the data for the area are falling into important patterns, especially in respect of prehistoric boundaries and subsistence strategies, as will be discussed in the relevant chapters. It seems an appropriate time, therefore, not only to assemble the data currently available, but to describe these patterns and define the gaps and uncertainties which need to be filled by further researches, into both the archaeology and ecology of the area. 'There is no Truth in archaeology; but there are better and better truths as new evidence is acquired and new and economical interpretations are applied to it' (Gould, 1980).

2 Presentation

The basic strategy of the report is first to provide the maximum amount of data on the prehistory of the area. We then construct what appears currently to be the most acceptable series of self-consistent explanations of this archaeological record in terms of the palaeo-environment, and the subsistence and technological and social activities of the human populations which created the record. The report looks to the past in compiling a survey of what has been recorded by workers in the area; it also looks to the future in providing hypotheses which are capable of being assessed by ongoing work. The hypotheses are of necessity those which the author believes, on the whole, provide the most convincing framework against which to set the data. But of course, judgements in these matters vary, and the aim has been to give so complete a set of data, that archaeologists may use them with confidence to make their own interpretations. By such a process of reformulation of ideas and checking them against the facts we can continue to deepen our understanding.

The environmental material necessary for a proper interpretation of the prehistory is given in the first two chapters, the geology by Professor Hemingway, and the palaeo-environment by Professor Simmons, in cooperation with his co-workers in this area. The archaeological data, drawn from many sources, are given in the tables, and displayed in the maps and diagrams. In tabulating and mapping the material in this way, it has been possible to minimize the descriptive matter in the text, consistent with clarity, so that the emphasis in the archaeological chapters is upon interpretation. The one large gap in the data is the provision of a survey of round barrows throughout the area. This has been done by Crawford (1980) for County Cleveland, the northern sector of the study area, but the task was too vast for the approximately 2000 square km of the study area for it to be attempted within the compass of this report. We have to depend mainly on the Ordnance Survey maps for this information, supplemented where necessary,

The report relies heavily on artefact distribution maps, in the almost complete absence of proven Neolithic and Bronze Age settlements and of those of the earlier part of the Iron Age. It is therefore necessary to make some general comments on their validity, and the limitations which must be observed in their interpretation. In general they result from the work of many people over the past century and more, and provide a fair picture of overall distributions. But they are not reliable in fine detail, and must be studied with several reservations in mind. The residence of active archaeologists has produced concentrations of finds in certain areas, as with Hayes and the Helmsley Group in the central and western Tabular Hills, the Scarborough groups in the eastern Tabular Hills, and Elgee, Close, and others in Cleveland. There has been active archaeology at Whitby, but unfortunately not all finds, particularly flint sites, are provenanced. On the other hand, there has been a lack of local archaeologists on the north-western fringe, which tends to be poorly represented on all maps. The map of the early Mesolithic sites is based on the work of a small team, and therefore depends upon the search strategy of that particular group. Further, the nature of the terrain has affected recovery. In the ploughlands, and on the high moors where regular burning of heather and erosion have exposed the subsoil, recovery has been possible, if not always reported: thousands of flints have been collected with no record. On the medieval ploughlands many prehistoric sites have been totally destroyed. In the areas, particularly in the south-east of the region, where there has been extensive state forestation since the 1920s, large tracts of land have been obscured. And in the moorland valleys, the hillwash of the past two millennia, clearly very considerable but so far little studied, and unquantified, must have covered many sites and artefacts. Finally, the inaccuracy of recording creates a considerable problem, particularly with objects such as stone axes and bronzes studied in museum collections. They are usually identified by a label with a village or town name. If this refers to a small lowland township on a homogeneous terrain, this does not create much uncertainty about the location or its interpretation. However, some of the moorland townships are very large. Allerston, for example, some 13km inland from Scarborough, comprises a north-south strip some 20km in length, the northern third being on the Jurassic sandstone moors, the central half on the Tabular Hills, and the southern one-sixth on carr land in the Vale of Pickering. A label may be more explanatory (eg Allerston High Moor, Allerston Carr), but where it simply bears the name of the township, the find is allocated to the most likely place, ie the ploughlands of the village. Casual finds of all descriptions, apart from flints, are rare on the high moorlands and have not been placed there unless there is specific evidence, for example that they are labelled ‘High Moor’ or provenanced from a known barrow. The situation is not completely satisfactory, but on the other hand does not lead to distribution maps which are entirely misleading if they are read with a proper understanding of their limitations.

For the Neolithic and Bronze Ages we have to draw deductions about the settlement pattern from the artefact distributions, but there have been few discoveries and no unequivocal dating of settlements by which to verify the pattern of casual finds. In the late Iron Age and Roman periods, however, we have a verification of the settlement pattern deduced from the finds of beehive querns. Reference to Figures 65 and 70 of Iron Age and Roman settlements shows that their overall pattern corresponds quite well with those of the querns shown on Figure 64. In summary, therefore, ‘one may have reasonable confidence in general broad conclusions drawn from the artefact distribution maps, but they must not be used for detailed comparisons out of context and one must be extremely cautious in drawing quantitative conclusions from them.

The task of ordering the data into coherent chronological periods is also not without problems, as all authors of prehistoric syntheses discover. The approach adopted in this report has been to make temporal divisions where the archaeological and environmental evidence indicate major changes in the subsistence or technological methods; that is to say, for example, that superficial changes such as those of pottery style or design of bronze artefacts are not sufficient to warrant separating out a discrete period for discussion. The factual basis for the subdivisions are given for post-Mesolithic artefacts in Figure 1, and for the environmental in Chapter 2; they are discussed in detail in each archaeological chapter. In summary, they are as follows:

Period	**Date Span bc/AD**	**Chapter**
Upper Palaeolithic	to 7600 bc	3.1
Early Mesolithic	7600 to 6600	3.2
Late Mesolithic	6600 to 3500	3.3
Early Neolithic	3500 to 2500	4.1
Late Neolithic/ Earliest Bronze Age	2500 to 1700	4.2
Early Bronze Age	1700 to 1300	5.1
Late Bronze Age	1300 to 600	5.2
Iron Age	600 to AD 70	6
Roman	AD 70 to 410	7

In the cases when an artefact is found in more than one of these periods, it is discussed in the period of its first occurrence. And of course, what this report describes is the continuous evolution of hunter-gatherers to highly developed, settled, mixed farmers, in which different facets of life changed at different rates. The periods from the beginning of the Neolithic to the end of the Iron Age have little absolute meaning; they are a framework in which the author can place the data and which labels it for the reader.

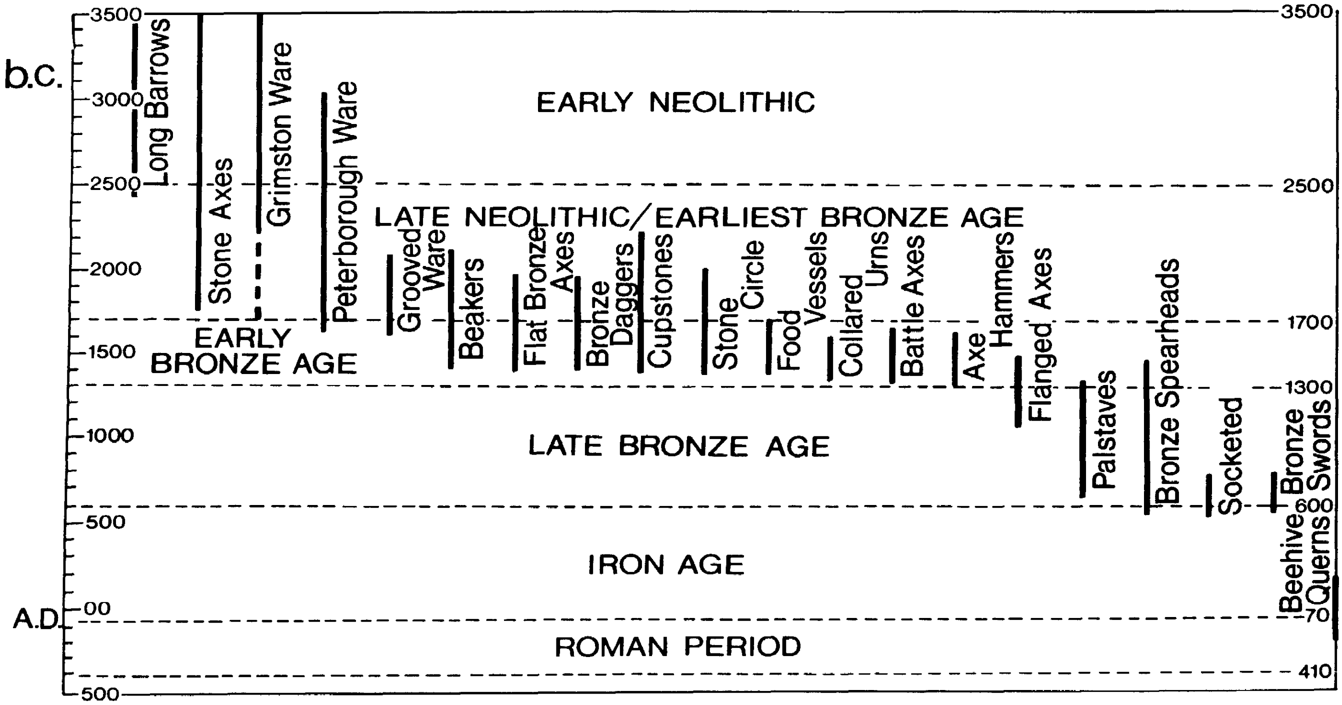


Figure 1 Date-spans of post-Mesolithic artefacts

This problem has been recognised but not entirely solved in modern syntheses, if indeed it is capable of a completely satisfactory solution. For example, in their national survey, Megaw and Simpson (1979) used a system of overlapping periods:

	bc/AD
Early Neolithic	3500–2500
Late Neolithic	2500–1700
Early Bronze Age	2000–1300
Later Bronze Age	1400–500
Iron Age	600–200 AD

Such overlaps may well be justifiable in an area as large as the British Isles, but they are not appropriate to a small area. Again, their division of the Bronze Age into early and late might arguably be the best method of presenting the national data, but on the North Yorkshire scene, it is necessary to isolate and discuss a median period 1700–1300 bc, because this embraces much of the activity on the moorlands, and to term it the Early Bronze Age, in conformity with current practice. It then seems necessary to give the hybrid name Late Neolithic/earliest Bronze Age to the preceding period, 2500-1700 bc, in recognition that it contains both Neolithic and Bronze Age characteristics.

Dates throughout the volume are given as radiocarbon years taking Cl4 half-life as 5568 years. While calibration data for converting radiocarbon to calendar years have not been finally agreed, this seems to be the best method of obtaining a consistent timescale, which is simple to convert as new calibration data become available in future.

1 Geology and topography of North-East Yorkshire

J E Hemingway

1 Introduction

The extent to which the geological evolution of a region influences its archaeological history has not always been appreciated. Not only does geology control the distribution and ready availability of those raw materials desirable or even essential to the primitive cultures of early man and to their subsequent developments; it also moulds the topography of the area, the distribution and form of high and low ground, the location and water supply of defensive and settlement sites, and the very soil upon which the cultures were founded and developed.

The region of this study, North-East Yorkshire[1], epitomizes these factors in its archaeological evolution. An isolated upland area of Jurassic rocks, basically triangular in form, it is bounded to the east for the most part by high sea-cliffs and to the west by an equally high west-facing escarpment, the northern part of which is known as the Cleveland Hills (Fig 2). The escarpment also fronts over the Vales of York and Mowbray, which at their northern end swing eastward to join the broad estuary of the river Tees to form an area sometimes known as the Plain of Cleveland. To the upland area in general the traditional name of Cleveland (cliff-land) was well applied. The central area, made up of many locally designated 'moors', is however today best referred to collectively as the North Yorkshire Moors[2], a term which has replaced the historic and more vivid Blackamore, once used for the eastern sector.

The region rises to a maximum of 454m OD on Urra Moor, at the western end of the watershed which extends to Cock Heads (Fig 2). From this medial belt the moors fall gently in all directions, though dissected by broad, fertile valleys which radiate from it. To the north the upland is also bisected by the Leven-Esk through valley, whereas, by contrast, to the south it falls gently through the Hambleton, Tabular and Hackness Hills to the low-lying Vale of Pickering.

2 The Jurassic sequence (age: 136 to 190–195 million years)

The solid rocks of the region fall into three subdivisions which are well-defined both geologically and topographically (Fig 3). The oldest rocks, the Lias (Lower Jurassic), form a succession of grey and black shales with some flaggy sandstones, as well as the massive Cleveland Ironstone Formation. The sequence (*c* 400m) is in origin marine throughout and yields an abundance of fossils. One thin bed (8m) yields the tough 'hard' jet normally associated with Whitby, though only fragments washed onto the beaches were used by early man. The Lias floors the upland valleys of the river Esk and its tributaries, as well as the complementary dales which drain south off the main watershed. It also forms the base of both the coastal cliffs north-westwards from Robin Hood's Bay, and the foot of the entire west-facing escarpment.

The succeeding Middle Jurassic was initiated by a marine episode, when the thin, variable, iron-rich Dogger Formation was laid down. In the main, however, the Middle Jurassic is a sequence of yellow-buff to brown sandstones, pale grey siltstones and clays, with thin ironstones and coals. It caps much of the coastal cliffs and dominates the upper slopes of the northern dales and the moorland belt above. It is about 200m thick, the product of alluvial, fluvial, marshy, and minor deltaic environments. The sandstones accumulated in meandering river channels which crossed the alluvial flats and now form massive lenticular units up to 20m thick. The silty clays in particular formed soils for the rich contemporary flora, which in their turn formed only thin coals, resting on good quality fireclays (Fig 4).

These Middle Jurassic conditions were interrupted three times by marine incursions which flooded the subaerial surfaces and produced thin, shelly deposits of sand and mud, some limey and others rich in iron, but each only a few metres thick overall. Thus the Eller Beck Formation is now made

1 In this account the terms 'North-East Yorkshire' and 'Cleveland' are used in the traditional sense. It should be noted, however, that the Cleveland Hills, as originally designated, and much of the Cleveland Dyke, lie outside the county of Cleveland as bureaucratically defined.

2 Recently this has itself been illogically abbreviated to the North York Moors (eg Ordnance Survey Leisure Guide: North York Moors, 1987), although the Moors themselves lie 37km from that city at their nearest point.

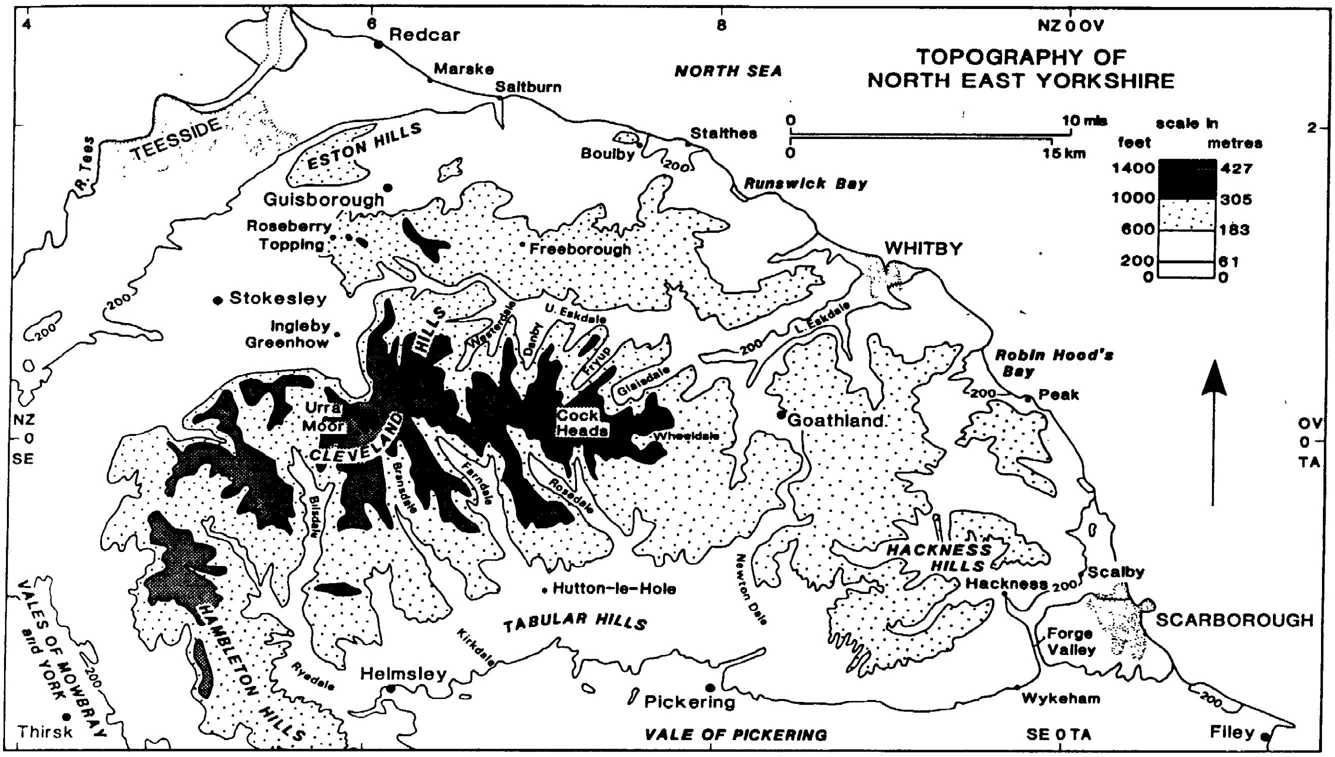


Figure 2 The topography of North-East Yorkshire

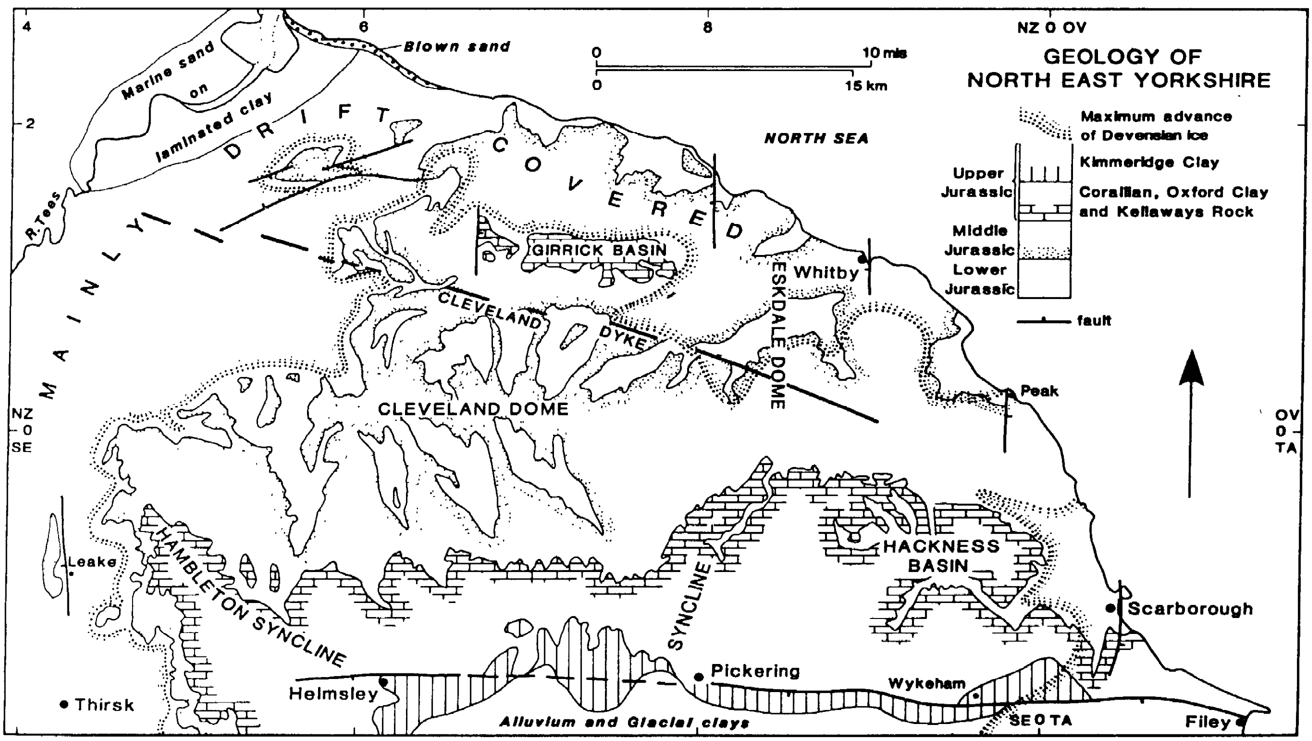


Figure 3 The geology of North-East Yorkshire

up of two or three thin nodular beds of clay ironstone (siderite mudstone) in shale, overlain by a ripple-marked flaggy sandstone. Similarly the succeeding Scarborough Formation (*c* 16m) includes thin, nodular shelly ironstones (used at the Roxby site and probably elsewhere), together with a medium-coarse sandstone, the crinoid grit (*c* 6m). This latter proved to he a valuable stone for the making of querns (see section 6 below). The succeeding closely cemented quartzite, the moor grit, was little used for this purpose. The channel sandstones were, however, the most widely used, although they wore relatively quickly. Above the moor grit the uppermost part of the Middle Jurassic (*c* 55m) is mainly siliceous silts and thin sandstones, which today form the most sterile part of the moorland belt.

The third of the main subdivisions, the Upper Jurassic sequence (350m), is in origin marine throughout, in contrast to the marshy, freshwater environment of the Middle Jurassic. It represents a phase of dominantly shallow, warm-water deposition of thick shales, calcareous sandstones and limestones. The Kellaways rock, a ferruginous sandstone near the base, is succeeded by the ill-exposed Oxford clay The Corallian, which forms a wide spread across the south of the region, was laid down as thick banks of shelly oolite with coral reefs (the Hambleton and Malton oolites) interbedded between the lower, middle, and upper calcareous grits. These are yellow-buff, fine-grained sandstones, which weather to relatively weak rocks on decalcification, except for their tougher, massive concretions, the ball beds. Chert is present throughout much of the corallian limestones, in both nodular and tabular form. The shales of the Kimmeridge clay (*c* 250m) form the youngest Jurassic formation in the region, but in the main they are hidden beneath the alluvium of the Vale of Pickering.

This long phase of varied deposition, both marine and non-marine in origin, resulted in the stacking up, in orderly succession, of some 900m of Jurassic siltstones, sandstones, shales, limestones and ironstones. To the south, in the Yorkshire Wolds, this sequence is seen to be succeeded by the cretaceous chalk; to the east, in the North Sea, this is followed in turn by a thick Tertiary succession of sands and silts. No representative of these rocks occurs in the region under review, although the chalk was originally present, as well as some Tertiary representatives. These have now been removed by erosion.

3 Tertiary developments

In mid-Tertiary times, *c* 30 million years before the present, the region was subjected to a phase of folding which gently rucked up the sequence into several forms. The resulting dips are rarely more than 3°. The largest structure, the Cleveland dome (see Fig 3), dominates much of the higher land, now moorland, in the middle of the region. By contrast the elongate Eskdale dome is topographically less striking, as are many smaller fold structures to the north. More important to this study are the structural basins as at Hackness and the two synclines of Hambleton and Pickering which pitch (fall) southwards and which later were profoundly to influence topography and drainage.

At about the same time as the development of folding, the region was fractured by faulting in approximately north-south and east-west directions (Fig 3). Faults are relatively few, although those which cut the coast show a striking echelon pattern which was ultimately to affect archaeological sites profoundly; their vertical displacement rarely exceeds 100m and is usually much less. Their importance in the present context is confined to those which brought a resistant rock into contact with a weaker bed. Subsequently weathering resulted in the formation of strong topographic features, which in some cases were made use of by early man (see section 6 below).

The only indigenous igneous rock in the region is the Cleveland dyke, a basaltic andesite which was intruded in mid-Tertiary times. Its maximum width is 15m at Great Ayton, from which area it thins to the east-south-east and dies out near Blea Hill. The dyke is, however, of little topographic significance.

The tertiary peneplane

The dominant feature of the central part of North-East Yorkshire is the regularity of height of the higher hills and ridges, now moorland. When traced south this vast peneplane, now warped and dissected, crosses the Tabular Hills of the limestone belt and truncates the Yorkshire Wolds and the regions beyond. It is the product of long marine submergence in Tertiary times and the consequent erosion of those parts of the uplands that were outstanding, with the formation of a surface that was essentially plane.

Subsequently, in late Tertiary and Quaternary times, this block was uplifted above sea-level, doubtless in stages. It was also slightly warped, probably with minor activation of the Cleveland dome and other fold structures. Today the principal part of the surface lies around the heads of the moorland dales (*c* 335-365m OD), from which it falls to the north, east and south at a gradient of about 1 in 150.

No Tertiary deposits remain in North-East Yorkshire as evidence of this prolonged marine submergence. In the region as a whole, however, the joint effect of folding, followed by peneplanation, was to expose a broad belt of Upper Jurassic rocks, many lime-rich, across the south of the area, whereas elsewhere Middle Jurassic sandstones, silts and clays occupied the then surface, other than a small infolded belt which now forms Girrick Moor.

The dissection of the region

On emergence from the Tertiary sea, in the latter part of Tertiary time, several million years before the present, Jurassic rocks extended far beyond their

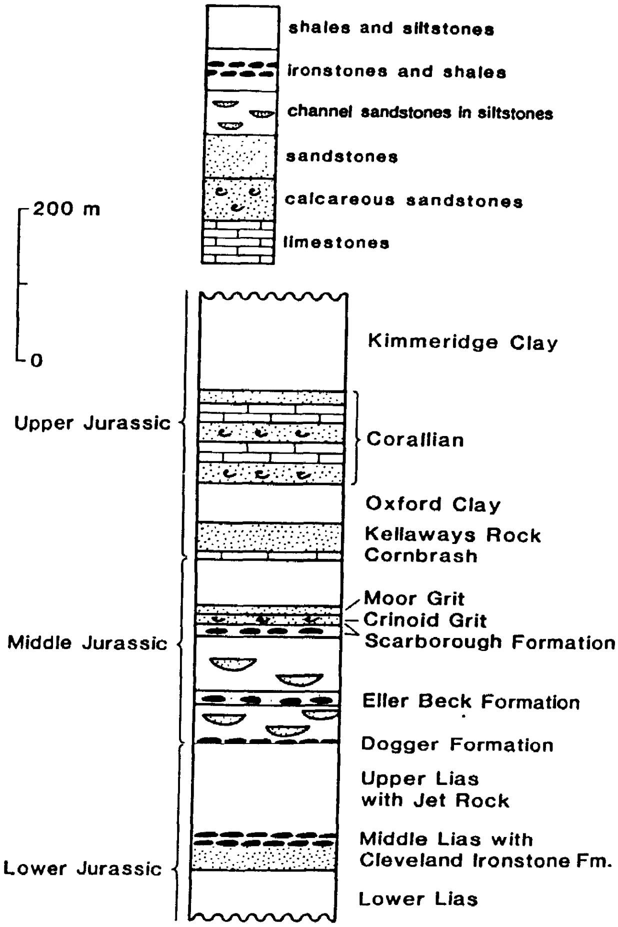


Figure 4 Generalized succession and lithology of the Jurassic rocks of North-East Yorkshire

present outcrop in North-East Yorkshire, westwards towards the Pennines, northwards across the river Tees and eastwards into the North Sea. Not only was the emerging surface immediately under erosion by subaerial agents, initially dominated by rain and the resulting river action, but the margins were also under attack by marine action from the east and at times from the north and west. These processes were collectively very effective, driving back the developing cliff lines for distances up to some tens of kilometres and slowly reducing the area of Jurassic rocks to something near the form of the upstanding block of the present time.

In particular the western scarp was eroded to such an extent that at least two established stream systems were destroyed. It is most probable that a proto-Ingleby Beck originally flowed north-north-west from Urra Moor as an upland stream in a major valley, comparable to the other northward-flowing streams off the Cleveland dome. Its head remains as the topographically impressive Ingleby re-entrant; its modified eastern slope now forms Greenhow Bank, but the western side has been almost completely eroded. Similarly a proto-Cod Beck stream system flowed south and south-east near the foot of what is now the western escarpment. Its sources were in Osmotherley and Over Silton Moors and, as a member of the south-flowing drainage series, its course strikingly paralleled that of the river Rye. Erosion has not yet been adequate to remove all traces of the western valley slopes of this stream; such Jurassic outliers as Woolmoor, Hood Hill, and the Oldstead group among others remain as residual fragments. Although these two drainage lines remain little more than speculative, and it is certain that there were others, it is nevertheless clear that before the beginning of the Devensian the western boundaries of North-East Yorkshire had been driven eastwards to an overall form and position not markedly different from the present-

The processes of subaerial erosion as initiated in late Tertiary times continued throughout the Quaternary, interrupted only by the ‘ice ages’. These several phases of refrigeration, each of varying degrees of intensity, changed fundamentally and for a time the pattern of both erosion and deposition. Nevertheless, much of the present form of North-East Yorkshire, other than the coastline, was established long before the ‘last’ (Devensian) ice age. It is for this reason that the processes of subaerial erosion are discussed here before a description of the effects of the glaciations. Post-Devensian erosional effects, though considerable in some parts of the region in human terms, are nevertheless relatively minor in contrast to erosional influences on the region in late Tertiary times and during the long interglacial phases.

The drainage pattern

The slowly developing stream system established on the freshly emerging warped peneplane was strongly influenced and in part controlled by the reactivated fold structures. Thus ten valleys, some compound, radiate from the elongate Urra Moor-Cock Heads belt (see Fig 2). Of these only Wheeldale in the east fails to cut through the Middle Jurassic sandstones and clays; the remainder penetrate into the Lias, to form the broad but crag-framed valleys which characterize so much of the region. The northward-draining streams from Baysdale to Glaisdale join the river Esk, which flows along the line of an earlier river which itself followed a direct course from the Pennines to the North Sea.

To the west the powerful Hambleton syncline directs the ramifying drainage system via Rievaulx to form the river Rye; to the east the complementary structure controls a comparable stream pattern to Hackness. A similar fold-structure, though on a smaller scale, has resulted in the formation of the Hole of Horcum, an impressive amphitheatre a kilometre in diameter and 400m deep, cut by the spring-head sapping of several small streams. lb the north the Goathland syncline is followed by the

Murk Esk, but nearer the coast glacial deposits obscure the original drainage pattern (see p 10) and in consequence no reliable relationship to the fold structures may be deduced.

Valley shapes and controls

In the unglaciated parts of the region, those valleys which cut through the Middle Jurassic sequence into the shales of the Lias are broad, l–3km wide and about 500m deep, with gently sloping fertile floors which rise sharply into steep and often craggy edges to the moor above. The south-flowing streams, after developing such valleys (eg Rosedale and Farndale), are distinctive in that they then cross the Upper Jurassic belt, and in particular the Corallian limestones and calcareous sandstones. Here, solution of the limestone floor has controlled the valley shape, with the formation of narrow, steep-walled valleys only about 300m wide, a dramatic change from the broad valley-forms upstream. Sinks also develop in the stream-bed with the reduction or even complete loss of water-volume at the surface. Some of such water emerges as springs on the Helmsley–Filey fault line (see Fig 3), today the sites of long-established villages, Subterranean solution of the limestone long before the 'last' (Devensian) ice age also resulted in the formation of Kirkdale Cave (see p9) which yielded a classic mammalian fauna.

On the tops of the Tabular Hills in particular, small tributary streams, often seasonal, cut additional deep and narrow rock-walled gulleys or 'griffs', only a few metres wide, through the weak sandstones of the calcareous grits. These grade steeply to the floors of the main valleys in the Corallian belt, and effectively dissect. the dip slopes still further.

Differential erosion of the surface

At the same time as river erosion was actively dissecting the region, subaerial erosion was differentially modifying the surface of the peneplane. The sandstones were relatively little affected but the three main groups of weaker shales – the Lias, the Oxford clay and the Kimmeridge clay – were rapidly reduced. Thus the Lias at the foot of the north- and west-facing escarpments, as well as in the interior valleys, was steadily eroded, with the maintenance of steep faces. On the coast from Peak (Ravenscar) to Saltburn, Lias also forms the lower part of the high sea cliffs (to 200m), which in consequence were and are rapidly undercut with the maintenance of near vertical, unstable rock-faces below the more resistant cap rocks (see p12).

Erosion of the Oxford clay was in some ways even more striking than that of the Lias, with the formation of the strong, north-facing escarpment which crosses the region below the Corallian from Scarborough to Black Hambleton. It defines the northern edge of the Hambleton, Tabular and Hackness Hills, which at Black Hambleton and Hackness thrust northwards under synclinal control. At the southern edge of the hills erosion has stripped off the youngest beds of the Jurassic succession to expose the south-facing dip-slope of the Corallian limestones and sandstones and to leave the Vale of Pickering floored by Kimmeridge clay, though for the most part masked by more recent deposits.

In any consideration of the overall rate of erosion many variables, some indeterminate, must be considered. In the mid-Pennines, a region of comparable climate (Young, 1958), the average annual ground surface loss at present ranges from 0.025 to 0.127mm per year. On this basis the average surface erosion of the uplands of North-East Yorkshire since the last ice age ranges between 0.3 and 1.5m.

Scarp recession

The progressive recession of the western escarpment, as well as the valley walls of the moorland dales, follows one or more of several processes, each of which produces distinctive landforms. The most striking and rapid are rock-falls, as at Whitestone Cliff in 1775, as well as at Beacon Scar (Arncliff), Roseberry Topping and elsewhere; these are relatively uncommon and leave vertical rock-faces, each tens of metres high, above a jumble of large, angular sandstone blocks. By contrast, slow-moving rotational landslips are common in those areas where a tough but pervious rock, such as one of the many channel sandstones, caps a weak and impervious shale or siltstone. These leave a succession of rock-capped ridges which successively step down from the crest of the escarpment towards the valley floor and leave complementary, boggy hollows between. Imposing examples occur in Farndale, Great Fryup, and Pie Thorn. Less striking are the clay and mud-flows which fan out from shale-dominated parts of the escarpment, as within the Ingleby embayment.

On the steep edges of the Hambleton Hills in particular a fourth form of scarp recession, cambering, is frequent. Large blocks, usually in belts up to a kilometre long and some tens of metres wide, successively tilt, with increasing dip towards the lower ground. Each leaves behind a narrow fissure or gull which narrows downwards, in part debris-filled and usually capped by soil. Of these the finest series is at the crest of Sneck Yat Bank, where eight near-parallel gulls are up to 15m deep and 40m wide. Elsewhere some gulls remain permanently open to form 'windypits', which penetrate downwards as irregular shafts for several tens of metres below the surface before ending in a jumble of fallen blocks. One at least has remained open since the Bronze Age (see p81).

On the western escarpment the results of these several processes are imposed upon a more basic pattern, a series of major cuspate to semi-circular embayments, each l–2km in diameter. These are individually unnamed: the finest occur near Hood Grange (Sutton Bank) and around Southwood Hall; others lie south-east of Woolmoor, round Cowesby Wood and south of Whitestone Scar. Their form is that produced by marine erosion on a sequence of sedimentary rocks. They developed when a major arm of the sea occupied the Vales of York and Mowbray, after the most western river systems of the North-East Yorkshire block had themselves been destroyed by marine erosion. These cuspate features are in part modified by the debris of one or other form of more recent scarp recession, but they remain an impressive feature of the western escarpment.

By contrast, in the moorland dales, rotational land-slips abound, leaving festoons and ridges of broken, often rocky ground, interspersed by peaty marshes and ponds. Solifluction flows, rockfalls and spring-head sapping are present, but the cuspate form of scarp recession is absent, as these areas were beyond the influence of marine erosion.

Residual topographic features

The steady but varied erosional history left many highly distinctive residual features, some of which played their part as defensive or burial sites, as well as in the folklore of the region. Highly characteristic are the innumerable steep-sided 'nabs' or short promontories, not only on the coast but particularly inland, invariably capped by a more resistant, often craggy sandstone upon a weaker shale. Even more distinctive are the narrow, elongate 'riggs' (ridges), as between the radial valleys in the central region. Thus Castleton Rigg is 5km in length, but only 25m wide in its narrowest part. There are many other riggs in the Hambleton and Tabular Hills, where they lie between the deeply-cut tributary valleys which dissect the Corallian.

Outliers of many forms, and particularly those which are conical or nearly so, are striking features near the edges of the escarpments. Thus Free-borough (Kellaways rock on Middle Jurassic clays), an almost perfect cone, rises 45m above the adjacent area, and is often mistaken for a northern Silbury. Blakey 'Topping (45m) is less regular; Hood Hill (98m) is elongate, as are Easterside Hill (75m) and the adjacent Hawnby Hill. Whorl Hill (l00m) is a faulted Liassic outlier with only a very small cap; Roseberry Topping (70m), although very impressive from the north-west, is only partially detached from the main escarpment. Much smaller, though similar in form, are Carlow Hill, Over Silton (40m); Howe Hill, Kepwick (30m); and Round Hill (15m), between Little and Great Fryup, which has lost its cap. It is noteworthy that although many of the nabs and riggs were utilized by early man, few, if any, of the conical and smaller outliers were used, probably because of the lack of an assured water supply.

The larger but irregular outliers (Eston Hills, Hackness Hills, Woolmoor, and others) are by contrast less dramatic in form. Most probably, however, they proved more attractive for defence or settlement because of the larger area available for rain percolation and the consequent availability of spring water.

4 Glacial influences

Early glaciations

Several times during the last two million years (the Quaternary), northern Europe suffered phases of refrigeration which interrupted the complex inter-play of subaerial and marine processes of erosion and deposition. Each major cold phase probably lasted at least 120,000 years; each was separated one from the other by longer periods of warmer climate – the Great Interglacial was over 300,000 years in length. Each of these interglacial episodes was manifestly more effective in its influence in moulding the shape of the region than the *c* 13,000 years of 'post-glacial' time in North-East Yorkshire. Of the effects of the earlier cold phases little is known in the region under consideration, though they would at least have served to shatter the sur-face rocks and cause erosion; at their maxima they would heavily abrade all parts overridden by ice, though little evidence remains. A thin scatter of quartz and other siliceous pebbles found beneath the peat of the upland moors and a few patches of till round the Vale of Pickering are accepted as the sole relics of the penultimate glaciation (Wolst-onian), when ice overrode the entire region.

The classic deposits of Kirkdale Cave, near Helms-ley, are now attributed to the subsequent or last Upswichian) interglacial. The cave, in Corallian limestone (Malton oolite) was, before quarrying, about 100m long and 1–4m high. It was used as an hyaena den, in the mud floor of which, and coated with travertine, were found the crushed bones and teeth of eighteen species of mammals. In a rigorous revision of the fauna1 list (Boylan, 1981), some ear-lier identifications have been rejected as erroneous, and others are doubtful. Together with cave hyaena, however, the following, among others, are confirmed:

Canis cf lupus	*wolf*
Vulpes vulpes	red fox
Ursus cf arctos	brown bear
Mustela cf erminae	stoat
'Panthera' cf leo	lion
Elephas antiquus	straight-tusked elephant
Hippopotamus amphibius	hippopotamus
Cervus elaphus	red deer
Cervus cf dama	fallow deer
Megaloceras giganteus	giant deer
Bison cf priscus	bison
Dicerorhinus hemitoechus	rhinoceros

No trace of man was found. It is not unlikely that other comparable interglacial cave deposits occur in the limestone hills, as yet undiscovered.

Glacial erosion

During the last (Devensian) ice age, ice impinged upon North-East Yorkshire from the east, north and west. The powerful North Sea ice overrode the cliffed coastal belt and drove inland for distances up to 15km (Fig 3). By contrast the Vale of York ice failed to overtop the western escarpment: it reached about 200m OD in the Cleveland Hills, but steadily decreased in height southwards to the York moraine. Thus the greater part of the region remained essentially ice-free during the maximum phase of the Devensian, though undoubtedly snow-covered for much of the time. There is, however, little evidence on the northern and western escarpments for active ice erosion on a substantial scale at this time. Undoubtedly weathered rock debris was stripped from the slopes, though surprisingly little Jurassic material remains in the drifts. It is also noteworthy that the scattered Jurassic outliers in the Vale of York persisted throughout the Devensian glaciation without any major erosion of their form, though today ringed by glacial sediments. Thus the Vale of York ice does not appear to have acted as a vigorous erosional agent at this time.

Glacial deposition

As the ice sheets melted, their load of ill-sorted rock debris was deposited to form boulder clay or till, which, together with interbedded sand and gravels, were plastered irregularly over the glaciated parts of the region. This heterogeneous deposit, also known collectively as ‘drift’, brought fundamental changes to the topography and character of the lowland and coastal belts in particular.

Boulder clay is the finer, ungraded and uncemented rock debris transported by ice-sheets, together with boulders and cobbles, derived from the regions over which they had passed. The far-travelled erratics found in North-East Yorkshire, some up to several tons weight, are from the Lake District, Scotland or Scandinavia; most are distinctive in appearance and tough in character. Although they are rounded in form rather than angular, the majority having been derived from stream or beach gravels, they do not appear to have been used to any marked extent by early man. In addition, less far-travelled erratics of Carboniferous Limestone and siliceous Yoredale sandstones from Wensleydale and County Durham, as well as Magnesian Limestone and Lias limestones from Durham and Cleveland respectively, commonly occur in the boulder clays. The less-resistant and weathered rock debris from all sources forms much of the finer fraction of these clays. That derived from igneous rocks and limestones in particular is of outstanding importance in that it contributes favourably to the fertility of boulder clay soils to form a terrain incomparably richer during its slow weathering than that of the unglaciated uplands.

The effect of the vast deposition of drift over the lowlands of the region was to block and even obliterate the valleys of the smaller and medium-sized streams with boulder clays and sands, together up to 90m thick. Major streams which originally had entered the sea at Runswick Bay, Whitby West Cliff, Saltwick, Robin Hood’s Bay, Scalby and elsewhere were forced on ice retreat to cut new channels over and through the drift, or along courses earlier established by subglacial streams. These new valleys, still unstable and immature, are in places several hundred metres distant from the pre-glacial courses.

In the Vale of York boulder clay deposition was accompanied by the accumulation of sands and gravels on the shrinking flanks of the glacier, as well as in shafts and holes in the ice itself. The former remain as well-drained shelves above the valley floor (lateral kames), patchily distributed at the foot of the Jurassic escarpment between Stokesley and Thirsk, and in the Skelder area and elsewhere near Whitby. The latter now form conical or flat topped hillocks of sand and gravel (isolated kames) usually up to 15m in height. Lateral kames provided favourable settlement sites (eg Scarth Nick Farm), but the isolated kames were too small to attract the favourable attention of early man.

5 Late-glacial and recent changes

Melt-water effects

With the amelioration of the climate and the consequent release of the meltwaters, initially only seasonally, distinctive erosion channels were cut at or near the edges of the ice-fronts. These marginal drainage channels, up to some tens of metres deep, were eroded into the rock-head by meltwaters which flowed along the ice-edge; other streams flowed downslope below the icesheet itself. Those ice-edge waters draining off the northern slopes of the main watershed ultimately poured south through Newtondale, a pre-Devensian valley which had breached the Corallian escarpment and which was deepened by the spillway waters. They drained into Lake Pickering, an ice-dammed sheet of water which originally extended from the Wykeham moraine to Gilling and Helmsley.

Similarly, to the east, meltwaters draining south through the coastal marginal channels were diverted by ice from Scalby and turned through the already established Forge Valley to the lake. The site of glacial Lake Pickering, which would otherwise today form a marine inlet up to 8m below present sea-level, was raised by recent floor sediments, alluvium and peat to +20 to 30m OD.

With further ice recession the marginal drainage channels, deprived of their flow of meltwaters, developed into ill-drained and peat-filled hollows, many of which roughly follow the contour. They were and remain obstructions to easy communication, but are archaeologically important in that their peat profiles, as at Moss Swang (p 50) present a reliable post-Devensian chronology. Lake

Pickering also lost much, but not all, of its inflow. It persisted as scattered, shrinking lakelets, probably into post-Roman times. Upper Eskdale was filled with ice during part of the Devensian, which was for some of that time stagnant. During at least the final part of glacial retreat, however, this area was also occupied by a lake in which laminated clays were laid down; it was succeeded, as was Lake Pickering, by shrinking lakelets and peaty marshes.

Solifluction deposits

More striking in its effect, however, was the release, during the late-glacial thaw, of moisture originally locked as ice within the soils, subsoils and near-surface rocks. This slow but steady release of water mobilized all fine-grained surface materials, as well as scattered pebbles and cobbles, which then flowed steadily downslope as a semi-fluid, muddy melange. The results of this widespread process of solifluction is particularly apparent on the slopes of the broader upland valleys such as Danbydale and Farndale, as well as near the foot of the western escarpment. It has left a deposit up to several metres thick which forms a relatively uniform surface inclined at 1 in 12 to 1 in 15 below the crags and landslips of the Middle Jurassic sandstones. It may well include some of the interglacial upland soils which had been protected by snow during the Devensian glaciation and removed only by this highly effective process of transport. In any event the solifluction deposits undoubtedly provide the basis of the rich agricultural land of those dales outside the full effects of Devensian glaciation, as well as those slopes which had been ice-covered.

Sea-level oscillations

With the retreat of the ice from North-East Yorkshire, some 10,000 to 13,000 years ago, the smaller lowland valleys as well as the coastal bays were choked and even obliterated by till. The flanks of the larger Tees and Esk valleys were also heavily plastered with boulder clay, but their form remained clearly apparent. The ill-drained till-covered lowland surface, originally devoid of vegetation, extended far seaward of the present coastline. As the climate over the whole region returned to something approaching that of the present day, the surface was slowly colonised by vegetation (see p17). Subaerial erosion resumed all those processes so effective on the uplands in pre-glacial times, as well as initiating new cycles on the lowlands which effectively dissected the weak glacial clays.

Near to present-day sea-level, however, two additional and opposing factors became effective in the control of the position of the coastline and the geological processes associated with it. The return of large volumes of water to the oceans from melting ice caused the sea-level to rise. However, the release of the load of ice resulted in the uplift of those parts of the earth's crust that had been most heavily glaciated, as they returned to their earlier positions. As a result there were oscillations of sea-level relative to the land which varied according to local rates of adjustment, a process which still continues. Furthermore these variations are complicated by distant crustal movements, particularly of the ocean floors. Thus the overall effect in any one restricted coastal region is to cause a complex variation in sea-level relative to the land. This is most clearly apparent where sea-level had stood relatively stable for a period of time, which may be only a few hundreds of years, though sufficient to allow marine erosion to cut a platform or bench, as into weakly resistant glacial deposits; alternatively in a favourable moist to freshwater environment a peat may develop near but above sea-level,

Thus the disposition of wave-cut platforms, together with widely distributed peats, may allow the successive positions of sea-level in relation to the land in any one region to be resolved. There is, however, a further complication: at any time, particularly in those coastal localities where a temporary lake is trapped between the retreating ice-front and the land surface, a plane wave-cut surface may be eroded in the till sequence, in a position entirely unrelated to sea-level.

In North-East Yorkshire all these diverse processes affect not only low-level topography but with it the archaeological record. Thus around the bays in the coastal belt well-marked plane benches, which slope gently seaward, cut into the drift. Although now dissected by more recent streams, their extent and form is clearly in contrast to the irregular till surface on their inland margin. Thus behind Robin Hood's Bay the landward edge of this surface lies at *c* 60m OD; near Runswick Bay and Staithes it is at *c* 90m OD with a lower surface *c* 60m OD. West of Whitby and landward of Sandsend Wyke a less well-defined surface at *c* 75m OD may be traced up the Esk valley for 7km where, at Newbiggin Hall, it was selected as a plane surface for a Roman settlement. These surfaces are related to the positions of large offshore ice-trapped lakes rather than to sea-level: their archaeological significance lies in their plane, low-level surfaces being available for future human colonization in areas of otherwise considerable topographic diversity.

Streams established on these emerging surfaces rapidly cut into the drift to form narrow, unstable valleys some tens of metres deep. Furthermore, because they were originally established on remarkably plane surfaces free from minor irregularities their courses were unusually straight and even in pairs, only a few scores of metres apart, eg Sandsend and Eastrow Becks, Roxby and Easington Becks.

The broad estuary of the Tees, however, shows better than elsewhere in the region the varied interplay of land and sea-levels during archaeohistoric times (Fig 3). Thus a late-glacial phase recognized only in the Tees basin is marked by a deposit of laminated clay. It rarely exceeds 9m in thickness and penetrates inland for *c* 19km, where it reaches 25m OD as it passes into a marginal deposit of clay-sand (Agar, 1954). In common with the benches at higher levels, this was also most probably deposited in a temporary lake, dammed behind a retreating, offshore ice-front.

This relatively stable episode left a surface of stoneless clay gently inclined towards the river and the sea. At about the onset of what is usually regarded as Recent time, rivers rapidly cut down through the glacial deposits and in places into the underlying solid rock, as they graded their floors to the then low sea-level. Steep-walled channels, gorge-like in places, were cut, often one or two km distant from the present course. Thus, the rock-floor of the Tees channel, now buried, lies at -25m OD near the present river mouth; that of the Esk, even 2km upstream, is at -15m OD, though here the higher slopes of the rock gorge remain unburied. A subsequent slow rise of sea-level resulted in the filling of these narrow channels with gravels, sands and silts, from which at -9m OD a dolichocephalic skull, a bone perforated as for a stone axe, together with red deer bones and antlers, are recorded near leesmouth (Agar, 1954).

A short-term cessation or even minor regression of sea-level allowed peat deposits to accumulate. Thus, in the Tees estuary a widely occurring peat lies between -2m OD and OD. At West Hartlepool, 6km north of the area here considered, the same peat, here at low-water mark, yielded flints originally regarded as of Mesolithic (Atlantean) age (Trechmann, 1947) but now assessed as early Neolithic (Tooley, 1975). The same peat occurs at Redcar, and at Whitby similar, but undated, peats occur in the upper harbour at -2m and -4m OD.

A restoration of rising sea-level caused a strong marine transgression to flood across the peat to a maximum position of +12.5m OD in the Tees estuary. It left a beach deposit of yellow sand with *Mytilus edulis* and *Cardium edule*, which now forms a broad wedge in the estuary extending inland for 9km. The deposit here averages only 0.3m in thickness but at Whitby thick banks of sand on both sides of the Esk were laid down during this higher sea-level (Hemingway, 1958). They form the site of the medieval town, which doubtless overlies earlier settlements.

The final phase, during the last 3000 years, saw the regression of sea-level to its present position, though not without minor pauses. At this time a very restricted strip of brown alluvium was deposited along the river banks of the entire region. Later, on the low-lying coast from Teesmouth to Marske (8km), sand dunes were to continue to be blown inland from the beaches.

Cliff erosion

Although the variations of sea-level within the estuaries of North-East Yorkshire served to preserve a measure of the archaeological record, some evidence is clearly buried so deeply within recent sediments that the likelihood of its discovery is remote and at best only by chance. However, records on the cliffed coasts of the region, which face from north to east, are even less favourably placed because of rapid marine erosion.

In terms of their form the cliffs may be divided into three parts. Those from Peak (Ravenscar) to Scalby (Fig 2) are dominated by Middle Jurassic sandstones, much of which is massive. Not only do these resist erosion, but the fallen blocks at their foot provide a long-term protection as natural breakwaters. North-west of Peak, Liassic shales of several types with ironstones and some sandstone form much of the cliffs and particularly the cliff-base. They are less resistant than the overlying Middle Jurassic sandstones which cap parts of these cliffs. The rate of undercutting here is relatively rapid; the local rock-falls, though large, are mainly of weak, much fragmented shale, which is readily removed by wave action. As a result, cliff recession here proceeds steadily. Before the Devensian ice age, deeply incised bays developed in those places where shale persists below sea-level, leaving promontories where a marginally more resistant bed within the Lias occurs near mid-tide level. The bays, now plugged by glacial deposits, are rapidly being cleared of their unresistant boulder clays and sands.

South of Scalby the coastal rocks show an even greater variation in resistance to marine erosion than most of the northern sector. At the North and South Bays at Scarborough and at Cayton Bay, for example, boulder clays abut against massive sandstones; at Gristhorpe and Filey Bays, thick shales are in contact with resistant sandstones at shore level. As a result these latter stand out as promontories as at Castle Hill, Scarborough, and as Osgodby Nab and Filey Brigg.

Along the entire coastline from Saltburn to Filey the great variation in rock type results in a corresponding variation in erosion rates. Only a few measurements have been attempted, either directly (Hemingway, 1958) or by map analysis (Agar, 1960), and both are necessarily short-term. At the heads of the bays north of Peak, the boulder clay plugs are receding at the high average rate of *c* 20 to 3Om per century, with local variations. By contrast, those cliffs with Lias at sea-level and unprotected by promontories retreat at about 10m per century. No observations have yet been made from Peak to Cloughton Wyke, but here will probably not exceed 3m per century. Thus the coastline suffers recession which is throughout substantial and in places very rapid. It is indeed remarkable that any man-made structure, originally located of necessity near to the then cliff edge, should have survived for more than a millennium.

It is apparent from the several oscillations of sea-level in late- and post-glacial time, as well as from the climatic variation, that no backward extrapolation of the present rates of erosion may reliably be made. It may nevertheless be suggested that in Roman times the open coastline of the northern sector may have averaged some 200m seaward of its present position, with bays less deeply incised than at present; in Mesolithic times it may have lain a kilometre seaward falling eastward, and everywhere under a till cover.

6 Geological potential of the region to early man

In early post-glacial times North-East Yorkshire presented to early man an essentially isolated upland block bounded by sea-cliffs to the east, by steep scarps above undrained clay lowlands to the north and west, and to the south by gentle slopes falling southwards to shrinking, marsh-fringed lakes. It is in consequence not surprising that the earliest known settlement, the Late Upper Palaeolithic site at Flixton Carr, is by these low-level marshes of the Vale of Pickering. The geological and topographic evolution of the region developed by a multiplicity of processes also provided man with both upland and lowland sites of varied potential, suitable for defence, exploitation, settlement or cultivation. Furthermore, an ample water supply was assured, not only in the lakes and tree-choked streams draining off the uplands, but preferably from the abounding springs which emerged on the valley sides, as at the base of the Jurassic sandstones and on the fault-bounded southern margin of the Tabular Hills.

The richer south-facing dip-slopes of the limestone Hambleton, Tabular, and Hackness Hills contrast with the less favourable sandstone and silt soils of the central area, now moorland. Over the northern and coastal parts of the region glacial deposits, however, improved the agricultural potential, but their original undrained form and subsequent deep dissection detracted from it. It may well prove that the solifluction deposits, together with the lake-clays, provided favourable terrain for early colonization in Eskdale and its tributary dales. The several forms of scarp and valley-wall recession were significant. Their resulting massive festoons of slipped and broken rock, though partially plant-covered, were useless for colonization, despite their location below the protection of an escarpment. Furthermore, they presented for the most part substantial obstruction to primitive communication, with the result that early routes up the escarpments, as followed by some modern roads, preferred the nabs between the landslips.

Many raw materials were available to early man, who was clearly highly selective in his choice of indigenous rock for quern-making. Of the Middle Jurassic sandstones, the marine crinoid grit was highly valued for this purpose and was quarried at its relatively restricted upland outcrop. The cavities left on solution of its small fossils, now dissolved by the acids of the moorland soils, maintained the essential roughened surface in a relatively tough rock (Hayes *et al*, 1980). The abundant channel sandstones were also extensively used, some querns being most probably fashioned from ‘tumblers’ (fallen blocks on the valley slopes) or from rounded boulders from the rivers. Querns from both these principal sources of parent sandstones were transported south to the agriculturally more favourable Tabular Hills and the Vale of Pickering. The weak calcareous grits and the limestones of the Corallian were rarely used for quern-making, though the concretionary ball beds were occasionally utilized. In addition the early walls, boundary stones, standing stones and circles of the moorland are all of Middle Jurassic sandstone, including the more resistant moor grit, quarried or cleared from the immediate site.

Clay for pottery-making was widely available from lacustrine, alluvial and glacial sources and was commonly mixed with chips to 3mm in length of crushed igneous rock, either Cleveland dyke or glacial erratics. Unlike the Howardian Hills pottery to the south, Jurassic clays were not so used in North-East Yorkshire.

The extent to which the extensive deposits of ironstone were used in the region during the period under review is unknown, though they were worked from Iron Age times. It is remarkable that the thin nodular deposits of clay ironstone (siderite mudstone) were originally preferred to the massive beds of equally iron-rich rock (chamosite oolite) from the Cleveland Ironstone Formation. Both are well exposed in the cliffs and river valleys of the northern sector. Nevertheless, the synonym ‘Julian’s line’ for the nodular ironstones of the Eller Beck Formation (Barrow, 1877), which were extensively mined in medieval times, is entirely unjustified as far as any Roman connotation is implied.

Jet was highly valued for personal ornament from earliest times. Waterworn fragments from adjacent cliff falls were apparently collected from the beaches, and much was traded in the Roman period to York and other parts of northern England.

River gravels, washed from glacial deposits were undoubtedly valued as a source of slingstones, as is shown by the pile of some 25 pebbles exposed during afforestation of the flanks of Moor Ridge, below Black Hambleton. These are all well-rounded, of uniform size (*c* 60gm) and lithology (tough Yoredale sandstone). They occur at 270m OD, high above the maximum of the adjacent glacial lake at 180m OD. It is also most probable that the only two granite querns found in the region under review were shaped from boulders washed from boulder clay, most likely on the coast, where the original boulders would be abraded by beach erosion and so retain their unweathered character (Hayes *et al*, 1980).

It is surprising that no Corallian chert was used for implements, though it is abundant in the limestone hills. Nearly all the small implements found in the region are of grey flint typical of the Yorkshire Wolds; indeed, such blocks, each several kilograms in weight, were imported in nodular form for working on site. All larger implements were also apparently imported in finished form; none is known with certainty to have been fashioned from glacial erratics.

Localities mentioned in Chapter 1

Baysdale	NZ 6207	Marske	NZ 6323
Beacon Scar	SE 460998	Moss Swang	NZ 806035
Black Hambleton	SE 4894	Murk Esk	NZ 8103
Blakey Topping	SE 872939	Nether Silton	SE 456924
Blea Hill	NZ 902004	Newbiggin Hall	NZ 842070
Carlow Hill	SE 448932	Newtondale	SE 8191
Castleton Rigg	NZ 6804	Oldstead	SE 530800
Cloughton Wyke	TA 0295	Osgodby Nab	TA 064854
Cold Moor	NZ 5501	Osmotherly Moor	SE 4597
Cowesby Wood	SE 4789	Over Silton Moor	SE 4797
Danby Dale	NZ 6905	Peak	NZ 980018
Easington	NZ 945180	Ravenscar	NZ 980018
Easterside Hill	SE 554907	Roseberry Topping	NZ 579127
Eastrow	NZ 864126	Rosedale	SE 7296
Eston Hills	NZ 5617	Round Hill	NZ 716049
Farndale	SE 6697	Roxby	NZ 7616
Forge Valley	SE 9886	Runswick Bay	NZ 8115
Freeborough	NZ 690128	Saltwick	NZ 915114
Girrick Moor	NZ 7011	Sandsend	NZ 860129
Glaisdale	NZ 7503	Scalby	TA 010905
Great Ayton	NZ 5510	Scarth Wood Farm	NZ 466008
Great Fryup	NZ 7305	Skelder	NZ 845095
Greenhow Bank	NZ 6003	Sneck Yat Bank	SE 508876
Gristhorpe Bay	TA 010825	Southwood Hall	SE 502847
Hackness	SE 965901	Staithes	NZ 781185
Hawnby Hill	SE 540905	Star Carr	TA 027810
Hood Grange	SE 504823	Urra Moor	NZ 5801
Hood Hill	SE 504813	Upgang	NZ 881119
Howe Hill (Kepwick)	SE 465905	Whitestone Cliff	SE 506837
Ingleby Beck	NZ 5904	Whitestone Scar	SE 485929
Kirkdale Cave	SE 678856	Whorl Hill	NZ 493026
Little Fryup	NZ 7105	Woolmoor	SE 459883

2 Prehistoric environments

I G Simmons, M A Atherden, E W Cloutman, P R Cundill, J B Innes and R L Jones

1 Introduction

This chapter presents an updated summary of the results of several years' work on the environments of prehistoric man, and the way in which his communities in turn changed their surroundings. The account has been divided into conventional archaeological periods allied to the major chronological divisions of the time since the last glaciation, ie the Late Devensian (late-glacial) and Flandrian (post-glacial), the terminology and chronology of which are set out in Figure 5. Thus we have in this chapter an account of the Late-Devensian and Early Flandrian (Fl I) stages by R L Jones, which covers the terminal Palaeolithic and the earlier Mesolithic; of the mid-Flandrian (Fl II) by I G Simmons and J B Innes, which covers the later Mesolithic; by P R Cundill of the part of Flandrian III which corresponds to the Neolithic and Bronze Ages; and by M A Atherden of the later part of Flandrian III which covers the Iron Age and Romano-British period on the moors. Edward Cloutman's work has provided the section on pollen and stratigraphic analysis in the Vale of Pickering. Some other relatively small pieces of work have also been added to the text and their authors are credited at the appropriate points. The whole chapter has been edited by I G Simmons, who has also provided the top and tail, for which he is solely responsible.

This account is not the place to give details of the methods used in coming to our findings. The whole battery of palaeoecological techniques such as pollen analysis, macro remain identification, peat stratigraphy, spatial analysis of pollen frequency distributions, soil analysis, and the like, has been used, and readers who wish to learn more about techniques should refer to summary accounts such as that of Tooley (1981) and thence to more specialized sources. We have tried to avoid the more obscure scientific terms in order to make the work accessible to a wide range of readers; we have also condensed a lot of very detailed material into a short account, and if more detail is desired then readers should consult the individual theses and papers to which reference is made in the text. A highly condensed archaeological-environmental account for part of the moors is given by Spratt and Simmons (1976) in the light of knowledge of that time.

This is only the third time all the material has been put together in a chronological account such as this, and so any overall conclusions are bound to be tentative and may eventually change upon further consideration. This synthesis shows, too, how few radiocarbon dates were obtained in the course of the work and so certain parts of it, especially in later prehistory, have large uncertainties because there are insufficient geochronometric markers, largely due to the shoestring budgets upon which this work was financed. Parts, however, were financed by NERC, by the University of Durham, by the British Academy, and by the North York Moors National Park Committee. The upland work was mainly carried out in the Department of Geography at the University of Durham. Most of the lowland work was executed at University College of Wales Department of Plant Sciences at Cardiff, and those who worked in these departments are grateful for the use of their facilities. We also extend our thanks to the numerous landowners who have given permission for the taking of samples from sites on their land: without their ready help much of this work would not have been feasible. We acknowledge here the stimulus provided by the work of Professor G W Dimbleby and the interest he has taken in this work.

There is scope still for more research in this field: there are still unanswered questions and gaps to be filled, While we know the main outlines for the story, there are several subplots whose details are obscure. To give one instance, we are lacking in analyses of deep organic matter profiles from the limestone Tabular Hills, as distinct from the largely sandstone areas of the higher moors. When such tasks have been fulfilled, it seems likely that the North Yorkshire Moors will be the British upland above all others where detailed knowledge of the prehistoric past in both its environmental and cultural aspects will have gone hand in hand to a level of synthesis not hitherto achieved; we will also have the great advantage of knowing a lot about its surrounding lowlands, and the chalk hills to the south also are not ignored.

Dates in this chapter have been given in radiocarbon years 'before present' (bp), a chronology which assumes 'present' as being 1950.

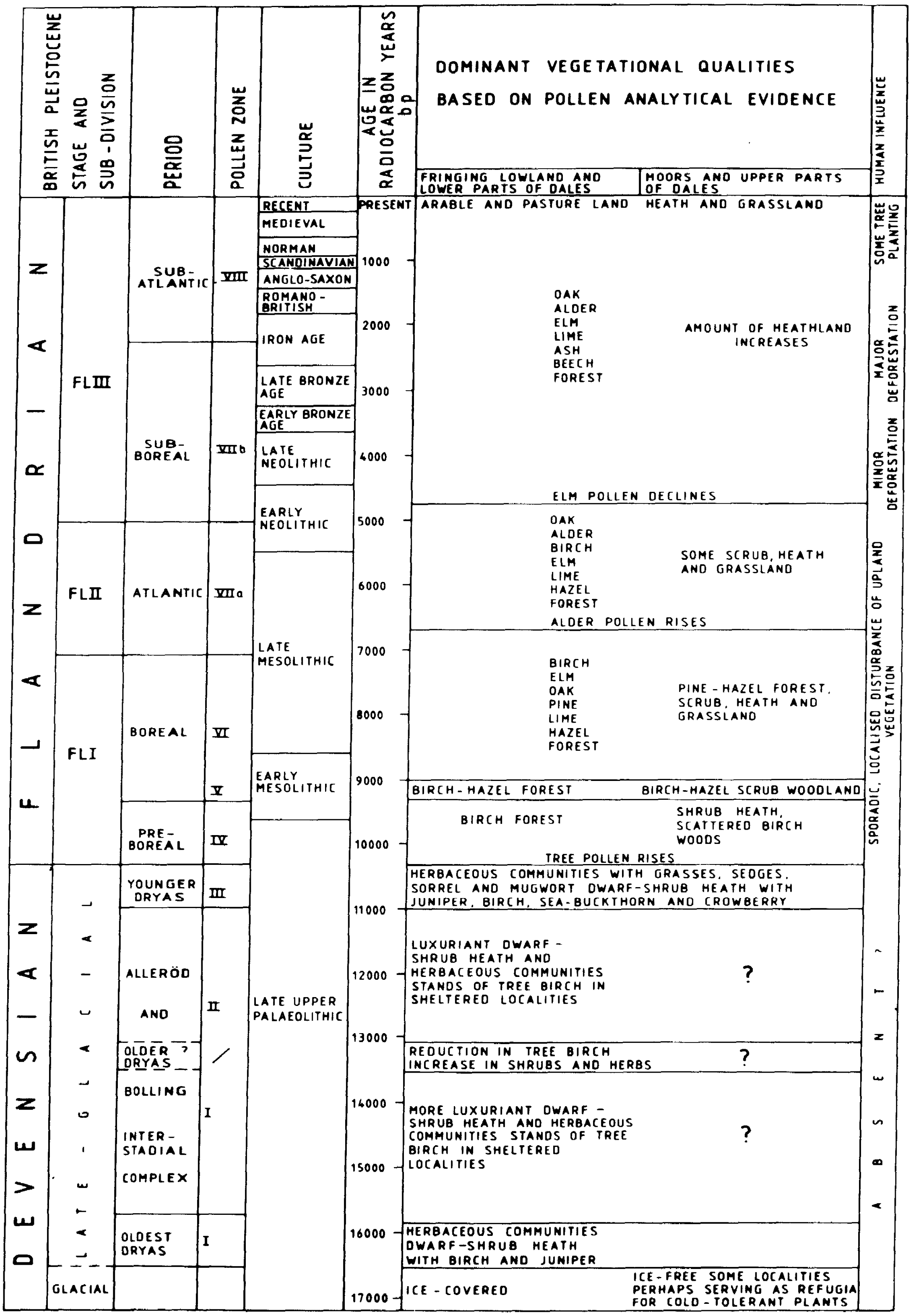


Figure 5 A schematic view of chronology, terminology, and vegetational change on the North Yorkshire Moors. This serves both as an introduction to chapter 2 (especially the four left-hand columns) and as a summary of its overall findings. British chronological scheme based on West (1977). (After Jones et al, 1979).

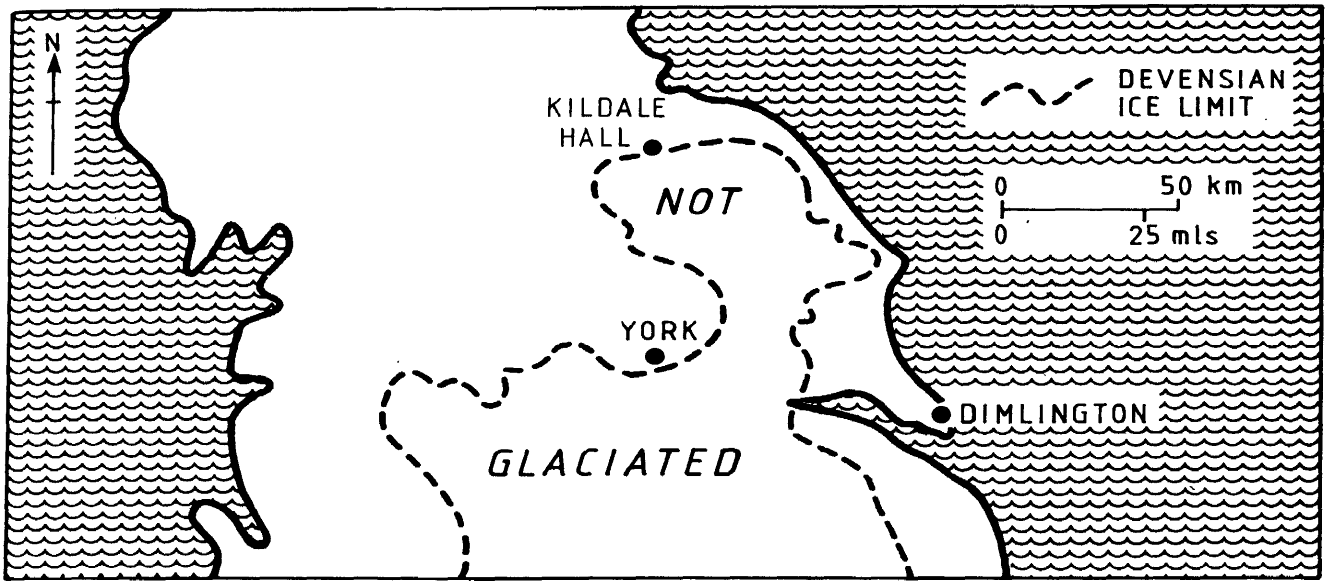


Figure 6 The limit of glaciation during the late (Devensian) major glaciation in Britain

2 Late Devensian and Early Flandrian ecological history

The Late Devensian

Ice of the last (Devensian) glaciation engulfed the northern and eastern flanks of the North Yorkshire Moors, and filled the major east-west (Leven-Esk) valley systems therein. It did not surmount the prominent western escarpment, nor transgress the high massif of the moors during progress towards its southern limit in the Vale of York (Gregory, 1962; 1965). Radiocarbon dates, the mean of which is 18,730 years bp, from organic silts beneath Devensian boulder clay at Dimlington, Holderness (Madgett and Catt, 1978; Rose, 1985), indicate that the last ice reached here after that time. The moss remains and insect fauna from the silts are diagnostic of cold conditions and imply that the ice was not far from the locality during the deposition (Penny *et al*, 1969). At Kildale Hall (168m OD) in the Leven valley, a shell marl with moss remains (the basal ones dated by radiocarbon to 16,713 ± 340 years bp (SRR-145), which accumulated in a small lake fashioned in Devensian glacial deposits, indicates that this part of the North Yorkshire Moors was ice-free *c* 16,000 years bp (Fig 6). Combining the Dimlington and Kildale evidence, it is clear that the Devensian glaciation came late in this cold stage (which began about 70,000 years bp), and was accomplished relatively quickly. However, at the time of deposition of the basal sediments at Kildale Hall, deglaciation may not have been entirely achieved locally, as geomorphological evidence suggests the isolation and stagnation of numerous ice lobes in the Leven-Esk valley system as the glacier waned (Gregory, 1962; 1965). Kildale Hall, together with another, much larger, lake site at Seamer Carr near Stokesley (70m OD), some 13km to the west (Fig 7), possesses a complete sequence of Late Devensian (late-glacial) sediments. These inorganic and organic deposits have yielded substantial quantities of pollen grains and spores, together with plant macro-fossils and mo11uscan remains, which between them have enabled a coherent of Late Devensian vegetational development and ecological history to be formulated (Jones, 1971; 1976a; 1977a; 1977b; Keen *et al*, 1984; Fig 5).

As the climate began to ameliorate after the glaciation, the initial vegetation appears to have been of a very open and rapidly changing nature. Climatic conditions were still quite severe, and there would have been spreads of unstable glacial and fluvioglacial deposits, where mass movement was in progress. Water tables must have been high due to ice melt, and the fresh, base-rich substrate lacking in soil development. Herbaceous communities dominated by *Gramineae* (grasses), *Cyperaceae* (sedges), *Artemisia* (mugwort) and *Rumex acetosa* (sorrel), were accompanied by dwarf-shrub heath in which *Betula nana* (dwarf birch), *Salix* (willow), *Juniperus* (juniper), and *Empetrum* (crowberry) were prominent.

Significant increases in the values of *Juniperus*, *Hippophae* (sea-buckthorn), and *Betula* sp (tree birch) pollen, together with the appearance in the spectra of a greater variety of herbaceous taxa, imply that a more complete and diverse plant cover developed. Herbaceous and dwarf-shrub heath communities retained their ecological dominance; however, there seem to have been stands of tree birch, probably in the more sheltered localities. Consonant upon the climatic improvement, an increase in slope stability must have resulted from the

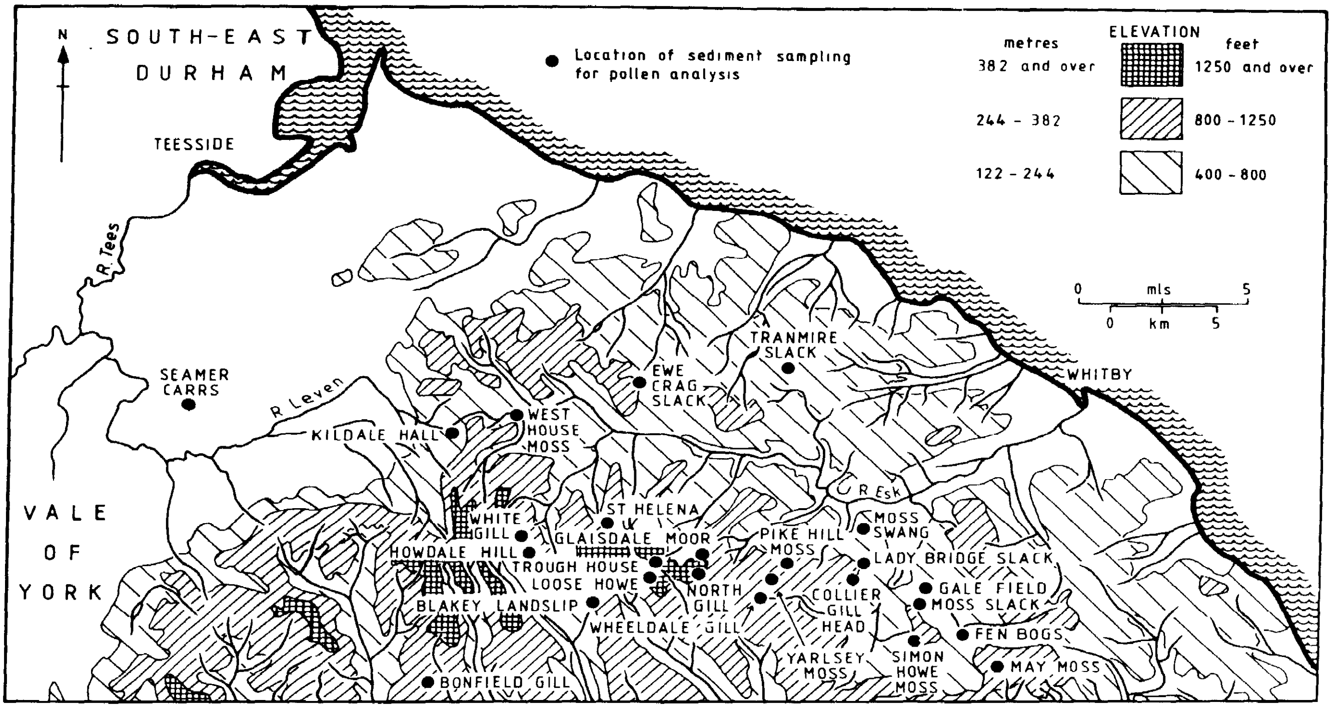


Figure 7 Relief map of the northern portion of the moors showing pollen sampling sites

lessening of mass movement, and soil conditions were enhanced as water tables continued to fall and organic matter to accumulate.

The pollen records thereafter reflect a slight change in vegetational composition, and the corresponding stratigraphic horizons contain an influx of inorganic material. Tree birches appear to have become less important in the flora, where herbs and shrubs attained more significance. A retrogressive environmental factor, perhaps a climatic cooling which led to renewed slope instability and mass movement, is likely to have been responsible for such a change, the culmination of which has been radiocarbon assayed to 13,042 ± 140 years bp (SRR-146) at Seamer Carr (Stokesley).

A subsequent increase in juniper and sea-buckthorn pollen, and rise in the values for tree birch, suggest that the climate improved again and more wooded conditions returned. As the open woodland environment persisted, the pollen records indicate that the quantity of herbs and shrubs gradually began to increase. Then, at about 11,000 years bp a further significant change in vegetational composition becomes evident, with a variety of open habitat shrubs and herbs gaining ascendancy over birch woodland. At about this time, the molluscan fauna of a small lake at Kildale Hall became extinct (Keen *et al*, 1984). In addition to the palaeoecological records from Kildale Hall and Seamer Carr (Stokesley), sites at the West House Moss on the Esk-Leven watershed and Ewe Crag Slack on Danby Low Moor (Fig 7) provide data for this phase. Herbaceous communities with grasses, sedges, sorrel, and mugwort assumed considerable importance, and there was shrub heath containing dwarf birch, juniper and crowberry. Such a pollen assemblage implies that the climatic conditions worsened. Mass movement, particularly solifluction, resulted in the production of unstable slopes and disturbed soil profiles. Fresh mineral materials produced by frost action (unless it came only from an acid sandstone) led to a higher base-status of substrates, and soil disturbance provided an opportunity for the reassortment of existing plant communities. While it seems that temperatures were lowered enough to permit the freezing of water bodies for considerable periods, trees still grew in the most protected localities.

Support for such a Late Devensian environmental sequence is forthcoming from localities adjacent to the North Yorkshire Moors. At Neasham near Darlington in the Tees valley, Blackburn (1952) presented palynological evidence of a wooded phase in late-glacial time and obtained radiocarbon dates of 11,561 ± 250 bp (Q-208) and 11,011 ± 230 bp (Q-207) (Godwin and Willis, 1959) for the deposit, which contained a skeleton of *Alces alces* (elk). At Seamer Carr (Scarborough) and Killerby Carr in the Vale of Pickering, Walker and Godwin (1954) identified two birch woodland phases, and obtained a radiocarbon assay from Flixton of 10,413 ± 210 bp (Q-66) (Godwin and Willis, 1959) for sediment belonging late in the second woodland phase, or early in the final cold, open habitat phase of Late Devensian time. Bartley *et al,* (1976) describe a late-glacial vegetational sequence from Thorpe Bulmer near Hartlepool in east Durham, which is very similar to that of the North Yorkshire Moors area, especially around Seamer Carr (Stokesley). In east Durham, too, there was a double tree-birch maximum, probably representative of the Bölling and Alleröd interstadials of the late-glacial (Watts, 1980), with three intervening phases equivalent to the Oldest Dryas, Older Dryas, and Younger Dryas zones when more open conditions prevailed.

The Early Flandrian

About 10,000 years bp there began an important climatic amelioration which marked the end of the Devensian glacial and the commencement of the Flandrian interglacial stage (West, 1977). The environment of the North Yorkshire Moors became modified in response to the climatic change, but detailed examination of the palaeoecological record indicates that, dependent upon altitude, varying vegetation types developed (Fig 5).

Around the western and northern fringes of the moors, and in the lower parts of the dales which open onto the lowland, an increase in juniper and sea-buckthorn pollen values at about the Late Devensian/Flandrian boundary, followed by their rapid demise and a rise in arboreal pollen frequencies, indicates that the tree-line was nearby and crossed this area quickly. As the climate improved, birch forest colonized much of the landscape. Tree-birches were soon joined by *Corylus* (hazel), probably in habitats which birch had failed to colonize, and there also appear to have been some stands of *Pinus sylvestris* (Scots pine). A rise in the pollen curve for the thermally sensitive *Filipendula* (meadowsweet) (Iversen, 1954) provides additional support for climatic improvement at the late-glacial/post-glacial transition. The thermophilous trees *Ulmus* (elm) and *Quercus* (oak) immigrated to the fringing lowland forests shortly afterwards. They must have competed successfully with birch, although the elm particularly would have been favoured by the better soils. By about 7000 years bp, birch gave way to substantial quantities of oak, elm and alder *(Alnus glutinosa),* and the build-up of a mixed deciduous forest cover was well under way (Jones, 1976a). This pattern of early Flandrian forest history is similar to that established in the Vale of York (Bartley, 1962), south and east Durham (Bartley *et al,* 1976) and Airedale (Keen *et al,* 1988).

The higher parts of the dales cut into the moors, and the uplands themselves exhibited a rather different sequence of Early Flandrian vegetational history. Palynological data from Kildale Hall and West House Moss (178m OD) (Jones, 1977b), and Ewe Crag Slack (235m OD) (Jones, 1978; Fig 7) indicate that a forest cover did not develop rapidly after the conclusion of Late Devensian time. Hereabouts, the initial Flandrian vegetation appears to have consisted of a mosaic of quite luxuriant heath in which *Empetrum* (crowberry) and grasses were prominent, together with patches of scrub woodland composed mainly of birch and hazel. Pine was almost certainly present in some places, while more sheltered localities and better soils probably supported limited occurrences of elm and oak. A similar situation appears to have existed on the east central moorlands, where at Fen Bogs (164m OD) (Atherden, 1976a; Fig 17), and May Moss (244m OD) (Atherden, 1979) deposits, probably older than 8650 bp, have a pollen content indicative of open woodland with birch and pine, together with extents of grassy heathland. A pollen diagram from Moss Swang (175m OD) on Egton High Moor (Simmons, 1969a; Fig 7) suggests that the early Flandrian birch-hazel-pine forest was a closed one in the vicinity, but may be mainly a reflection of quite densely wooded conditions in a sheltered channel cut in the moorland.

The general picture of open woodland and heath during the first part of Flandrian I time (in the pre-Boreal and Early Boreal periods, during Pollen Zones IV and V), may be attributable to a number of causes, none of which were probably exclusive of the others. There was almost certainly a time-lag in the arrival of colonizing tree species at higher altitudes. In the upper reaches of the dales, and over the moorlands, a range of topographic, climatic, and edaphic controls were probably in operation. These would have included elevation, exposure, the incidence of frost-hollows, and the occurrence of skeletal soils. An interesting perspective is given on these findings by the work of Bush and Flenley (1987) and Bush (1988) on the Yorkshire Wolds, where a fen carr deposit near the Gypsy Race yielded some Late Devensian and Flandrian deposits. These show open grassland persisting through the Early Flandrian period, with some possible disturbance of incipient woodland (giving rise to enhanced birch frequencies) at about 8900 BP There is a gap in the record between 7980 and 4300 BP (*c* 1900 bc), after which open vegetation is again the dominant form.

Excavations in the Vale of Pickering

Four seasons of excavation between 1978 and 1981, under the direction of T Schadla-Hall, have yielded a quantity of animal remains from Seamer Carr (Scarborough) that have been identified by Dr J Clutton-Brock to the following species: wild horse, *Equus ferus* ; wild pig, *Susscrofa* ; aurochs, *Bos primigenius;* red deer, *Cervus elaphus;* and roe deer, *Capreolus capreolus*.

This assemblage of ungulates is characteristic of fauna1 remains from the Early Boreal, Zone V, although it is possible that some of the horse remains are derived from late glacial gravels at the base of the peat. The relatively large number of horse teeth, together with a few bones, is somewhat puzzling as horse remains from other early Holocene sites in Britain have been rare. The majority of the bones from *Bos primigenius* include a mandibular *ramus* with cheek teeth, an innominate bone, vertebrae, and a scapula. There is also a red deer antler that may have been worked. A few of the bones appear to have been chopped by man, but otherwise there is little evidence to show how the animals died. The skeletal remains could be the debris from human or wolf kills, although there is no sign of canid gnawing, or they could be from animals that died naturally in the Carr.

Very detailed work by E Cloutman (1988a; 1988b; Cloutman and Smith 1988) has made it possible to reconstruct the land-water environment of the Seamer, Flixton and Star Carr areas of the Vale of Pickering. Contouring of the sub-peat surface and levelling of key stratigraphic horizons makes it clear that an intricate mosaic of open water, reed-bed, *Cladium* (saw sedge), fen carr, and small islands clad in ferns and birch woodland existed during the early Mesolithic. Hence, the cultural remains excavated by T Schadla-Hall (see Chapter 3) can be placed in a firmly dated stratigraphic context; information about the land/water relations of the famous site at Star Carr can now be amplified. Coupled with additional excavations of settlement sites, this kind of work holds out the promise of the possibility of very detailed reconstructions of human society and biophysical environments during this period and possibly later, since later Mesolithic activity seems to have taken place in this setting as well.

The possible earliest effects of man on the Flandrian environment

Fauna1 remains, notably *Rangifer tarandus* (reindeer), *Cervus elaphus* (red deer) (Cameron, 1878) and *Bos primigenius* (aurochs) (Jones, 1976b), have been recorded from sediments of possible Early Flandrian age in the Leven valley around Kildale. The lake site at Kildale Hall (see above) was surrounded by a swamp at this time, and from the latter an almost complete, disarticulated skeleton of *Bos primigenius* was recovered. The bones were accompanied by charcoal of birch and *Ericaceae* (heath plants), and a substantial quantity of silt. The deposit encasing the bones had been dated by radiocarbon to 10,350 ± 200 bp (Gak-2707). Its pollen content implies the presence of shrub heath, grassland and open birch-hazel woodland around the site. Subsequently, a radiocarbon date of 8270 ± 80 bp (BM-1725) has been obtained from one of the *Bos* bones (Burleigh *et al*, 1983). The non-contemporaneity of the bones with their embedding medium is most likely to have been the result of post-depositional compaction and consolidation of the sediment, with the bones becoming displaced into earlier sediment. However, as Grigson (1983) notes, these *Bos primigenius* remains are still among the earliest in Britain. By *c* 8000 bp, the area around Kildale Hall had become vegetated by pine-hazel woodland, although some open habitats remained (see below). Such an environment would have suited the existence of the early Flandrian ungulates recovered in the locality Reindeer prefer a tundra-like environment, aurochs appear to have been equally at home in either an open or a wooded habitat (Evans, 1975), while the red deer was more specifically a deciduous forest dweller. The presence of such large mammals also perhaps contributed to the maintenance of open-habitat vegetation, since their browsing and grazing habits might have sustained certain plant communities types and prevented the succession of others, notably closed woodlands. They presumably used the lake as a source of drinking water, and would have congregated there.

Such a natural focal point may have influenced the activities of early (Maglemosian) people, in addition to later Mesolithic hunter-gatherers, and was well within the exploration zone of the former (see Chapter 3.2). Small Maglemosian sites are known in this area, for example in Sleddale and Seamer Carr (Stokesley), as shown in Table 2. The hunters could have visited Kildale and its environs on a periodic basis and utilized the locality as a game-trap. Their activities may have been analogous to those envisaged for other Mesolithic populations by Jacobi *et al (1976)*. They cite evidence of recent hunter-gatherer practices and from controlled burning experiments which suggest that regular firing of forest or scrub vegetation can impose predictability on ungulate herd movement and lead to increased productivity by the animals. The generally dry Boreal climate, together with open-habitat vegetation, would have been conducive to the use of fire, If, as the disarticulated bones and charcoal suggest, the hunters killed and consumed their prey at the Kildale site, it was probably serving as a temporary camp (Simmons, 1975a; Jones, 1976b).

The Later Boreal environment

All sites in the moorland massif which contain sediments of Later Boreal (Fl I) age provide a pollen record which implies the gradual build up of a more complete forest cover. The Fen Bogs and May Moss pollen diagrams demonstrate this, as do pollen spectra from basal blanket peats at Collier Gill (274m OD) (Simmons, 1969a), Glaisdale Moor (37m OD), and Loose Howe (430m OD) (Simmons and Cundill, 1974a), and from basal sediment at Blakey landslip bog (323m OD) (Simmons and Cundill, 1974b), as well as from deposits referred to above in Cleveland, and now including Tranmire Slack (195m OD) (Jones, 1978) (Fig 7).

A fuller development of birch woodland is first portrayed, followed by a change to pine-hazel dominated association. At lower elevations, this may have been quite closed. Pine here would have cast a deep shade and restricted hazel to marginal habitats such as valley sides, where isolated occurrences of oak and elm were likely. At higher elevations, there is consistent palynological evidence to indicate that the pine-hazel association did not form closed canopy woodland. High hazel pollen values suggest that the shrub was extensive under relatively open stands of pine. Pollen of *Ericaceae* (heath plant) and ruderal herbs – *Calluna vulgaris* (heather) and *Plantago* *lanceolata* (ribwort), respectively, for example – reinforce the idea of open woodland, heath, and grassland in varying proportions in elevated and exposed locations-

Blanket peat began to form on the North Yorkshire Moors just prior to the time of the Flandrian I/II boundary. It commenced in shallow basins that later provided a core around which more extensive bog growth occurred (Simmons and Cundill, 1974a). P D Moore (1973; 1975) has explored possible factors leading to the initiation of blanket mires. The growth of much blanket peat has occurred in areas that were formerly covered by trees and shrubs. An increase in rainfall accompanying a reduced tree cover would give rising water tables, the lack of trees contributing by means of lower transpiration efficiency. Organic matter would begin to accumulate over existing soil profiles, eventually thickening into blanket peat. Moore contends that Neolithic man may have initiated blanket peat growth by removing the tree cover in certain areas. The presence of Mesolithic man towards the end of Flandrian I, when rainfall amounts were increasing towards those of the Flandrian II 'climatic optimum' (Godwin, 1975), could have seen a similar mechanism in operation.

Possible effects of man in Later Boreal time

The possible influence of Mesolithic man on vegetation has provided reappraisal of established concepts concerning Early and mid-Flandrian vegetational changes, notably by A G Smith (1970). It is now considered possible that Mesolithic peoples could have influenced the course of the assembly of the mid-Flandrian 'climax' mixed oak forest (Simmons, 1975b). This would have been achieved principally by the use of fire. High *Corylus* (hazel) pollen values may have been the result of the burning of other woodland components- Smith points out that *Corylus* is fire-resistant and springs up readily from the burnt stumps. Furthermore, it is capable of spreading rapidly to cleared areas. Pine may also have been influenced by man's activities as well as natural succession processes. Smith suggests that at the time of the Boreal/Atlantic transition, falling pine pollen curves could reflect the destruction of the tree by man.

Over the North Yorkshire Moors, a number of pollen profiles lend support to the hypothesis of pre-Atlantic (Late Boreal) vegetational disturbance by Mesolithic man. At Kildale Hall, West House Moss, and Ewe Crag Slack distinctive expansion of herb and shrub pollen taxa (notably *Gramineae, Rumex acetosa* (sorrel), *Melampyrum* (cow-wheat), *Artemisia* (mugwort), *Ericaceae*, and *Corylus)* at the expense of tree pollen, occur within a predominantly coniferous forest environment. As noted above, the human activities which may have been associated with the presence of the *Bos* remains at Kildale Hall, must now be ascribed to this time period, and might have led to vegetational changes of this sort. Further evidence that these vegetational changes may have been human-induced comes from Ewe Crag Slack (Simmons *et al,* 1975; Jones, 1976b), where a 150mm-thick layer of silt containing charcoal occurs in the peat bog (Fig 9). The overall context is a Boreal one, with pine and hazel pollen prominent, so that events here predate the characteristic alder rise in the pollen diagram, a phenomenon dated at nearby West House Moss to 6,650 ± 290 bp (Gak-2706) (Jones, 1977b), and which marks the opening of Flandrian II, or the Atlantic period (West, 1977). In detail, arboreal pollen values decline at the level of the silt and charcoal, while those of hazel and a range of herbaceous taxa rise (Fig 8). We interpret this to mean that part of Danby Low Moor near to the peat bog was cleared by Mesolithic man using fire. Such clearance led to bare areas, from which soil was eroded and washed into the mire by increased run-off. Patches of ruderal and grassy sward developed in some of the clearings. *Corylus* probably benefited both from its resistance to fire, and its ability to colonize cleared areas, and so formed quite extensive thickets. Presumably, the activities of the hunter-gatherers were then abandoned and the mosaic of vegetation left to regenerate towards forest once again, as a reasonably closed tree cover seems soon to have emerged.

The recent work at Seamer Carr, near Scarborough, in the Vale of Pickering, shows a major disturbance of the local vegetation at the Boreal/Atlantic transition. The peat deposit contains a thick black band of charcoal at this level, with highly concentrated, well-preserved pollen. It is probable that during this period the margins of Lake Pickering, which were formerly colonized but wet fen carr, were drying out. The pollen diagram during this period shows the classical increase in the percentage of alder pollen. Unusually, however, there is a marked increase of grasses and open habitat taxa such as *Rumex, Artemisia, Pteridium* (bracken), *Melampyrum, Potentilla, Filipendula* and *Tubuliflorae. Ophioglossum* (adder's tongue) spores are also present in some abundance. The percentages of the remaining trees and shrubs decrease.

In general there is a marked increase in species diversity during the rise of alder coincident with the charcoal level. The density and thickness of the charcoal layer, together with the presence of Mesolithic artefacts along the former lake margin, argue for an interpretation in terms of human impact on the environment rather than a chance natural fire. Work attempting to relate the charcoal layer to specific suites of Mesolithic artefacts is continuing in collaboration with T Schadla-Hall. Excavations based on a contour plan made of the lake margin have produced early and late Mesolithic artefacts. A charcoal date from the sands at the lake edge is of Star Carr age (CAR-197: 9,330 ± 84 bp). Bones of *Bos primigenius* and *Cervus elaphus* in the marginal peats have produced a date of 9,150 ± 95 bp (CAR-196).

While as Jones *et al* (1979) point out, occasional weed pollen can scarcely be considered reliable

LOCALITY		DATING		POLLEN SEQUENCE A = CLEARED TAXA, B = TAXA RESPONDING TO CLEARING, C = REGENERATING TAXA																			NOTES
SITE NAME AND ALTITUDE IN METRES	GRID REFERENCE	INFERRED / ABSOLUTE	FLANDRIAN CHRONOZONE	PINE	BIRCH	OAK	ELM	LIME	ASH	ALDER	HAZEL	GRASSES	HEATHER	RIBWORT	BRACKEN	POLYPODY	OTHER FERNS	ROSE FAMILY	COW-WHEAT	BOG MOSS	WILLOW	PHASE	PCe = CLEARLY BEFORE ENTRY OF CEREALS INTO PROFILE
FEN BOGS 164	SE 853977	JUST ABOVE 4720 ± 90 bp ELM DECLINE	III	●	●				●				●									C	PCe
												●		●	●	●			●		●	B	
				●	●				●													A	
ST HELENA 'B' 302	NZ 683038	LATE NEOLITHIC / EARLY BRONZE AGE	III							●	●				●						●	C	PCe
												●		●	●		●					B	OTHER RUDERALS RESPOND ALSO SORREL, COMPOSITES, SPURREY, GREAT PLANTAIN
					●					●	●											A	
ST HELENA 'A' 302	NZ 683038	? BRONZE AGE	III								●		●									C	PCe
										●				●		●	●	●			●	B	OTHER RUDERALS
					●																	A	SORREL, MUGWORT
BLAKEY LANDSLIP 323	SE 674996	? POST IRON AGE	III						●			●	●								●	C	OTHER RUDERALS PRESENT
										●	●	●	●	●	●		●			●		B	CEREALS PRESENT
					●																	A	
EWE CRAG SLACK 'B' 235	NZ 695110	IRON AGE	III	SHARP AND PERMANENT REDUCTION IN TREE POLLEN FREQUENCY																			
		BRONZE AGE	III	All taxa fluctuate at this time																		C	
																						B	
					●					●	●											A	
		BRONZE AGE	III	●	●		●	●					●		●							C	ALSO BEECH PRESENT
											●											B	
					●	●			●													A	
		NEOLITHIC	III							●	●											C	SOME ISOLATED CEREALS
													●	●								B	
					●	●					●											A	
		AT ELM DECLINE	II / III					●			●		●		●		●					C	OTHER RUDERALS ALSO
										●												B	
						●	●															A	
		PRE ELM DECLINE (MESOLITHIC)	II		●	●		●		●	●			●			●			●		C	
													●									B	
					●	●		●			●											A	
EWE CRAG SLACK 'C' 235	NZ 695110	PRE ALDER RISE (MESOLITHIC)	I		●	●											●				●	C	PCe
											●					●		●	●			B	
					●	●					●											A	

Figure 8 Matrix table giving details of inwash stripes of mineral material from peat deposits in channel mires and landslip bogs

indicators of the presence of man, there is an increasing body of evidence based upon archaeological and palaeoecological data to support the interpretation of the interference with the natural vegetation of upland Britain by Mesolithic man during Flandrian I, especially in its later stages. Simmons (1964; 1969b; 1969c) suggests such activity on Dartmoor in Pollen Zone VI, while from the southern Pennines, Hicks (1972), Switsur and Jacobi (1975), and Jacobi *et al* (1976) present archaeological and ecological evidence for early Mesolithic utilization of the area. Jacobi, Tallis and Mellars intimate that Mesolithic populations may have first used the southern Pennine uplands when they were largely unforested due to the existence of climatic conditions too cold to permit the growth of trees. Such an unforested condition seems to have prevailed prior to Pollen Zone VI, as a result of an unfavourable climate. The extension of trees upwards during Zones VI and VIIa could, they argue, have to some extent been prevented by recurrent burning practices of Mesolithic man. Charcoal has been found in pre-Atlantic mineral soil and peat in the region, and suggests the deliberate use of fire for vegetation manipulation during this time.

The development of the Atlantic forest

The opening of the Atlantic period is denoted on pollen diagrams from the North Yorkshire Moors, and elsewhere in Britain (Godwin, 1975) by a marked rise in the *Alnus* (alder) curve. In this part of north-east England the Alnus pollen rise has been dated to *c* 6650 bp at West House Moss (Jones, 1977b). Here such a rise in *Alnus* pollen value probably reflects the widespread development of alder woods in damp localities such as slacks and stream sides. The increased availability of damp habitats may have been a result of a rise in the water table caused by a wetter climatic regime. At about this time in the Flandrian, temperatures were increasing, perhaps attaining values of 1–3° C above the present mean during the so-called 'climatic optimum' (see above), which lasted from approximately 7000 to 5000 years bp (Goudie, 1977).

In response to the climatic changes, the composition of the Flandrian forests underwent considerable modification, especially in the dales and on the moorlands of North-East Yorkshire. Such modification was, as noted earlier, perhaps assisted by the activities of prehistoric peoples. While there were

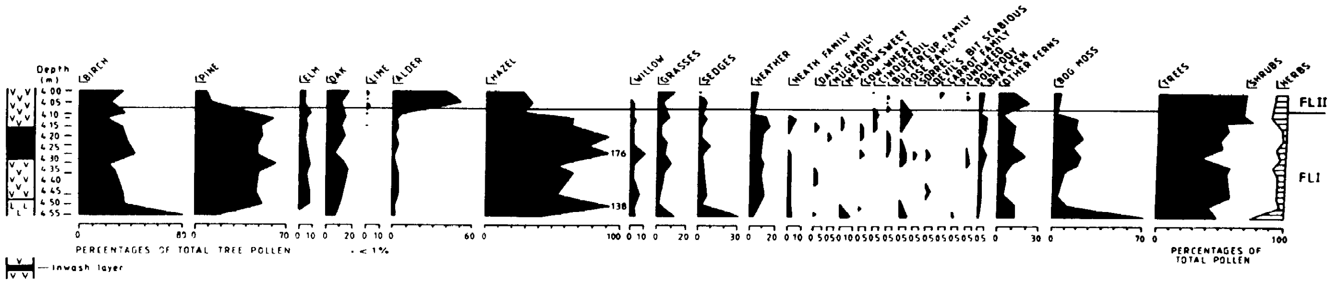


Figure 9 Part of the pollen diagram at Ewe Crag slack showing level of inwash stripe

undoubtedly intra-regional variations in woodland composition reflecting the range of local environmental conditions, and a less complete tree cover at higher altitude, the Atlantic forests of the North Yorkshire Moors and environs were overall of a similar type. Thermophilous trees, notably oak, elm, alder, birch, lime and ash dominated, together with hazel. On the fringing lowlands, the earlier dominant role of birch was reduced and a more varied arboreal composition achieved. In the dales and on the moors the predominantly coniferous forest of Later Flandrian I time was replaced by one in which mixed deciduous components, especially oak, assumed importance.

Analogous pollen assemblages to those of the lowlands fringing the moors occur in south and east Durham (Bartley *et al,* 1976). Sites in the Vale of Pickering demonstrate a pine-hazel pollen assemblage in Zone VI being replaced by mixed deciduous forest pollen in Zone VIIa (Walker and Godwin, 1954). In Upper Teesdale, pine forest was superseded between 8000 and 5700 bp by a predominantly alder-oak tree cover (Turner *et al, 1973;* Squires, 1978).

The emergence of forest soils

The mixed deciduous forest which clothed the North Yorkshire Moors and environs in the Atlantic period was the natural climax vegetation of the Flandrian interglacial. This vegetation and the plant communities successional to it played an important role in soil formation.

Dimbleby (1962) reported brown soils characteristic of deciduous forest environments buried beneath Bronze Age monuments on the North Yorkshire Moors. Pollen extracted from these fossil soils indicates the presence, some time prior to monument construction, of a mixed deciduous tree cover. It is almost certain that a mosaic of brown forest soils underlay the North-East Yorkshire deciduous forest. Notwithstanding local topographic and climatic controls, variation in parent material must have assumed considerable importance in Flandrian soil development. The high moorlands were not glaciated during the Devensian. As Limbrey (1975) points out, such localities would have retained some base-poor, weathered material that accumulated during the previous interglacial stage. This material, together with rather sandy and porous bedrock which would have encouraged the process of leaching by downward percolating water, is likely to have resulted in acid soils. Limbrey suggests that such conditions may have contributed to the delayed forest development on the moorlands which pollen evidence indicates. Conversely, at lower altitude in the region, the success of forest colonization in the early Post-glacial may have been partly due to the high base-status of the mantle of glacial deposits there, which provided very suitable parent materials for soil development.

In the lowlands, succession from birch to mixed thermophilous forest would have been accompanied by a gradual deepening of soil profiles and the incorporation into them of humus, thereby giving rise to brown forest soils. In the uplands, though (as noted earlier), the path of vegetation succession during the Flandrian was rather different. Here, heathland gave way to birch woodland which was then replaced by pine-hazel forest, with ultimately a mixed deciduous tree cover emerging. Why pine managed to displace birch here, but not in the surrounding lowlands, is an open question. However, the competitive ability of pine in what may have been rather open birch woodland, an elevated location with quite sandy soils, and a dry climate, could have been contributory factors. The dry climate may also help explain why the coniferous forest does not appear, as might be expected, to have led to the formation of podzolized soils. Indeed, the Atlantic forest of the uplands seems to have been able to effectively colonize the soils vacated by the pinewoods. The increased precipitation during the Atlantic period would have promoted more effective leaching, and also contributed to the build-up of organic matter in soil profiles. The combination of leaching and organic matter accumulation seems likely to have been responsible for the formation of acid brown soils under the mixed deciduous forest in the uplands. As already observed, the accumulation of considerable quantities of organic matter above soil profiles in suitable locations during the last part of Boreal and first stage of Atlantic time initiated blanket peat development.

3 The mixed deciduous forest of Flandrian II and its occupants, 6650-4750 bp

Introduction

In this section we are concerned with the ecology of the deciduous forest which spread into the region as a consequence of the ameliorating climate of the post-glacial period. In climatic terms, Flandrian II is dominated by the so-called Atlantic period, in which the optimal post-glacial climate for plant growth (the so-called 'altithermal') was reached. Estimates made by J A Taylor (1975) and by Lamb (1977) suggest that in upland Britain in the period 8000-5400 bp the average temperatures were l-3°C above those of the present day. Precipitation, too, was thought to be higher, and the period saw, probably in the period 8470-7910 bp, the final insulation of Britain from the continent, with the disappearance of the last land which had remained along a line from Grimsby and the Humber estuary to the Dutch archipelago. The climate favoured tree growth, although it might, as we shall see, also permit the accumulation of blanket peat.

The differential rate at which tree species immigrated into Britain ensured a changing forest flora during the later part of Flandrian I, but by contrast the floral composition of Flandrian II is more stable, with few new species becoming established, even though the relative frequency of those already there may have changed.

These conditions created an environment in which something approaching a steady-state, 'climatic climax' forest could evolve, even though later tree immigrations might have carried succession further had the forest persisted in a largely virgin state. So initially we shall be concerned with the composition of this forest and how much of the land surface it covered, following with a more speculative account of its ecological dynamics as a backdrop for considering the effect of the human inhabitants on the forest ecosystem.

In terms of absolute dates, the Atlantic period on the moors is not well documented, but the radiocarbon date at West House suggests that the deciduous forest was fully established soon after 6650 bp. The conventional end of the period is at the *Ulmus* (elm) decline, usually dated at 5000 bp but two dates from the moors (at North Gill and Fen Bogs) are 4767 bp and 4720 bp so that we may think of the elm decline in this part of North Yorkshire as dating to *c* 4750 bp (2800 bc), ie rather later than is usual in lowland Britain.

The inspection of many pollen analytical profiles from all over Britain (Birks *et al*, 1975; Rackham, 1980), suggests that south of the Scottish border there was more than one main type of the Atlantic forest, which is called rather romantically by Rackham the 'fully developed wildwood'. The most significant division is into two forest types: woodlands of oak and hazel, which predominated in the highland zone, and forests in which lime was the commonest tree, which were dominant in lowland England and north into Lancashire. Within this latter forest, oak, hazel, or ash might be the next most important tree. Given that the successions of the pre-Atlantic period produced in Britain not a uniform blanket of oak forest but a number of regional communities, we need to inspect the North Yorkshire pollen diagrams with care to see if they fit into any of the established patterns or whether, for example, the lowest upland in Britain produced its own variant. Looking at the pollen diagrams which cover all or part of the Atlantic period, it is immediately apparent that the regional wildwood was of the oak-hazel type characteristic of upland England. Even allowing for differential pollen production and for the different situation of pollen analytical sites, it seems certain that oak and hazel were the commonest trees (although we cannot tell from this evidence if they grew together or were clumped, there must be a strong supposition that oak was dominant and hazel an understorey and 'edge' species). Alder was also common and a combination of its affinity for wet places and high pollen production sometimes 'swamps' the pollen diagram; given the humidity of the contemporary climate, and of a closed forest canopy, it may have been commoner away from obviously wet places than it is now. Elm was present at moderate levels throughout the period at all altitudes and there was a little ash. Lime is of interest since in the lowlands it is thought to be so common in the Atlantic. Here, even given its poor pollen production vis-a-vis oak and hazel, it does not seem to rival them for a predominant place. It does seem to exhibit two kinds of behaviour in the North Yorkshire diagrams, however. In some it is present throughout the Atlantic period but in others it rises about half-way; in most it increases near or just after the elm decline. In so far as a pattern can be detected, it looks as if the lower sites — eg Moss Swang, Fen Bogs, Seamer Carrs (Stokesley) — exhibit the latter type of behaviour and higher sites than the former. Unless this is a quirk of pollen rain composition, it seems hard to explain.

The role of pine merits a few words. Normally, this is virtually absent by definition from the Atlantic since the zone boundary is drawn where its frequency drops. But if we zone principally on the rise of the oak and alder, then in a few diagrams from the region pine retains a rather late presence. No spatial or altitudinal pattern appears detectable except again for the fact that two instances of pine keeping a relatively high frequency until half-way through the zone occur at low-altitude sites. High frequencies at the base of the zone, dropping sharply, are found at two high-altitude sites, and at North Gill the pine frequencies are tied up with charcoal levels, suggesting that fire favoured its regeneration, as it does today.

It is difficult to make any case for altitudinal variations within the forest: the evidence suggests that its composition, if viewed in the aggregated form presented by pollen diagrams, contained the same amount of variation except where wet places favoured large quantities of alder.

Other features of the forest ecology may be hinted at by other pollen and spores present in the subfossil record. *Pteridium aquilinum* (bracken fern) seems to be present throughout the zone, but at low levels, and indeed in some profiles it is represented only by a broken curve. Bracken will tolerate any shade except the densest and the low levels of its spores suggest a minor presence beneath a woodland canopy which no doubt (see below) contained some gaps. Bracken is a calcifuge and intolerant of waterlogging, so its presence through the Atlantic suggests that there were at the very least patches of dry soils with a pH in the range 3.2–4.3, with 3.7 representing a modal value. These indications are to a small extent countered by the occurrence (in small quantities and at only two low-altitude sites) of *Mercurialis* (dogs mercury) pollen, which suggests dense shade, an absence of waterlogging, and a relatively high pH (usually greater than 6.0), though it will grow in more acid sites.

Another woodland herb occasionally present in the Atlantic period is the genus *Melampyrum* (cowwheat); whichever of the two species this is referred to, it is likely that it indicates openings in the canopy and acid soils at least in the case of *M pratense*. If the forest soils were highly acidic then we might expect a distinct representation of the *Ericaceae* (heath plants). Inspection of the curves for *Culluna vulgaris* (heather) and undifferentiated *Ericaceae* pollen reveals that there is commonly a representation throughout the Atlantic at perhaps half the sites and very little at the remainder. Accepting that most of the *Ericaceae* are likely to be local contributors to pollen rain, no great case for their strong presence is made and so it is perhaps too much to infer that there were strongly acid soils in these woods. Regrettably, most ground herbs of woodland are poorly represented in peat pollen studies and so the evidence is distinctly scanty, but the overall picture of the North Yorkshire Moors wildwood is one of oak-hazel woodland with lesser proportions of alder, birch, elm, and lime, growing on soils which at least in some places had an alkaline or neutral reaction but which elsewhere were acidic, yet not so strongly so that, as in many oak woods today, there is an ericaceous ground layer.

The upper limit of the forest

Pollen analysis is an inexact tool for considering the question of whether the Atlantic wildwood covered the upland entirely or whether there was a tree-line beyond which grassland, heather, moor, or bog was the dominant community. The difficulty is that the very pollen which might indicate open ground, such as grasses, sedges, heathers, and bracken, are often (with the exception of bracken which is intolerant of waterlogging) plants of peat-forming communities and hence of the local pollen rain, and pollen analysis does not distinguish the provenance. Given the variety of deposits investigated, too, crude tree pollen/non-tree pollen ratios are unlikely to be informative: each profile needs to be interpreted in its local context. Tree stumps and other wood remains may be a useful guide but they are not of themselves sufficient: partly because a tree stump might rot away before peat growth and thus leave no record of its presence, and partly because trees may regrow after a period of burning (see below); again, each profile needs careful attention to its unique features.

In a broader perspective, of course, we can compare the moors with other parts of the country where investigators have felt able to commit themselves to a firm view of the height of tree-lines during the Atlantic. These heights (from places like West Wales, the North Pennines, and the Cairngorms) vary, but all have in common a much higher altitude than the highest summits of the moors. Given also the relatively dry conditions of the moors, which should have favoured less the peat growth which is said to have overwhelmed forests everywhere, then we might expect *a priori* that the wildwood covered the whole of the moor during the Atlantic.

Yet, a common theme running through the published pollen diagrams from the Moors for this period is the authors' feeling that although their sites were set amidst woodland, open ground was not far away. In general, such statements are ways of explaining the ambiguous provenance of open-ground pollen (discussed above) and they must be seen in this light. Firmer evidence might come from blanket peats which started to grow during the Atlantic and which obviously replaced trees since a wood layer is found near the base. Most such profiles, however, do not start until late in the Atlantic (and a greater number of blanket peat profiles, mostly without wood remains at the base, start in post-elm decline times) and in circumstances which cast doubt on whether their inception was an entirely natural phenomenon. A few deep blanket peats, such as at May Moss, are pre-Atlantic in origin and thus suggest high-altitude openings in the forest during the earlier part of the Atlantic. The situation of May Moss, on a col, parallels many other sites of peat accumulation in upland Britain, and, like them, probably resulted from naturally occurring poor drainage in a time of increasing climatic wetness; in this region similar sites exist at Loose Howe and Glaisdale Moor.

Putting together all these lines of reasoning, we can arrive at a tentative conclusion: during the earlier part of the Atlantic, the wildwood covered all the valley sides and most of the plateau surfaces, but there were shallow basins and col sites with small areas of mire growth. Later in the Atlantic there was an extension of the area and number of bog sites but, as we shall see, it is possible that human agency was involved. However, it is probably incorrect to think of the wildwood itself even in a natural condition as an unbroken blanket of forest.

As well as the patches of bog just mentioned there may have been openings, which are discussed in the next section.

The ecology and dynamics of the forest

Pollen analysis can only take us so far in any reconstruction of the Atlantic forests. It provides essential information on tree flora, some hints about relative abundances and a limited understanding of the forest dynamics. If, however, we are willing to use evidence about the ecology of contemporary woodlands and hope that similar processes were at work in the ancient woodland, then we can suffuse the pollen analytical information with these data and expect to get a more realistic picture. Two major sources of modern information in particular are useful here: the comprehensive study of the nutrient and water budgets of a mixed deciduous forest (including the effects of dis-forestation) at Hubbard Brook in New Hampshire (Bormann and Likens, 1979), and the data about the behaviour and history of English woodlands (mainly in the lowlands) collected by O Rackham (1980). Some results of the International Biological Programme researches on biological productivity may also be relevant.

These works may allow the inference of certain features of the Atlantic wildwood which was, like Hubbard Brook, a relatively steady-state forest until interferences by human activity. Bormann and Likens point out that a steady-state forest is an array of irregular patches of vegetation of different ages, and although they cannot calculate the quantity of open land due to treefall within the forest at any one time, they allow that it is universal even if modest in extent, It becomes larger after windstorms and, whether due to such exogenous events or to natural senescence, it encourages the regeneration of understorey trees and of seedlings. Yet in British forests, Rackham observes, woodland trees usually rot above ground and if they then topple they make only a small hole: uprooting is an uncommon fate for a tree. So it seems uncertain as to whether the oak-dominated wildwood would have been replete with patches of open ground and of regenerating forest, but a mosaic of even-aged stands does seem quite likely. Likewise, it seems probable, though, that *Quercus petraea* (sessile oak) forest would never have cast sufficiently dense a shade to eliminate entirely many of the open ground plants that occur occasionally in the pollen diagrams of the Atlantic period. Heather, for example, will spring into oakwood clearings and coppices from buried seed until it is shaded out by coppicing or other dense woodland. Hazel is not very tolerant of shade and so is unlikely to have been an undershrub in the oakwoods but formed dense stands on its own. Where it now forms over 75% of the stand, it tends to be on relatively infertile, acid soils with a high proportion of sands or loess; the latter is certainly detectable in some plateau soils of the moors, eg in the Broxa area. Acidity is confirmed by *Melampyrum* (cow-wheat) pollen if this relates *to M pratense,* for this plant is found in oakwoods on the more acidic and least fertile soils and, indeed, the whole upland *Quercus petraea* dominated woodland type is usually found now on acid soils. It seems unlikely, therefore, that the colonization of the upland had produced, by the Atlantic, neutral brown earth soils: an acid brown earth seems more likely and this type could have been the category preserved in relict form under barrows (Dimbleby, 1962).

Lastly, we may note that the solar energy fixed by deciduous forests is largely confined to the litter and plant components of the ecosystem and that a very small proportion of it appears as animal biomass, especially as large mammals. It will not do to think of these forests as swarming with deer. Evidence about the history of the aurochs *(Bos primigenius),* presumably also an inhabitant of the wildwood, is also interesting. Speiss (1979) collects opinions that it was an animal of the deciduous forest zone but that it ate acorns as well as being a grazing (rather than a browsing) animal. It would not have found closed woodland conducive to its survival, we may assume. Oak would of course have produced food for wild swine *(Sus scrofa),* which would also root about for invertebrates. They are said to prefer areas of open forest rather than unbroken high forest. But although these animals, along with red and roe deer, would have been the dominant large mammals of the Moors, we have no direct evidence for their existence in Atlantic times.

In summary, the forest of the first half of the Atlantic period was probably dominated by oak, growing on soils with a distinct tendency to acidity. Hazel was the next most important tree, growing in separate stands where it was not shaded by the oaks or other forest trees like elm and lime. By analogy with some lowland woods, the hazel may have fringed valley alder woods in the general oakwood matrix. On certain cols and in small microtopographic basins on the upland plateaux, bogs became established during the Atlantic, occasionally just before this period. Other openings in the forest (the area of which is very difficult to estimate), were due to senescence and windthrow of standard trees along unstable river banks, perhaps the slopes of the bigger swangs, and possible on landslips since the peat in one of them, at St Helena, started to grow late in the Atlantic. It is likely, too, that lightning will from time to time have resulted in the loss of tree canopy. We have now to consider the relationships of the human inhabitants with this ecosystem.

The Mesolithic inhabitants of the forest

The archaeology of these cultures is described in Chapters 3.2 and 3.3 and the known sites are plotted on Figures 25 and 28. Here we note that it now seems acceptable to think of the earlier Mesolithic cultures as being present on the uplands as well as at lowland sites like Star Carr. The lithic evidence for the later Mesolithic comes mostly though not exclusively from the uplands, though this is due to recent peat erosion revealing the flint sites, rather than a true reflection of activity pattern. The economy of the later Mesolithic people who inhabited the forests of Atlantic time was no doubt of the general type known as hunting and gathering. The stone tool kits dominated by microliths and the scattered spreads of flint material and charcoal on the uplands allow little other interpretation. What we would like to know, and can only speculate about, are the relative contributions of the diet of plant and animal material, and the species of larger animal which were hunted. In times past we have been apt to think of the later Mesolithic upland dwellers as solely hunters, but as David Clarke (1976) pointed out, following Lee and De Vore (1968), most near-recent hunter-gatherers of temperate zones include a large element of plant food in their diet. In many British excavations of the relevant period, hazel nuts turn up in plenty, and we have already noted the abundance of hazel as a component of the vegetation of the Atlantic period. In the hazel nut, therefore, we have a probable target organism for a gathering group, to be collected in the autumn. Acorns do not appear in excavations but are eaten in some near-recent gathering cultures; they are very high in tannin and their flour has to be leached with boiling water before it becomes edible. Bracken fronds which have just emerged are edible, as are the fruits of many other woodland and forest edge plants such as brambles and small trees of the *Rosaceae* family. But given both the theoretical state of the mature wildwood and the pollen analytical evidence, we would not expect these to be very common.

Most large animals, too, would find the wildwood relatively uncongenial since, except at its various edges, the quantity of leafy browse and of grassy ground layer would be restricted. We might expect that natural populations of red deer and roe deer, wild pig and aurochs would be relatively small so long as the largely unbroken wildwood persisted, but would expand if the area of scrub (vegetated by small trees such as birch, hazel, alder, and rowan) and grassland increased, though eventually during later prehistoric times to shrink as cover and food for the animals became harder to find. Other food resources for humans in this region would doubtless have included the animals of the coast and the estuary, the latter brought further inland by rises in sea-level near the beginning of the Atlantic, and the fish in the rivers, of which perhaps pike (year-round) and salmon (seasonal) would be the most rewarding. It is, however, necessary to stress that for the Atlantic period in the North Yorkshire Moors we have no actual evidence for the presence or the taking of any of these foods.

Our thoughts on the Atlantic *genre de vie* become even more speculative when we consider the possibilities of a seasonal round. We know that most near-recent hunter-gatherers exploit different food resources at different times of the year: some move the whole band of people; other groups split into sub-bands; others send out detached parties (usually of males) from permanent base camps. For the earlier Mesolithic, J G D Clark (1972) envisaged an annual subsistence territory ranging from the lowlands of the Vale of Pickering to include not only the moors region (then becoming forested) but the eastern Pennines as well. In the later Mesolithic the same might apply, but it is also possible to think of a smaller territory, including visits to the upland flint and charcoal sites as one element in the round, and a stay at sites such as Upleatham (with a more diverse tool kit, see Chapter 3.3) as another element, perhaps longer and with more people. Another stage in the year's progression might be the use of coastal foods, for which the evidence may have vanished under both rising sea-levels and the normal course of coastal erosion. We have the site at Street House (Vyner, 1988a) to suggest this possibility as well as those on the Durham coast, such as Crimdon Dene. Putting together our knowledge of present-day animal ecology with the distribution of lithic sites, we can arrive at a tentative seasonal round (Fig 10) using a much smaller territory than has been postulated by Clark for this region, or by Jacobi (1979) for Devon and Cornwall. So there may be two alternative models here which need further evidence before we can say much more. Whichever version turns out to be supported by new findings, it seems likely that the Mesolithic people of the Atlantic period practised a hunting and gathering economy in which seasonal movement of some or all of the people was normal. What we must now consider is whether in the course of their migrations they changed their natural environment in anything but the most transient way, or whether, like later cultures, they tried to manipulate its resources for their own benefit.

Environmental manipulation during the Atlantic

In terms of resource potential and food-winning opportunities, the deciduous forests of Flandrian II were depleted in comparison with the more diverse ecosystems of Flandrian I. Woodland canopies were generally dense and continuous, reducing the input of light to the forest floor and with it the quality and quantity of available resources in terms of both plant and animal foods. The environmental characteristics of Flandrian II (ecological stability, forest inertia and much reduced plant and animal resource diversity) would place the extractive systems of the Mesolithic under increasing pressure. The consequences for a hunting and gathering community of a steady diminution of exploitable vegetable foods, and consequently of game animals, were likely to be increasingly severe. It is to be expected, therefore, that man's response was (a) to exploit preferentially those parts of the region which naturally retained vegetational diversity, and (b) if culturally and technologically feasible, to encourage this diversity by artificial means, in particular by fire clearance of woodland in favoured locations, generally by forest

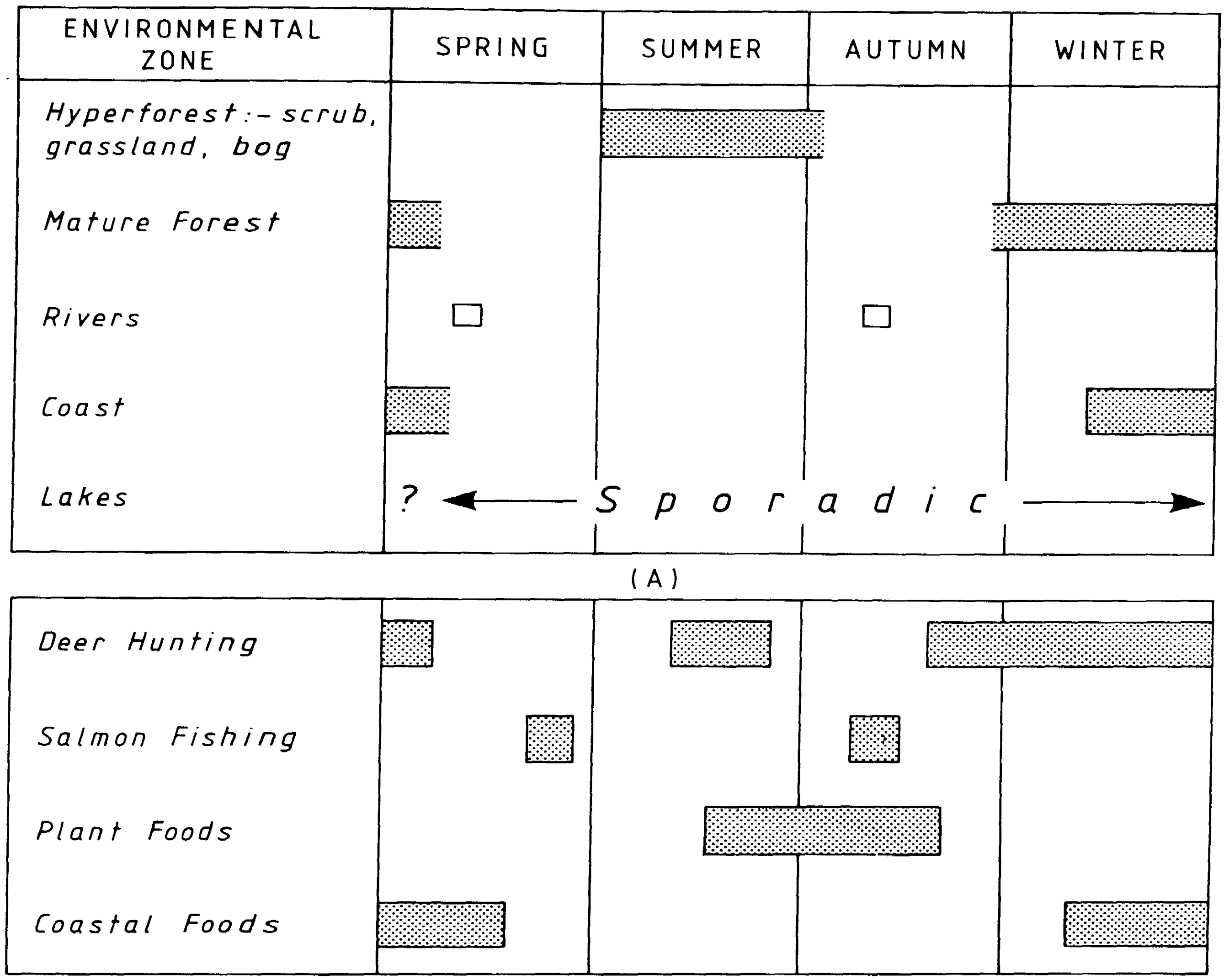


Figure 10 Possible seasonal use of environmental resources of later Mesolithic communities

edge, springhead, lakeside, or foreshore, where natural concentrations of game are most likely to be found.

The deliberate use of fire, pre-agricultural man's most potent ecological tool, as an instrument of economic policy is well-documented from ethnographic records of hunter-gatherer communities (Stewart, 1956), and while these are not strictly analogous with the Mesolithic situation, inferences may be made which may explain the extensive concentrations of charcoal which are frequently found in soil and peat profiles upon the upland regions of the moors in a pre-elm decline context, both in association with flint scatters and in isolation. It has been pointed out above that the moors in Flandrian II carried an open woodland in which the dominant oak was accompanied by a great deal of hazel. We do not know whether this association was a natural one for an upland area with a fair proportion of sandy soils, or whether the importance of hazel was a result of continued environmental manipulation by Mesolithic man and, therefore, culturally induced. There is persuasive palaeo-environmental evidence that the latter may, at least partially, be the case.

The first intimation that Mesolithic man may have been implicated in environmental change, and in particular in the alteration of vegetational communities, was recognized in the pollen analysis of soil profiles from the highest parts of the moors (Dimbleby, 1961; 1962). Dimbleby analysed the pollen content of soil immediately below a prolific flint scatter associated with charcoal at White Gill on Westerdale Moor, and concluded on the basis of a very low proportion of non-tree pollen to tree pollen (NTP/TP = 39%) that the landscape at the time of the Mesolithic occupation had been densely wooded. In the sample above the occupation layer, however, this figure had risen to 104%, while birch, hazel and heather had become much more prominent. This indicates that a more open type of woodland had come into existence, which would have been a change much to the benefit of Mesolithic man, and one for which the charcoal and flints suggested to Dimbleby that human activity may well have been responsible.

The inferred forest clearance activity at White Gill is given more detailed expression in the evidence from North Gill on Glaisdale Moor which is a springhead site at high altitude. Accumulation of organic deposits commenced early in Flandrian II, and pollen analysis of the peat (Simmons, 1969a, 1969b), together with the stratigraphic succession suggested that human activity was antecedent to and perhaps responsible for peat inception, and that localized environmental modification continued throughout Flandrian II. Several centimetres of charcoal-rich peat occurred at the base of the profile and contained a pollen assemblage characterized by a range of ruderal herb types, among which were *Artemisia, Rumex, Urtica* (nettle) and *Melampyrum*. Values for *Quercus* and *Alnus* were depressed while there was a greatly increased representation of taxa favoured by fire *(Pteridium, Corylus* and *Pinus)* and by increased light *(Salix, Fraxinus* and *Betula).* In addition, the basal peat layers were formed largely from the moss *Polytrichum,* a pioneer colonizer of newly burned ground (Viro, 1969). Such evidence is consistent with the creation of clearings in the deciduous forest by fire, and their subsequent regeneration to woodland. This basal clearance phase is radiocarbon dated to 6,316 ± 55 bp (BM-425). The presence of ruderal pollen and charcoal at the very base of the peat, a situation repeated at other sites on the moors, points to a possible relationship between the act of clearance and the initiation of peat formation, an hypothesis to which we shall return later. Towards the end of Flandrian II, fluctuations of a similar nature are recorded at North Gill (Simmons, 1969a), reflecting the temporary replacement of woodland by open-habitat taxa; this phase of forest recession was accompanied by charcoal and by a layer of fine silt particles, suggesting that soil erosion had followed this renewed clearance.

Recent re-examination of the deposits at North Gill have both confirmed and amplified Simmons' conclusions regarding the environmental sequence recorded there, and extension of the area subjected to pollen and stratigraphic analysis has allowed further assessment of the character and spatial extent of the Flandrian II clearance to be made (Simmons and Innes 1988a; 1988b; 1988c; 1988d). The basal charcoal band with which woodland clearance and peat inception are associated has been traced across the site and pollen profiles have been examined at close distances within the area, all of which tend to emphasize the springhead and its immediate environs as the focus of the clearance event.

Evidence for recurrent burning of woodland at springhead locations is not confined to North Gill, for equally illuminating examples may be quoted from other areas of the North Yorkshire Moors. One in particular, the site of Bonfield Gill Head on Bilsdale East Moor (Simmons and Innes, 1981; 1988c), will also be briefly referred to here, for it illustrates the periodic and transient nature of the clearance activity suggested by the evidence from North Gill.

The stratigraphic and palaeobotanical sequence for the basal 0.8m of the Bonfield Gill Head profile is displayed in conspectus form as Figure 11. The palaeobotanical record is divided into pollen zonules indicative of woodland interference (I) or regeneration (R), together with their diagnostic taxa and whether characterized by arboreal (AP) or non-arboreal (NAP) pollen. These zonules may be compared with the stratigraphic units and descriptions also shown upon the diagram. A clear synchronometry exists between stratigraphic charcoal and interference zonules. The charcoal layers of stratigraphic units d, g and i are reflected in pollen zonules 2, 4, and 6 by declines in arboreal pollen values, particularly *Quercus* and *Alnus*, sharp increases in *Corylus* and *Pteridium* frequencies, and the occurrence of a wide range of ruderal herb types including *Melampyrum, Artemisia,* and *Rumex*. The regeneration phases which intercalate these interference episodes record periods when woodland was able to re-establish itself on, or near, the site. This is shown not only by increased arboreal pollen values, particularly for *Betula* and *Quercus,* but also by the appearance of *Betula* wood in the stratigraphy at these levels. We seem to have evidence here of rotational burning of the same site, with woodland recolonization when clearance pressure was relaxed. *The* elm *(Ulmus)* decline is recognized at the beginning of pollen zonule 8 and thus the sequence of clearance and regeneration recorded in zonules 1 to 7 is assigned to chronozone Flandrian II and to an implied Mesolithic cultural context. A large *Betula* (birch) tree stump occurs in the profile at the base of the stratigraphic unit j, which correlates with the beginning of pollen zonule 9, and is evidence of major woodland recolonization of the blanket peat at the beginning of Flandrian III. Elimination of human pressure upon the environment may have been instrumental in permitting the regrowth of trees. Microscopic charcoal particles are present throughout the Flandrian II peat deposits, and while they are most abundant in association with the discrete charcoal layers which occur during the I phases, as would be expected, they are also present at a low but constant level during the R phases, when clearance activity is considered to have been absent from the site. This suggests that burning of the vegetation was taking place somewhere in the region at all times during this period, so that a background 'fallout' of charcoal soot was constantly present, In this respect this site resembles many other upland peat profiles from the moors, such as Loose Howe and Trough House (Simmons and

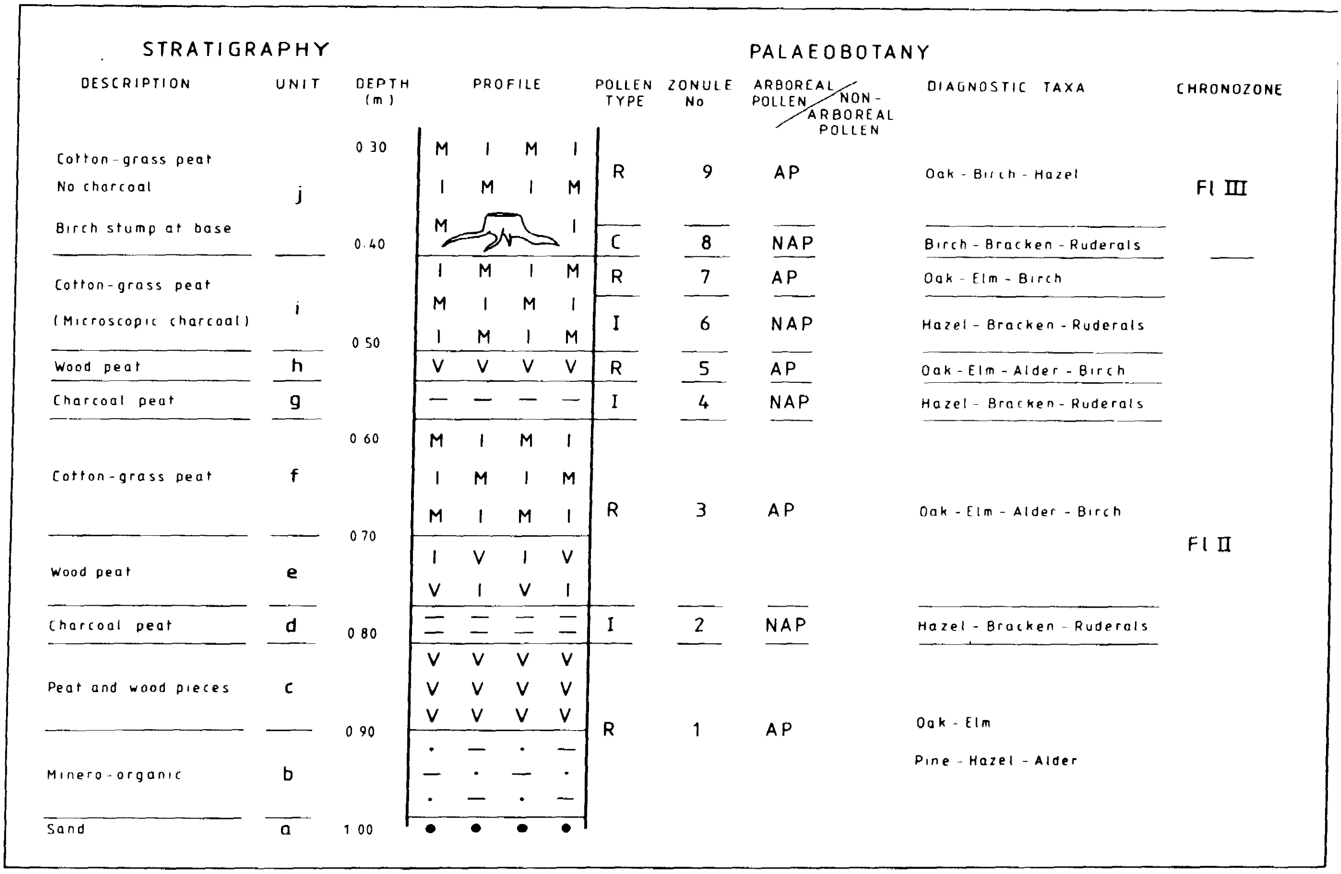


Figure 11 A simplified scheme of the pollen and stratigraphy at Bonfield Gill Head showing regeneration (R), interference (I) and clearance (C) phases. The elm decline which usually marks the end of the Mesolithic comes at 0.40m, ie the level of the birch stump

Cundill, 1974a), which incorporate charcoal throughout Flandrian II. At Bonfield Gill Head the Flandrian III deposits are devoid of both charcoal and 'soot'. This fact, and the reforestation of the uplands, suggests that either the form of land use which requires manipulation by fire of the ecosystem was no longer employed or that a complete withdrawal of human presence from the uplands of the moors took place. In either case we have clear evidence for the cessation of burning practices on the upland at the end of the Mesolithic.

The implications of the type of evidence we see at North Gill and Bonfield Gill Head are clear: repeated firing of the woodland was taking place in Flandrian II on the North Yorkshire Moors. Natural fires cannot be discounted, even though the probability of more than one affecting the same site (showing up as successive charcoal layers in peats) cannot be high. Even if the origin of an opening was natural, its continuance might be anthropogenic, for a number of reasons: (a) often charcoal spreads are associated directly with flint artefacts; (b) at several locations there is evidence for repeated burning of the same site, especially at a favoured location such as a springhead area; (c) numerous ethnographic parallels for such action from recent hunter-gatherer communities throughout the world; and (d) the advantages that would accrue to such communities following this kind of environmental management.

If the Mesolithic economy were based, at least seasonally, upon the exploitation of the larger ungulate populations, supplemented by smaller animals and vegetable foods, improvement of food stocks and increased ease of procurement would follow forest burning. It has been shown (Mellars 1975; 1976) that the grazing and browsing of woodland is much increased, both in quality and quantity, after fire and that ungulate populations tend to increase and to become concentrated in the cleared area. Deer are attracted to the freshly-burned ground by the lush grass and herb carpet which develops, and also to the ash which the fire created. Birds and small mammals are also attracted to the area (Ahlgren, 1966), and would form an additional food supply for humans. Increased sprouting of shrubs is sure to occur, and of particular relevance here is hazel, which is tolerant of all but the highest-intensity fires. Increased access of light to the cleared area could stimulate the flowering of *Corylus* (hazel) and therefore nut production, and as the shrub may be expected to sprout from its base after fire, the development of hazel scrub may well ensue. Other fruit and berry producing shrubs would be encouraged also. This induced succession on cleared areas, probably culminating in hazel scrub with heavy nut production, would provide a considerable reservoir of plant food resources, leading to commensurate multiplication of game animal resources for Mesolithic man. If forest burning were as regular an occurrence as our evidence appears to show, the oak-hazel woodland, which the pollen diagrams suggest characterized Flandrian II on the moors, may well be at least partially a man-produced or cultural vegetation.

Evidence of environmental disturbance of this kind is forthcoming from a number of sites on the North Yorkshire Moors during Flandrian II, taking the form of small, temporary openings in the woodland which may be attributable to the actions of Mesolithic communities. Figure 12 records the distribution of these instances of Flandrian II forest recession, and shows a concentration of sites on the high watershed area of the moors, generally on the headwaters of streams above 300m OD, although Collier Gill and May Moss are rather lower at 275m. It is interesting, however, that a significant number do occur at intermediate altitude *(c* 150m OD), particularly on the lower watershed of the Cleveland plateau, and a single instance is suggested for the lowland lakeside site at Seamer Carr (Stokesley). At this site Jones (1976a) records a phase in early Flandrian II during which the stability of the broadleaf forest surrounding the lake was disturbed and a number of heliophyte (shade-intolerant) taxa increased their pollen representation. Peaks of *Corylus, Pteridium* and *Pinus* and the beginning of a constant Fraxinus presence combine with the appearance of *Artemisia* (mugwort), *Plantago major* (greater plantain), *Rumex* (sorrel), *Cruciferae* and *Tubuliflorae,* to suggest the creation of open-ground and scrub communities not far from the lake.

Similarly, the deposits at Ewe Crag Slack, in a watershed situation at 245m OD (Jones, 1978), record two episodes during which reductions in tree pollen values are coincident with the introduction of herbaceous indicators of freshly cleared ground to the pollen spectra, in particular *Melampyrum* and *Artemisia.* Heliophyte shrubs were also encouraged, with *Corylus, Salix, Sorbus* (rowan), *Fraxinus,* and *Rosaceous* types reflecting the more open nature of the woodland. The clearance of areas adjacent to the mire resulted in soil erosion and the deposition of sediment in the form of inwash stripes of mineral material. Similar phenomena are recorded from Fen Bogs (Atherden, 1976a), Moss Swang and Lady Bridge Slack (Simmons, 1969a), and West House Moss (Jones, 1977a), where dislocation of woodland ecosystems and the creation of open areas are represented by the increased contribution of ruderal and regeneration types to the pollen assemblage, accompanied on occasion by the deposition of silt inwash and charcoal in the mire. Characteristic indicators of clearance include *Melampyrum, Artemisia, Rumex, Stellaria holostea, Compositae, Cruciferae* and *Chemopodiaceae.* The lower-altitude palaeoenvironmental evidence represented by these sites is comparable in demonstrating rather less intensive clearance than from the higher parts of the moors, probably reflecting the greater woodland density in these areas. In lowland clearance phases arboreal pollen falls from an average of about 70% of total pollen to about 50% and clearance indicators, while present in the same range as upland examples, do not show such high frequencies. An exception to this is a late Flandrian II forest recession at Tranmire Slack (Jones, 1978), during which arboreal pollen falls from 70% to 30% of total pollen, The full assemblage of ruderal types mentioned above is joined by *Plantago lanceolata* (ribwort plantain), *Plantago coronopus* (stagshorn plantain) and *Epilobium* (fireweed or rosebay willow herb), while peaks of *Pteridium, Grumineae, Fraxinus,* and *Corylus* occur. The deposition of a large inwash stripe in the mire again accompanies clearance.

The intensity of this clearance phase is analogous with those recorded from the high moors, of which the sites of North Gill and Bonfield Gill Head already described are typical examples, tree pollen falling from an average of about 50% to less than 30% following clearance. In addition to the contrasting density of woodland in which clearance takes place, other differences are apparent between upland and lowland examples, although both record a fundamentally similar event. Charcoal is present in every case in upland contexts both as discrete concentrated layers and suffused throughout the profile, indicating that firing of the vegetation was a common and perhaps even regionally continuous event. Charcoal is not in every case recovered from the stratigraphy at lowland clearance horizons, but the use of fire is implied by the almost universal expansion of taxa held to be characteristic of succession after fire, in particular *Melampyrum* (Berglund, 1966; Mamakowa, 1968), *Artemisia, Pteridium,* and *Corylus* (Ahlgren, 1966). Several sites exhibit more than one clearance horizon, and so were foci of activity at intervals throughout Flandrian II, but those in the upland appear to have been visited rather more often, although this may be illusory due to upland sites having had a greater pollen catchment area than those in the more densely wooded lowland. Calluna (heather) figures strongly in the clearance assemblage of Late Flandrian II in the uplands but is poorly represented in lowland situations, perhaps indicating contrasting soil development after clearance in the two areas.

It is clear that as well as exploiting zones of high resource potential, Mesolithic man was capable of increasing this potential through fire clearance of the high forest vegetation, with its attendant economic benefits. Clearance activity took place in varying locations throughout the region, although

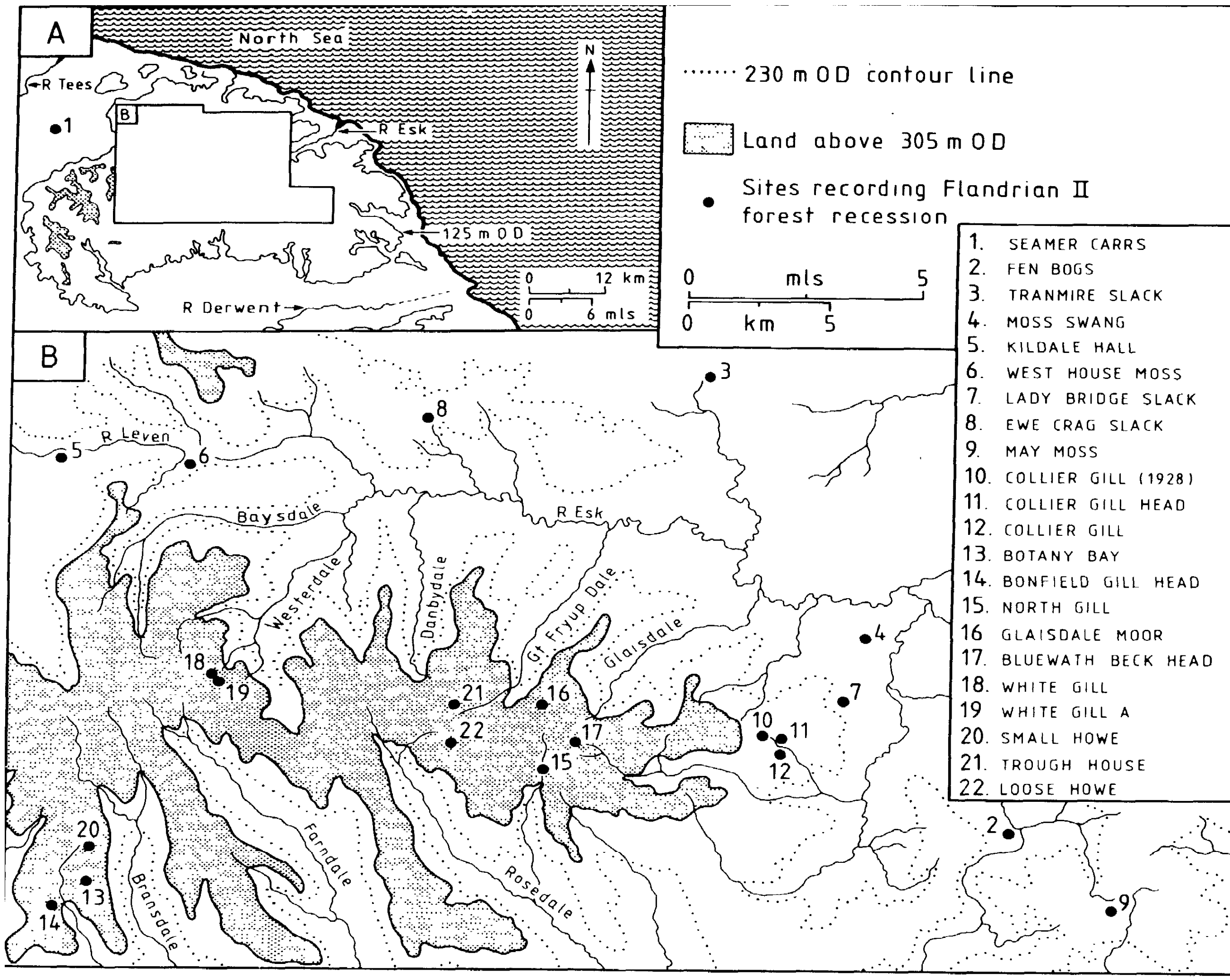


Figure 12 Sites on the moors showing forest recession during the oak forest period

all are comparable in having immediate access to the water, whether stream or lake, which is a logical focus for human and animal activity. The most rewarding zone for such manipulation, however, would be the upper edge of the forest wherever animals might naturally congregate near water supply, a description that fits all of the high-altitude sites shown on Figure 12 very well. Further research is required to clarify this distribution.

The spatial dimensions of a Late Mesolithic clearance event are difficult to deduce. It is clear, however, that there must have been an optimum intensity of burn and time of execution to produce the maximum benefit in increased vegetable and deer yields. Mellars (1976) has considered this question and quotes a number of authors who state that maximum deer populations are to be found on a relatively small cleared area. Diversity is the keyword once again, for forest edge vegetation is as important as the cleared area itself. The provision of cover (both for deer and hunter) is also a vital constituent of the area in question, for deer will not readily occupy too large an area of bare ground, Too small a clearing is equally unsatisfactory but a combination of bare ground, cover and regenerating browse supply is ideal. The consensus of opinion seems to be that the optimum diameter for the clearing may be rather less than 400m. If this is so, it corresponds very neatly with our evidence from North Gill, where the charcoal layers extend along the stream edge for a little more than 375m. Before final conclusions may be made, however, we require rather more evidence regarding the character and distribution of Mesolithic clearance over the moors as a whole.

We have already described phenomena of the kind outlined above as ‘temporary’ clearance phases. It remains to consider what lasting changes, if any, Mesolithic man may have wrought upon the landscape during Flandrian II. A long-term retraction of the extent of forest cover seems a possibility. Pollen analysis suggests that the central watershed of the moors did not carry high forest during the Atlantic, but may have supported at best scrub or open communities only. There is no reason why this should be so, for we have noted above that proven tree-lines in other parts of the country were at this time altitudinally far in excess of the highest parts of the moors. It seems likely that repeated firing of the woodland at high altitude, plus the consequent heavy browsing pressure (both very destructive and prohibitive of tree regeneration), could have led to removal of woodland.

Man-induced pressure on the forest margin may well have gradually moved the tree-line downhill as the cleared areas failed to regenerate. Certainly, the woodland was kept more open than would have been the case had human controls not been operative. If human pressure was continuous from early Flandrian I times, woodland may even have been prevented from forming at these highest areas at all. The early Flandrian III birch tree stumps at Bonfield Gill Head, and similar wood remains from Glaisdale Moor, suggest that the tree-line was indeed kept at an artificially low altitude during the Mesolithic cultural period. Nor should we neglect the possibility of permanently open areas at lower altitude, for we do have records of clearance at these levels. Until further evidence is forthcoming, however, it is perhaps prudent to assume successful regeneration at low altitudes, due to better soils and denser woodland.

The most serious effects of Mesolithic activity may have been in relation to soils. Developed on nutrient-poor parent rock, and exposed to heavy rainfall pressure during Flandrian II, the mature upland soils of the North Yorkshire Moors have already been under some stress, and may even be characterized as marginal. Heavy leaching would make them prone to acidification. Clearance of woodland would accelerate this trend towards acidity in a number of ways. Much of the nutrient store of the ecosystem would be lost, as vegetation combusted and ash and charcoal were transported away. Increased rainfall effectiveness would promote leaching, further depleting the soil. A rise in soil acidity is represented at both North Gill and Bonfield Gill Head by the rise of birch and heather and decline of alder following later Flandrian II interference phases. We have evidence of Flandrian II soil deterioration from other regions (Crampton and Webley, 1966), often in association with a Mesolithic presence, as at Oakhanger (Rankine *et al*, 1960). In addition, increased temperature and dryness of soil after fire increases soil friability, encouraging soil erosion, especially under conditions of greatly increased run-off from cleared slopes. We have physical evidence of such erosion, both at altitude (North Gill, Bluewath Beck Head) and lower down (Tranmire Slack, Ewe Crag Slack, Moss Swang) (Simmons et al, 1975) in the form of inwash stripes of mineral material at Mesolithic clearance horizons. Several examples from other regions may be quoted, eg Bodmin Moor (Connolly *et al*, 1950), and the Cumberland lowlands (Walker, 1966).

We have already mentioned the possibility that Mesolithic man may have initiated the inception of peat growth. Evidence of clearance is often found at the base of the blanket peat in the form of ruderal pollen or charcoal, as though the creation of open ground was the stimulus for its growth. Clearance of woodland releases vast quantities of water into the ecosystem which would previously have been bound up in the vegetation and, in a time of high rainfall such as Flandrian II, waterlogging of the soil may well occur, particularly if compaction of the soil surface has followed trampling of the site by the concentrations of animals that the clearance is designed to attract. Acidification of soils and impedence of drainage under high rainfall are conditions suitable for peat formation. The areas of bog interspersed in the woodland milieu which we have postulated for Flandrian II may well have served as the initial nuclei of mire formation. If the above mechanism operated on any scale, we should also expect the silt load and water volume entering the region’s streams to be much greater than would naturally have been the case, perhaps leading to flooding and sediment deposition in their lower courses of a recurrent and intense nature (Richards, 1981). Any such change in the regime of the region’s watercourses may well have had repercussions upon fish and aquatic plant resources.

In conclusion, therefore, we suggest that Flandrian II upon the North Yorkshire Moors was not characterized by the homogeneity of conventional wisdom, but by a tendency towards ecological instability and biotic diversity. The landscape appears to have been a mosaic of open woodland and regenerating communities at different stages of development, within which semi-permanent areas of open ground, bog, and heathland existed. The techniques of environmental modification employed by man which maintained this diversity of landscape may also have led locally to ecological degeneration of a severe and permanent nature.

4 The impact of Neolithic and Bronze Age cultures on the environment

Introduction

The British Neolithic and Bronze Age are generally recognized as having existed from approximately 5500 to 2650 years bp. This period of time was the first in which farming practices were the dominant form of survival for the population and these practices had a number of significant influences on the vegetation and scenery of the North Yorkshire Moors. Within the Neolithic and Bronze Age several

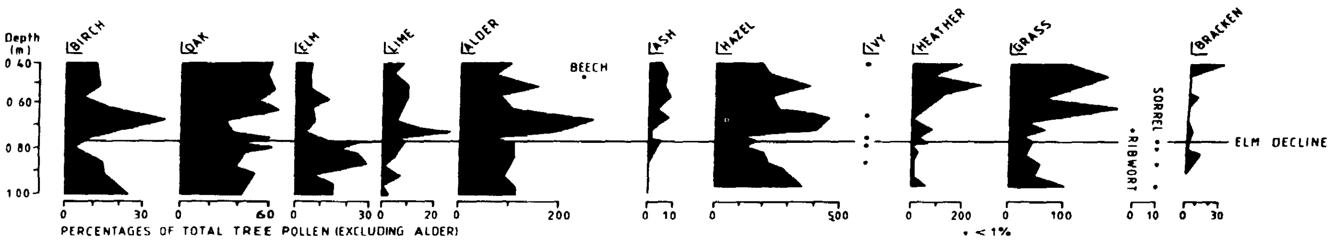


Figure 13 Extract from pollen diagrum at Glaisdale Moor

discrete vegetational and environmental phases may be identified and these provide the divisions for the discussion that follows.

The elm decline

A rapid reduction in elm pollen at the boundary between the Middle and Late Flandrian periods (chronozones FL II/III) is a distinctive feature of north-west European pollen diagrams (eg Godwin, 1975; Pennington, 1969) and probably forms the most significant horizon in pollen diagrams of this age. Initially the elm decline was recognized as having two elements: firstly what was described as a primary decline in which only elm pollen values were reduced, and second a 'landnam' or woodland clearance phase in which several woodland taxa were reduced in addition to elm (Iversen, 1941). In Britain few palynologists have been able to identify both phases and more often the two phases occur together, as on the North Yorkshire Moors pollen diagrams.

Perhaps the most remarkable feature of the elm decline is its relatively synchronous radiocarbon dates from different parts of Britain: the majority occur around 5100 years bp (Sims, 1973) although there are a number of earlier and later dates. On the North Yorkshire Moors the elm decline has been dated to 4767 ± 60 bp (BM-426) at North Gill (Jones *et al,* 1979) and 4720 ± 90 bp (T-1084) at Fen Bogs (Atherden, 1976a; 1976b). The pollen diagram from Glaisdale Moor (Figure 13; Simmons and Cundill, 1974a) illustrates the nature of the elm decline on the higher ground of the moors, while that from Seamer Carr (Stokesley) (Figure 14; Jones, 1976a) shows the same period for a lowland site adjacent to the Moors. Although it is often possible to identify an elm decline in pollen diagrams from the North Yorkshire Moors, there are some sites where a classic elm decline is difficult to recognize because of the very variable nature of the elm pollen curve. In particular, the sites on the sides of the moorland dales such as St Helena 'B' (Simmons and Cundill, 1974b), and in the Cleveland area like Tranmire Slack (Jones, 1978), appear to have the least clear elm declines. The possible reasons for such variations will be explored later.

Nature of woodland alteration

The elm decline is noted not only for a distinctive reduction in the value of elm pollen but also for a general change in the composition of woodlands in Britain. The decrease in the numbers of elm trees allowed other plant species to invade the vacated areas and it has been argued for some time that the woodland canopy became less dense. This allowed the expansion of the more light-demanding woodland tree species such as *Fraxinus* (ash), as well as encouraging the expansion of birch and hazel. Such changes may be identified on many of the pollen diagrams from the lowland areas of the North Yorkshire Moors, although the higher ground of the moors had ash and fairly high values of birch and hazel before the elm decline. While a reduction in elm must have had a noticeable effect on the composition of the woodland, it can be argued that the changes in pollen percentages of other tree taxa may not indicate a change in their populations in the ecosystem, For example, it is possible that an

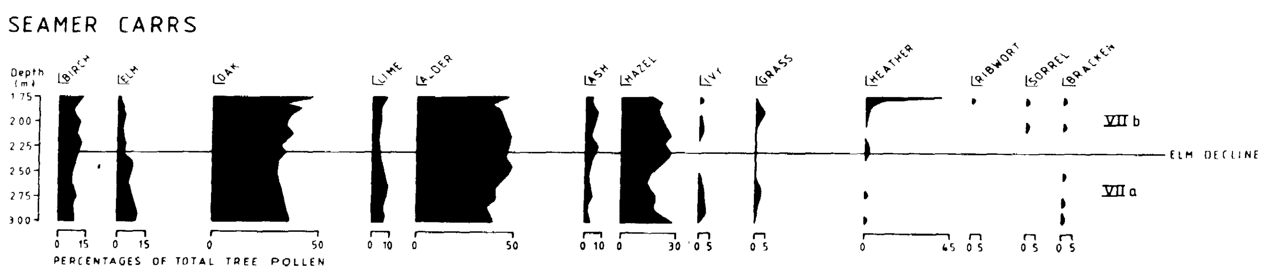


Figure I4 Extract from pollen diagram at Seamer Carr (Stokesley) opening up of the woodland canopy may have allowed a pollen rain derived from a larger area to be deposited, a pollen rain which contained greater percentages of other tree taxa. The appearance of *Fagus* (beech) in some North Yorkshire Moors pollen diagrams at this time may be a reflection of the opening of the woodland canopy.

One unusual feature which is recorded in some of the North Yorkshire Moors pollen diagrams is an increase in *Tilia* (lime) at the same time as the elm decline. This feature is more apparent in the blanket peat (eg Glaisdale Moor, Fig 13) and glacial drainage channel sites on the higher ground of the moors (Simmons, 1969a; Simmons and Cundill, 1974a). High values of lime are also found in the Vale of York and the Tees basin and have been attributed to optimum climate and edaphic conditions for its growth obtaining in these areas (Simmons, 1969a). It may be suggested, however, that it is also possible that increased values of lime pollen were reaching bog surfaces at the elm decline because of the reduction in elm trees. This explanation would not require an increase in the lime tree population.

Explanation of the elm decline

Although the elm decline is a distinctive feature of pollen diagrams from north-west Europe, no totally satisfactory explanation of what caused it has been forthcoming. A number of possible explanations have been put forward, including climatic change, which has been mainly suggested by continental workers. They point to changes in the nature of woodland at the elm decline, in particular the disappearance of frost-sensitive species such as *Ulmus minor* (smooth elm), *Hedera* helix (ivy) and *Viscum album* (mistletoe), as evidence for a deterioration in climate (eg Troels-Smith, 1960). *Hedera* is not helpful in this respect because ivy pollen frequencies are as high after the elm decline as before it in pollen diagrams from the North Yorkshire Moors (Figs 13; 14). In the case of elm pollen, Bennett (1986) in his study of East Anglian sites used Stockmarr's (1970) criteria to separate elm species and discovered that although *Ulmus minor* (smooth elm) was present at the time of the elm decline, it was not preferentially reduced in numbers. In northern areas of Britain, including the North Yorkshire Moors, it is probable that only one species of elm, *Ulmus glabra* (wych elm), occurred at the time of the elm decline. Therefore at present the available evidence does not support the idea of a major and sudden shift of climate which might have brought about the elm decline in Britain.

In the past the most widely adopted explanations for the elm decline in north-west Europe have been those which involve the activities of man. Anthropogenic explanations have tended to become popular because very many elm declines have clear signs of woodland destruction (and expansions of taxa such as *Gramineae* (grass), *Plantago* (plantain), *Pteridium* (bracken), which are indicative of open or disturbed habitats) and sometimes the growth of cereals. Investigations and radiocarbon dates from early Neolithic sites have demonstrated that the first clearly identifiable farming culture arrived in Britain at about 5000-5500 years bp (I F Smith, 1974; Evans, 1975). The linking of the elm decline with anthropogenic activities therefore seemed logical. Troels-Smith (1960) has gone further and argued that Neolithic man used elm leaves as animal fodder, which resulted in elm trees being pollarded, thus reducing the output of elm pollen.

Another possible way in which human influence may have produced the elm decline was explored by Sturlodottir and Turner (1985) in research on the northern Pennines. They argued that Mesolithic activities such as woodland destruction brought about a deterioration in the soils of these uplands which resulted in a threshold in the level of soil fertility being crossed at the elm decline, which led to the death of elm trees. This does not seem to be an explanation that can be applied to the sites on the North Yorkshire Moors, because other forest trees such as *Tilia* (limes) are not affected at the elm decline even though they also demand fertile soil conditions.

In recent years another explanation has gained more attention. It has always been recognized that elm may have been decimated by a disease similar in its effects to the modern Dutch elm disease epidemic in Britain. Support for this theory has always been difficult to find, but in the early 1980s two fossil specimens of the beetle that spreads the disease at the present day were found in deposits of elm decline age at Hampstead Heath in London (Girling and Greig, 1985). Further support may be found in the argument that it is difficult to accept that a relatively small population in early Neolithic times managed to Pollard a substantial number of elm trees across Britain in a short period of time in order to produce the elm decline (eg Rackham, 1986). This is not to dismiss the possibility that elm was pollarded in some areas, an activity which would have encouraged the spread of the disease (Rackham, 1980).

There is no direct evidence for disease at the elm decline on the North Yorkshire Moors, but even if an anthropogenic explanation is preferred simply because there is some support in the pollen data, there still remain a number of problems in any attempt to link Neolithic farming practices with the elm decline. It has been noted already that the elm decline is most clearly seen in pollen diagrams from high ground and also from areas peripheral to the moors. The latter situation is in keeping with the distribution of Neolithic axes, shown in Figure 29 to be peripheral to the high moors, ie on the Tabular Hills, in the valleys, and on the boulder clay lowlands and coast. On the higher g-round Neolithic activity is represented almost entirely by flint sites, which are often at the same sites as the Mesolithic hunting camps. It is therefore less easy to suggest a link between Neolithic farming and the elm decline on the high moorland. Indeed Dimbleby (1962) and

Radley (1969) have suggested that the Late Mesolithic peoples persisted well into Neolithic times on higher ground (see also Chapter 4), and this line of reasoning has been used by Spratt and Simmons (1976) to wonder whether the elm decline in these areas ought to be ascribed to the terminal Mesolithic rather than the Early Neolithic. This brings into focus a topic which has aroused considerable discussion in recent years; the nature of the link between the elm decline and the arrival of the Neolithic culture in Britain.

Conventionally it has been usual to regard the elm decline as the start of the Neolithic period. This presupposes that the elm decline was brought about entirely by human agencies and relies on synchroneity between a palaeobotanical event (elm decline) and cultural changes (arrival of the Neolithic). In recent years an increasing body of literature has thrown doubt upon this interpretation of events and proposes that the Neolithic culture existed some time prior to the elm decline. Much of the evidence so far comes from Ireland (eg Groenmann-van Waateringe, 1983) although there is a little from Britain (eg Edwards and Hirons, 1984). It includes evidence for cereal growing some 365 years before the elm decline (Hirons and Edwards, 1986). The data from the North Yorkshire Moors are not as precise, although it is possible that the terminal Mesolithic on the North Yorkshire Moors adopted some aspects of the Neolithic culture before the elm decline itself. This interpretation would relegate the elm decline to its correct position as a palaeobotanical horizon and remove the cultural implications often associated with it.

Impact of the Neolithic on post elm-decline woodland

Although the elm decline is recognized as a distinct feature in a number of pollen diagrams from the North Yorkshire Moors, as a woodland disturbance phase it was of short duration. Even the values of elm recover to some extent after the decline although they do not attain pre-decline values (Figs 13 and 14). However, it is also apparent from most of the pollen diagrams from the higher ground of the North Yorkshire Moors that the elm decline heralds a period of gradually diminishing tree cover. Within this period occasional woodland clearance phases of Neolithic age may be identified, such as the one at Collier Gill which has been dated to 3886 ± 79 bp (BM-428) (Simmons, 1969; Spratt and Simmons, 1976; Jones *et al,* 1979). Few such discrete periods of woodland destruction may be isolated from the gradual reduction in woodland, although the gradual reduction itself may be the result of constant farming pressure on the higher ground, as indicated perhaps by continuous finds of ruderal pollen. In more sheltered and lower-altitude places such as Moss Swang (Simmons, 1969a) and St Helena (Simmons and Cundill, 1974b), the post elm decline woodland appears to be little disturbed (Fig 15).

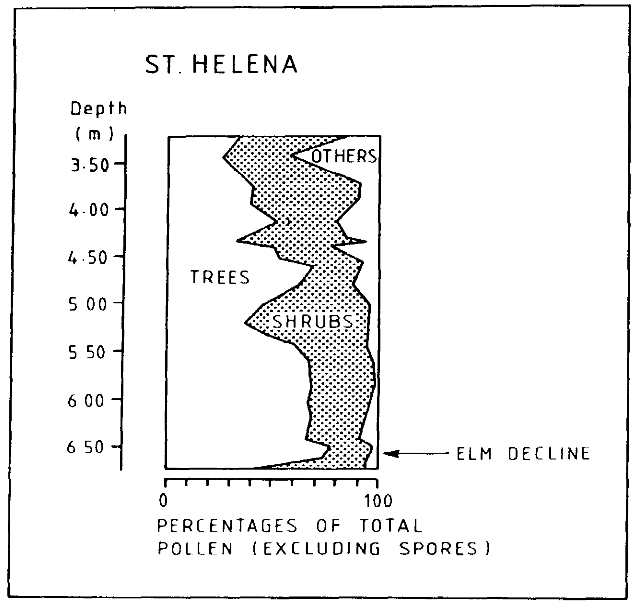


Figure 15 Summary pollen diagram at St Helena

This has led to the suggestion (Atherden, 1976b) that limited woodland destruction, perhaps on a sporadic scale, was taking place. The total evidence in Chapter 4 presents a picture of pastoralism within the forest on the lower ground of the northern part of the moors, while higher ground was being used for hunting; on the Tabular Hills there was much more intensive Neolithic settlement, probably for mixed farming.

Formation of blanket peat during the Neolithic

The only extensive areas of blanket peat on the North Yorkshire Moors are found on the higher ground known as Egton High Moor, Glaisdale Moor and Danby High Moor. Other more restricted areas of such peat occur on lower ground principally at May Moss (Atherden, 1979) and Harwood Dale Bog (Erdtman, 1928; Atherden, 1989). In many respects the blanket peats of the North Yorkshire Moors are not as well developed as those, for example, on the Pennines or Dartmoor. This is probably because of the drier conditions with only about 1000mm of rainfall each year on the highest ground (Eyre and Palmer, 1973). The main reason for discussing blanket peat at this point is that there are a number of sites where peat formation starts during the Neolithic (Cundill, 1977; Simmons and Cundill, 1974a; Atherden, 1979). Commencement of peat accumulation at this time is not unique to the North Yorkshire Moors, as P D Moore (1973) has recognized a similar phenomenon from blanket peat sites in central Wales, although Chambers (1981) found a more variable pattern in South Wales. The Neolithic is not identified as a period of increasing oceanicity of climate and this has led to speculation that Neolithic man may have had some influence in the inception of blanket peat growth. Whether this process could operate under conditions of limited Neolithic woodland clearance is difficult to judge, but in the absence of positive evidence for a wetter regional climate, even the limited indications of the presence of man provides a more attractive explanation for the start of blanket peat growth.

Bronze Age impact on woodland

While it has been recognized that limited impact on woodlands took place during the Neolithic, it has also been argued that during the Bronze Age the first significant destruction of the tree cover of the North Yorkshire Moors took place (eg Jones *et al*, 1979). Initially much of this argument was based on the inference that because Bronze Age remains, described in Chapters 4 to 6, are abundant on the moors, this culture must have had a substantial impact on the environment. In recent years a number of radiocarbon dates have been obtained for the first major woodland clearance recognized in pollen diagrams and these clearly show that the event did occur in the Bronze Age. For example, the dates of 3210 ± bp (Gak-2712) at Wheeldale Gill (Simmons and Cundill, 1974a; Spratt and Simmons, 1976) and 3400 ± 90 (T-1150) years bp for a clearance phase at Fen Bogs (Atherden, 1976a) are within the Bronze Age. The nature of the woodland clearance phase can be seen in the pollen diagram from Yarlsey Moss (Fig 16) where it is not dated (Simmons and Cundill, 1974a) and Fen Bogs (Fig 17) where it is dated (Atherden, 1976a). Pollen diagrams have also been produced from soils buried beneath Bronze Age burial mounds (Dimbleby, 1961; 1962) and provide further evidence of substantial destruction of woodland. For example, Dimbleby (1962) demonstrated that of two Bronze Age barrows at Burton Howes, one had been constructed in an extensive area of open land within a woodland. Clearance of forest during the Bronze Age is recognised from almost all pollen diagrams from the North Yorkshire Moors, whether from the higher ground or lowlands. The only exceptions are from those sites located behind landslips on the sides of the moorland dales (Simmons and Cundill, 1974b). However, it is likely that the location of these sites on very steep slopes made them unattractive for farming purposes and ensured that they remained wooded throughout the Bronze Age. Macro-remains from the Late Bronze Age palisade trench at Eston Nab (M. van der Veen in Vyner, 1988b) show that cultivation was then present near the site, presumably on the flatter ground of the plateau. Hazelnuts suggest scrub or open woodland and, in Iron Age times, evidence for this scrub is slightly greater, though that for cultivation disappears.

The nature of Bronze Age farming

Fleming (1971) has examined in detail the evidence for the types of farming carried out on the North Yorkshire Moors during the Bronze Age. He based his evidence on population size which in turn had been based in the number and distribution of burial sites, and he argued that Bronze Age people utilised the North Yorkshire Moors for cereal growing. His arguments were also partly based on analogies with African agricultural practices and Danish agricultural experiments using prehistoric implements and techniques. Fleming disputed the idea propounded by Dimbleby (1961) that woodland was primarily cleared for pastoral farming. Since 1971 a considerable amount of palaeobotanical evidence has become available and this has perhaps helped to clarify the situation.

Some variation in the nature of the palaeobotanical evidence from site to site is apparent, particularly in terms of the presence of cereal pollen. Table 1 demonstrates this variability, and in particular the sites of Atherden (1976a; 1976b; 1979) have no cereal pollen at the level of the Bronze Age activities. However, from other work there are signs of very local variations in cereal pollen production with, for example, records of cereal pollen at Yarlsey Moss but none at Wheeldale Gill, only a few hundred metres to the south, This kind of variation may be expected when it is recognized that cereal pollen production and dispersal is limited, and in the particular case of Wheeldale Gill, woodland existed which may have prevented cereal pollen from reaching the bog surface. Overall, records from higher ground show a very variable pattern with many sites having no evidence of cereal crop-growing during the Bronze Age. On lower ground, and particularly in the area examined by Jones (1977a; 1978), there is a picture of more persistent cereal crop growing, including the cultivation of *Triticum dicoccum* (emmer wheat) and *Hordeum* (barley) during Bronze Age times, Although Fleming (1971) argues for cereal growing as the reason for Bronze Age woodland clearances, he does make the point that it would be reasonable to assume that such crop-growing would have been successful only up to an altitude of about 300m and he suggests that above this altitude perhaps only one crop was possible before the soil was exhausted and soil erosion set in. It may be possible also that a single phase of crop- growing on the higher ground may have been missed in the pollen diagrams because a single pollen sample covers a relatively limited period of time and many pollen diagrams are constructed from samples taken at 5 or 10cm intervals. Therefore in the pollen records having no cereal pollen it cannot be assumed that no grain farming had been carried out close to the site, and because of this Fleming's suggestions cannot be discounted.

However, it also seems likely that while cereal growing was practised on the North Yorkshire Moors during the Bronze Age, other farming practices were adopted as well and these led to

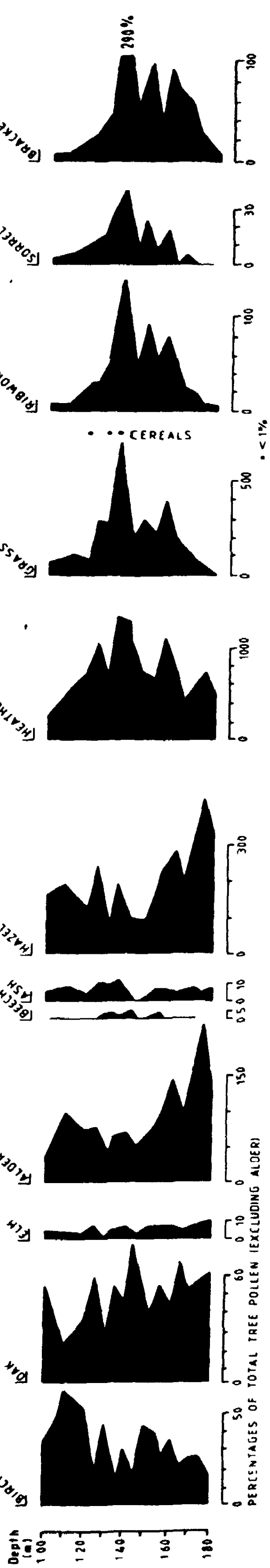


Figure 16 Partial pollen diagram at Yarlsey Moss showing pollen fluctuations and high frequencies indicative of open ground and agriculture

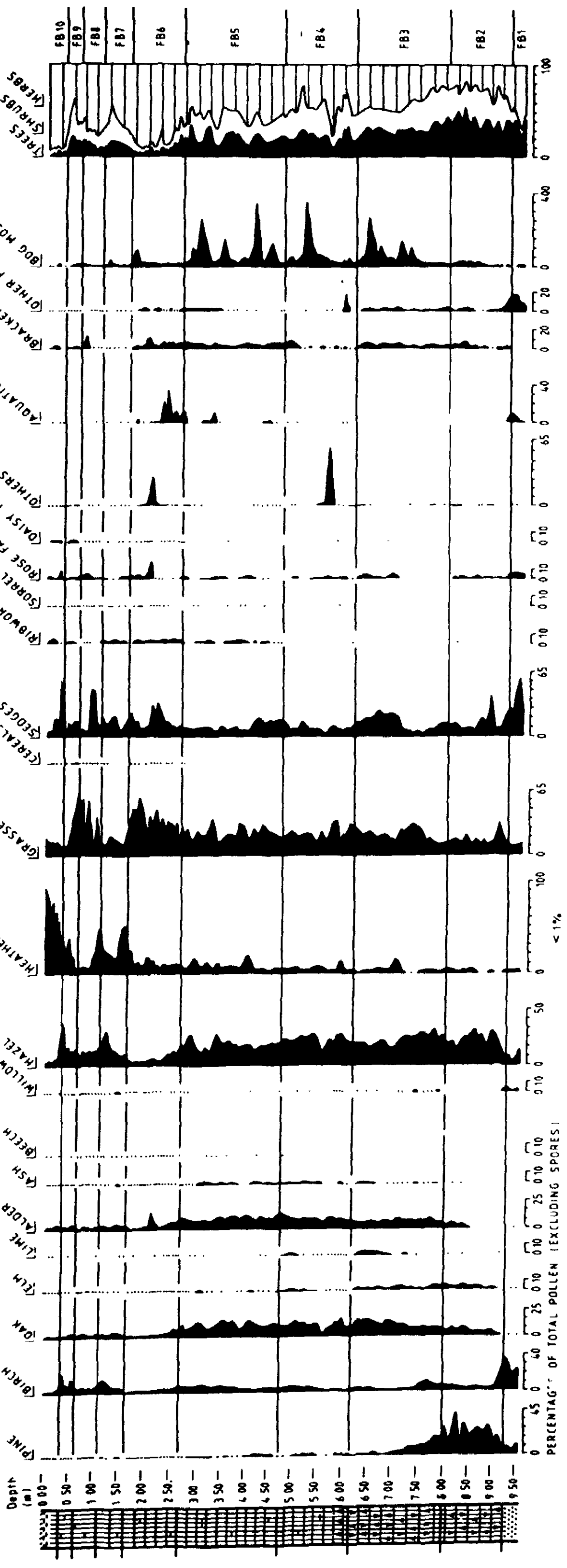


Figure 17 Part of pollen diagram at Fen Bogs

Table 1 Cereal pollen of Bronze Age in pollen diagrams from the North Yorkshire Moors

Author	Pollen site	Presence of Cereal Pollen (indicated by C)
Atherden 1976a,b	Fen Bogs	
Atherden 1979	Gale Field	
	May Moss	
	Moss Slack, Goathland	
	Simon Howe Moss	
Jones 1976	Seamer Carr (Stokesley)	C
Jones 1977	West House Moss	C
Jones 1978	Ewe Crag Slack A	C
	Ewe Crag Slack B	C
	Tranmire Slack	C
Simmons 1969	Collier Gill	C
	Ladybridge Slack	C
	Moss Swang	C
	North Gill	C
Simmons and Cundill 1974a	Glaisdale Moor	C
	Howdale Hill	
	Loose Howe	
	Wheeldale Gill	
	White Gill	
	Yarlsey Moss	C
Simmons and Cundill 1975b	Blakey Landslip	C
	St Helena A	C
	St Helena B	

clearance of woodland. A clue to these other farming practices is to be found in the range of ruderal pollen types found in association with cereal pollen. Spratt and Simmons (1976) believe that these ruderal pollen types indicate that the dominant land use was pastoral farming. They came to this conclusion by using the arable/pastoral index of Turner (1965), although even the use of Godwin's (1968) pastoral/arable list of ruderal pollen taxa would lead to the same conclusion. Fleming (1971) argued against the idea of pastoralism because he could not reconcile pastoral farming with woodland clearance. Perhaps he did not appreciate the importance of gazing in woodlands as an aid to woodland clearance (Dimbleby, 1967) and certainly such activity coupled with the firing of woodland during dry periods (perhaps ostensibly to encourage low-growing fresh browse) may have been an effective method of woodland destruction. It is probable that the woodland on the uplands was of a 'poor' nature by this stage, having already been disturbed by Mesolithic and Neolithic people, and it may have required less effort to destroy it than Fleming envisaged. Nevertheless, Fleming did recognize that pastoralism probably came into areas after cultivation and this pattern of events would not conflict with the pollen evidence from lower ground, particularly from the Cleveland area.

Soil deterioration

Dimbleby's work on buried soils beneath Bronze Age burial mounds (Dimbleby, 1961; 1962) was the first to highlight the nature of soil deterioration on the North Yorkshire Moors. It was the contrast between soils beneath two burial mounds of different ages that initially provided the evidence. The more recent work on the peat deposits of the moors has not specifically examined soils, but by providing a thorough picture of what was happening to the

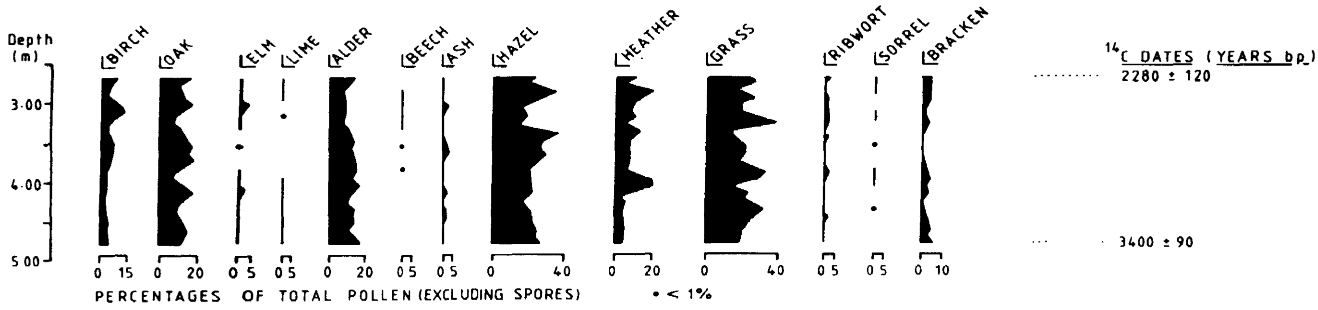


Figure 18 Simplified pollen diagram from Fen Bogs

vegetation it is possible to speculate about soil conditions. It does appear that soils on the moors, even on the higher ground, were initially brown earths (Dimbleby, 1962), and despite the impact of Mesolithic and Neolithic man on the vegetation it would seem that considerable areas of brown earth soils existed when Bronze Age man commenced his farming activities. However, it may be reasonable to suggest that the brown earth soils on higher ground would have been thin and acidic and that a major destruction of woodland such as that attributed to the Bronze Age would have resulted in (1) soil erosion, because the surface was no longer protected by woodland; (2) leaching of mineral nutrients from the soil profile, because the destruction of woodland would have broken the nutrient cycles that exist between deciduous woodland and soils. There is certainly considerable supporting evidence for soil erosion during the Bronze Age, as a number of mineral inwash stripes (mineral matter which was eroded from the moorland slopes and washed across the surfaces of the peat bogs, accumulating in glacial drainage channels and behind landslips) have been attributed to this period (Simmons *et al* 1975; Jones, 1978). Evidence for podzolization is contained within Dimbleby's work (1962), and the increasingly acidic nature of the soils during the Bronze Age woodland clearances is indicated in pollen diagrams from peat sites by the significant increases in *Calluna* values.

Woodland regeneration after Bronze Age woodland clearance

On many pollen diagrams the period after the Bronze Age woodland clearance is marked by a low and very limited recovery in tree and shrub pollen percentages. Nevertheless, it does appear that pressure on woodland slackened towards the end of the Bronze Age and allowed limited regeneration of woodland. The slow rate of recovery of trees and shrubs may be due to a substantial reduction but not complete cessation of farming activities. When one considers the higher ground another possibly significant factor comes into play, that of soil condition. It has been suggested that the eroded and leached soils on higher ground may have been unsuitable for recolonization by tree species. However, it may be difficult to attribute too much significance to this explanation, as Dimbleby (1952) has demonstrated that at the present day moorland soils will support naturally regenerating woodland vegetation (and thereby improve the soils), provided that the land is not burnt or grazed; his tree planting experiments at Broxa confirm this point of view.

The evidence from the North Yorkshire Moors suggests that at the end of the Bronze Age heath and bog were dominant on the higher ground with siliceous substrates in the area but substantial tracts of woodland survived on steeper slopes and probably on the wetter land in the dales and in the lowlands around the moors. Woodland destruction had begun in earnest and had substantially started the process of converting the area into heather-clad uplands and farmed lowlands, but some quite considerable elements of mid-Flandrian woodland survived, albeit in an altered state. Palaeobotanical evidence from an excavation of Late Neolithic/Early Bronze Age date at Street House, Loftus has been tentatively interpreted as showing the ritual use of the polypody fern *(Polypodium vulgare),* but may be due to the resistance to decay of fern spores (Turner *et al,* 1988): in this and doubtless many other ways the ecology of the woods was altered.

5 The Iron Age and Romano-British periods

Definition of *the time period*

The Iron Age and Romano-British periods may be taken to cover the time period from about 700 bc to AD 410. This period corresponds with the first part of Godwin's pollen zone VIII for England and Wales (Godwin, 1940), and its beginning has been correlated with the climatic deterioration from Sub-Boreal and Sub-Atlantic, originally recognized in Scandinavia by Blytt and Sernander. In many parts

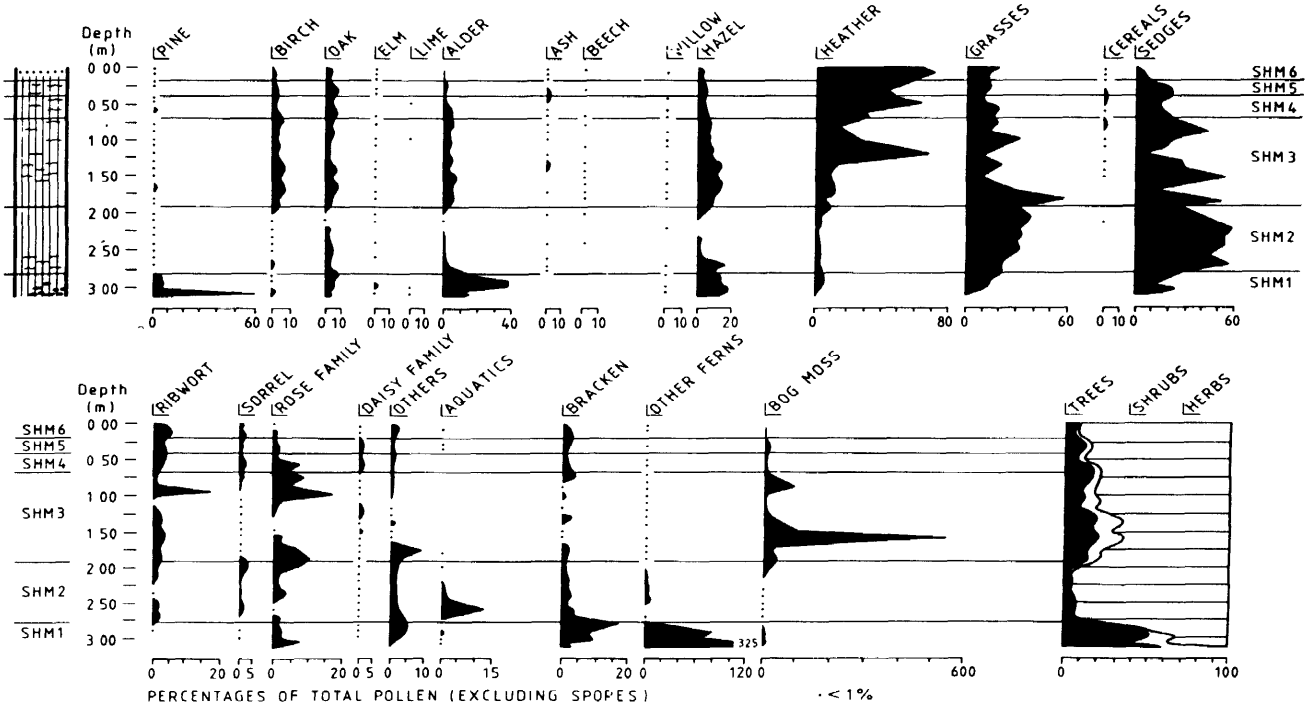


Figure 19   A pollen diagram at Simon Howe Moss

of Britain there is evidence at this time for an increase in wetness, reflected in the pollen diagrams by an increase in records for aquatic and other moisture-tolerant species. Other vegetational changes noted by Godwin included a decrease in lime and more substantial records for beech and *Carpinus* (hornbeam). However, the lime decline has been shown to be diachronous (Turner, 1962), and beech and hornbeam are not always present in sufficient quantities in northern England to form useful indicator species. West's zoning scheme (1970) recognizes no major boundary within Flandrian III at this point and many modern workers no longer differentiate between Godwin's zones VIIb and VIII.

Despite these problems, features such as an increase in the pollen of aquatics and a rise in the curve for beech (as seen, for instance, on the Fen Bogs diagram (Fig 18) do make possible some degree of correlation between diagrams from various parts of the North Yorkshire Moors and also with those from other parts of the country. This is particularly necessary for this period, as so few radiocarbon dates are available. Only two pollen diagrams from the North Yorkshire Moors have good sets of geochronometric dates spanning the period, those from Fen Bogs (Figs 17, 18) and Harwood Dale Bog (Fig 20). However, several other diagrams from sites nearby may be tentatively correlated to these two dated diagrams.

The Fen Bogs diagram (Figs 17, 18)

The summary diagram showing relative proportions of trees, shrubs and herbs, shows a series of small temporary clearances in zone FB5, which are analogous to the Bronze Age clearance phases described in the previous section. The contrast in scale between these small clearance phases and the massive clearance of FB6 is one of the most marked features on the diagram. During FB6 non-tree pollen reaches over 80% of the total and is composed mostly of grasses but with significant contributions from sedges, heather, and some weed species, eg plantain. At the same time a major decrease is seen in the tree pollen curves, shown most clearly in the cases of oak, alder and hazel. The only trees or shrubs to increase in relative importance during this zone are beech and willow. The tendency for beech to increase at the beginning of Godwin's zone VIII has already been noted, and the rise in the willow curve and significant records for aquatics are further evidence for a Sub-Atlantic date for this zone. The radiocarbon date for the opening of FB6 is 2280 ± 120 bp and the date for the boundary with FB7 is 1530 ± 130 bp, so the zone spans the period from the early Iron Age to the end of the Romano-British period.

Detailed examination of the weed spectra (shown in simplified form only on Fig 18) reveals a large

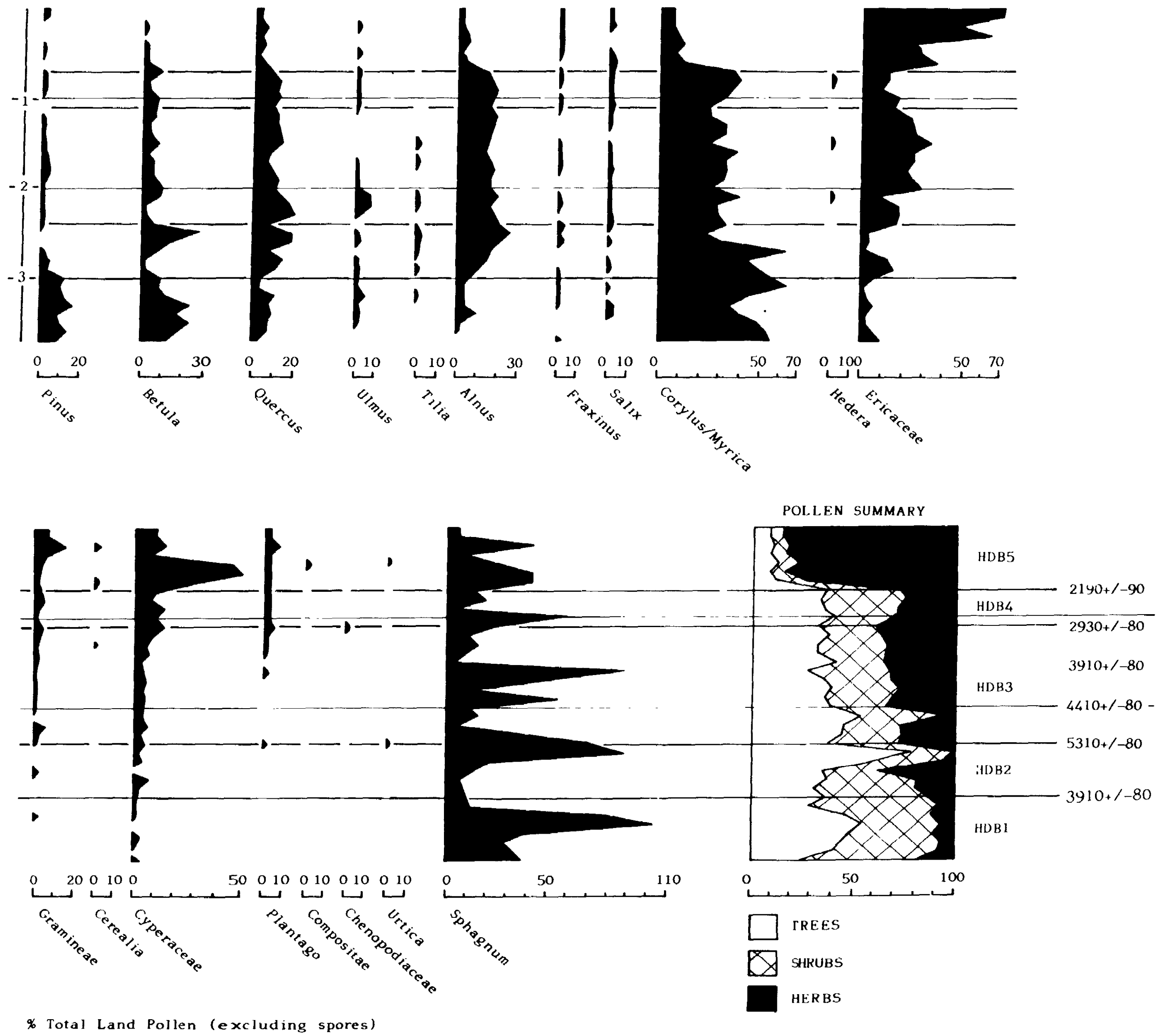


Figure 20 A pollen diagram at Harwood Dale Bog

range of species recorded, such as *Plantago* (plantain), *Rumex (sorrel), Ranunculaceae* (buttercup), *Vicia* (vetch), *Succisa* (scabious), *Urtica* (nettle), *Centaurea cyanus* (cornflower) and members of the *Compositae* (daisy), *Umbelliferae* (parsley), *Chenopodiaceae* (goosefoot), and *Cruciferae* (mustard) families. The list includes indicators of both arable and pastoral farming, and the cultivation of crops is confirmed by the regular records for cereal pollen during the zone (not recorded before the Iron Age at this site).

Application of Turner's (1965) arable/pastoral index gives figures of 87%, 69%, and 87% respectively for the beginning, middle, and end of the clearance phase. These figures are all well within the 'pastoral' category but suggest a trend towards more mixed farming in the middle of the zone. The importance of the arable element may be underestimated, however, as Edwards (1979) has noted the greater contribution of 'pastoral' weeds from field edge and fallow contexts in pre-modern clearance phases on pollen diagrams.

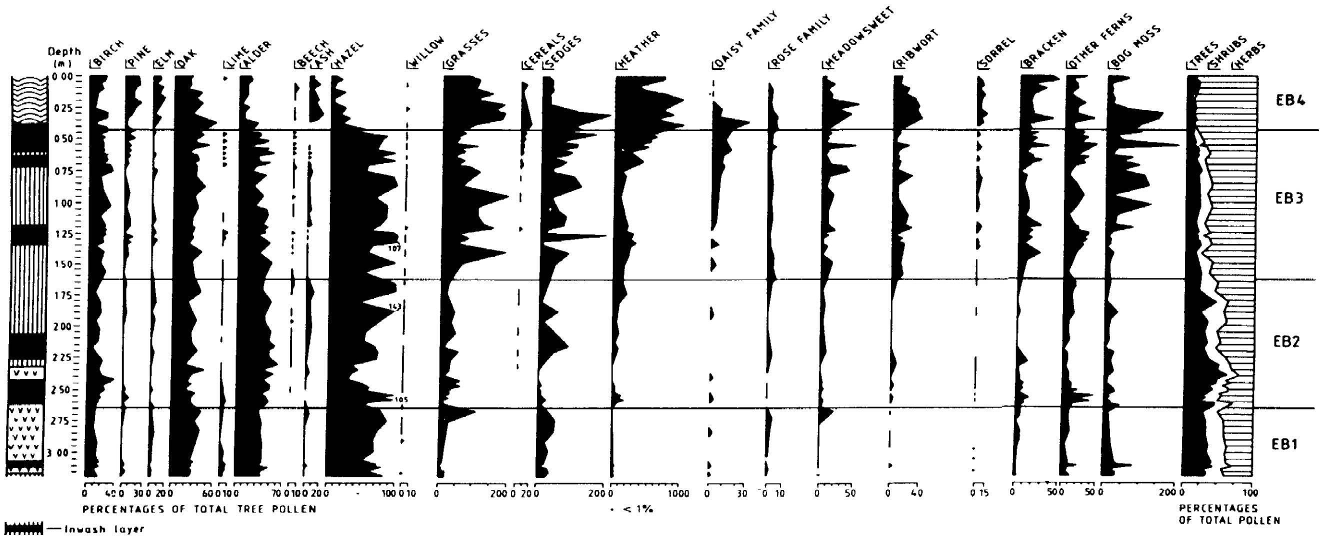


Figure 21 A pollen diagram at Ewe Crag Slack, showing inwash stripes

Other pollen diagrams from sites close to Fen Bogs

Two other pollen diagrams from sites close to Fen Bogs may be correlated to this diagram fairly easily. At May Moss a similar sequence of pollen assemblage zones is found, with a massive clearance in MM6, the details of which correspond closely to the picture seen at Fen Bogs. This site is only 2km away but is situated at a greater altitude, and, as the site itself was never wooded, it is believed to have received a very regional pollen rain (Atherden, 1972). The evidence from Fen Bogs and May Moss together therefore suggests an important change in the regional vegetation during Iron Age and Romano-British times. Simon Howe Moss is the site where the clearance phase is perhaps most marked. This diagram (Fig 19) corresponds very closely with the upper parts of the other two and the clearance of SHM2 is so marked that tree and shrub pollen values are reduced to less than 10% of total pollen at its peak. Grasses and sedges again make up most of the non-tree pollen, with many records for weed species but only one record for cereal pollen at this site. The increase in aquatics and the similarity to the top part of the Fen Bogs diagram makes it almost certain that the same clearance phase is recorded here as at the other two sites, which reinforces the suggestion of a large-scale impact on the landscape at the time.

The Harwood Dale Bog diagram (Fig 20)

A set of five radiocarbon dates for this site in the eastern part of the North Yorkshire Moors allows the detailed dating of the early part of Flandrian III. The date of 2930 ± 80 bp (HAR-5917) at the beginning of zone HDB4 marks the approximate beginning of the Iron Age, while the boundary with HDB5 is dated as 2190 ± 90 bp (HAR-5916), ie late Iron Age. It was not possible to obtain radiocarbon dates for the top part of the diagram, so it is not clear how much of HDB5 is included in the period under consideration, but probably most of the zone falls within the Iron Age and Romano-British periods.

The early Iron Age thus appears to correlate with HDB4. Tree and shrub pollen each contribute about 35% to the total pollen, with *Alnus* (alder) and *Quercus* (oak) as the most important trees and *Corylus* (hazel) forming the bulk of the shrub pollen and showing a small but notable increase from the Bronze Age (HDB3). The *Ericaceae* (heath plants) curve is decreasing throughout the zone, suggesting that the hazel scrub was perhaps regenerating over former moorland. *Gramineae* (grass) and *Cyperaceae* (sedge) pollen are low, but there is a consistent representation of *Plantago* (plantain) and occasional records for *Urtica* (nettle) and *Chenopodiaceae* (goosefoot). There are also scattered records of *Cerealia* (cereals). The overall impression of the early Iron Age from this site is one of agricultural activity continuing at approximately the same intensity as in the later Bronze Age (HDB3), but with a slight regeneration of shrubs on the higher ground.

HDB5 sees a massive decrease in tree and shrub pollen, reminiscent of that seen at Fen Bogs in FB6. Tree and shrub pollen combined comprise less than 25% of the total pollen and there is a correspondingly large increase in non-tree pollen. In the early part of the zone *Cyperaceue* (sedges) are dominant, probably indicating an expansion of cotton-grass over the surface of the bog in response to the wetter climate at the Sub-Boreal/Sub-Atlantic transition. Above 0.3m, however, *Cyperaceae* (sedge) decrease and *Ericaceae* (heath plants) are established as the dominant pollen type, reaching a value of 70% of total pollen at the top of the diagram. *Grumineae* (grass) also show a slight peak at 0.3m but the curve is never significant on this diagram. There are consistent records for *Cerealia* (cereals> and weed species, especially *Plantugo* (plantain), through HDB5. It is clear that this zone represents the first (and only) 'extensive' clearance seen on this diagram. An increase in woodland clearance is indicated, facilitating the spread of heather moorland on the higher ground and an increase in agricultural activity on the lower ground. The radiocarbon dates establish that the major clearance begins in the late Iron Age but it is probable that the Romano-British period is also represented in HDB5.

Other diagrams from sites close to Harwood Dale Bug

Two other pollen diagrams from sites close to Harwood Dale Bog may be tentatively correlated to this pollen diagram. At Evan Howe Slack (Atherden, 1989) a major clearance is seen in EHS3, with cereal pollen present and increasing amounts of heather pollen towards the top of the zone. The clearance almost certainly corresponds to the major clearance of HDB5. The top of EHS2 has some clearance indicators and a few *Cerealia* (cereal) records and may correspond to HDB4. At Foul Sike (Atherden, 1989) the major Iron Age/Romano-British clearance is probably to be identified with the top of zone FS3 and the early Iron Age with an earlier part of the same zone, but the correlations are less certain. At both Evan Howe Slack and Foul Sike, the major Iron Age/Romano-British clearance is followed by a phase of woodland and shrub regeneration, thought to postdate the top of the Harwood Dale Bog diagram and possibly correlating with the regeneration phase in the Dark Ages on the Fen Bogs diagram.

Diagrams from other parts of *the North Yorkshire Moors*

There are no other pollen diagrams from the region where the Iron Age/Romano-British phase can be reliably dated. The Wheeldale Gill diagram has a major clearance in the 'Heather-Ruderals' Zone, the beginning of which is dated as 1570 ± 90 bp, ie late Roman (Simmons and Cundill, 1974b). The radiocarbon dates for the site suggest that the Iron Age/Romano-British phase falls within WH1, a zone of relatively low clearance phenomena, but one of the four radiocarbon dates is out of sequence, which throws some doubt on the inferred chronology. Also, it may be noted from the pollen diagram that the clearance actually begins before the point where the zone boundary has been drawn, so it is possible that the latter part of the Heather-Ruderals Zone does include at least some of the period in question. At several other sites in the Egton and Glaisdale Moors area there is evidence for an increase in wetness corresponding with the major clearance of the Heather-Ruderals Zone. At St Helena, *Sphagnum* (bog-moss) and *Sparganium* (bur-reed) increase; at Blakey landslip, sedges increase and *Sphagnum* is high, while at Howdale Hill there is a slight rise in *Sphagnum*. All this suggests a Sub-Atlantic date for the Heather-Ruderals Zone, which probably begins during the climatic deterioration of the Iron Age, although it may also include later clearances, such as medieval ones.

To the north of the Esk valley there is a similar lack of radiocarbon dates for the period. At the Seamer Carr (Stokesley) former lake site, the first major clearance, with signs of both arable and pastoral agriculture, comes in SC13, the 'Oak-Alder-Ruderals' Zone. Jones (1976a) infers a late prehistoric context for this clearance activity: 'It is inferred that. . . Bronze Age and especially Iron Age inhabitants were responsible for the initial major phases of woodland removal.' Similarly, at West House Moss the major clearance of WH9 (the Heather-Ruderals Zone) is interpreted as Iron Age onwards in date (Jones, 1977a). On the Cleveland Moors, the Heather-Ruderals Zone is again thought to begin in the Iron Age and possibly includes the Romano-British period (Jones, 1978). The diagram from Ewe Crag Slack (Fig 21) perhaps illustrates the clearance best, with zone EB3 showing intense agricultural activity, including records for *Hordeum* (barley) together with charcoal deposits and evidence of soil erosion.

Summary of the palynological evidence

The palynological evidence for the Iron Age and Romano-British periods may be summarized as follows. There is very good evidence for a major clearance phase in the eastern part of the moors, clearly dated to the Iron Age and Romano-British periods at Fen Bogs and to the Iron Age onwards at Harwood Dale Bog. There is evidence for a major clearance phase elsewhere on the moors in the Heather-Ruderals Zone, together with some evidence for a climatic deterioration, which is probably from the Iron Age and Romano-British periods, although at Wheeldale Gill it may be slightly later. At other sites in the region, such as those described by Simmons (1969a), no firm conclusions may be reached about the correlation of pollen zones with these time periods. Taken together these lines of evidence indicate a significant and widespread impact on the environment of the North Yorkshire Moors during this period and at Fen Bogs and Harwood Dale Bog this impact represents the first major clearance phase in the region which can be firmly dated by radiocarbon assay.

The mechanism of change

The mechanism of environmental change during the Iron Age and Romano-British periods is likely to have been more intensive than in the case of the preceding Bronze Age clearances. In the profiles from the east of the area, the contrast with the major clearance beginning in the Iron Age is striking. Turner (1965) distinguishes 'small temporary clearances' from 'extensive clearances' according to the relative importance of the grass curve, and application of this criterion shows the phase in question to be the first zone which may be called an 'extensive clearance'. A sustained and large-scale impact is implied, such as might have been associated with longer-term settlement and agriculture. The settlement sites for the Iron Age tend to be peripheral to the high moors (eg Roxby, Levisham Moor), in places which would have enabled longer-term farming to take place, for instance on the more fertile soils developed over the Upper Jurassic Corallian rocks in the south of the region. The contrast between these more base-rich rocks in the south and the more acidic sandstones and shales further north has been an important one throughout the historical period and there is good reason to suppose that its significance was appreciated as early as the Iron Age and probably much earlier. From permanent farmsteads or groups of farms on the margins of the region, described in Chapter 6,

National Grid Reference: SE 901 903

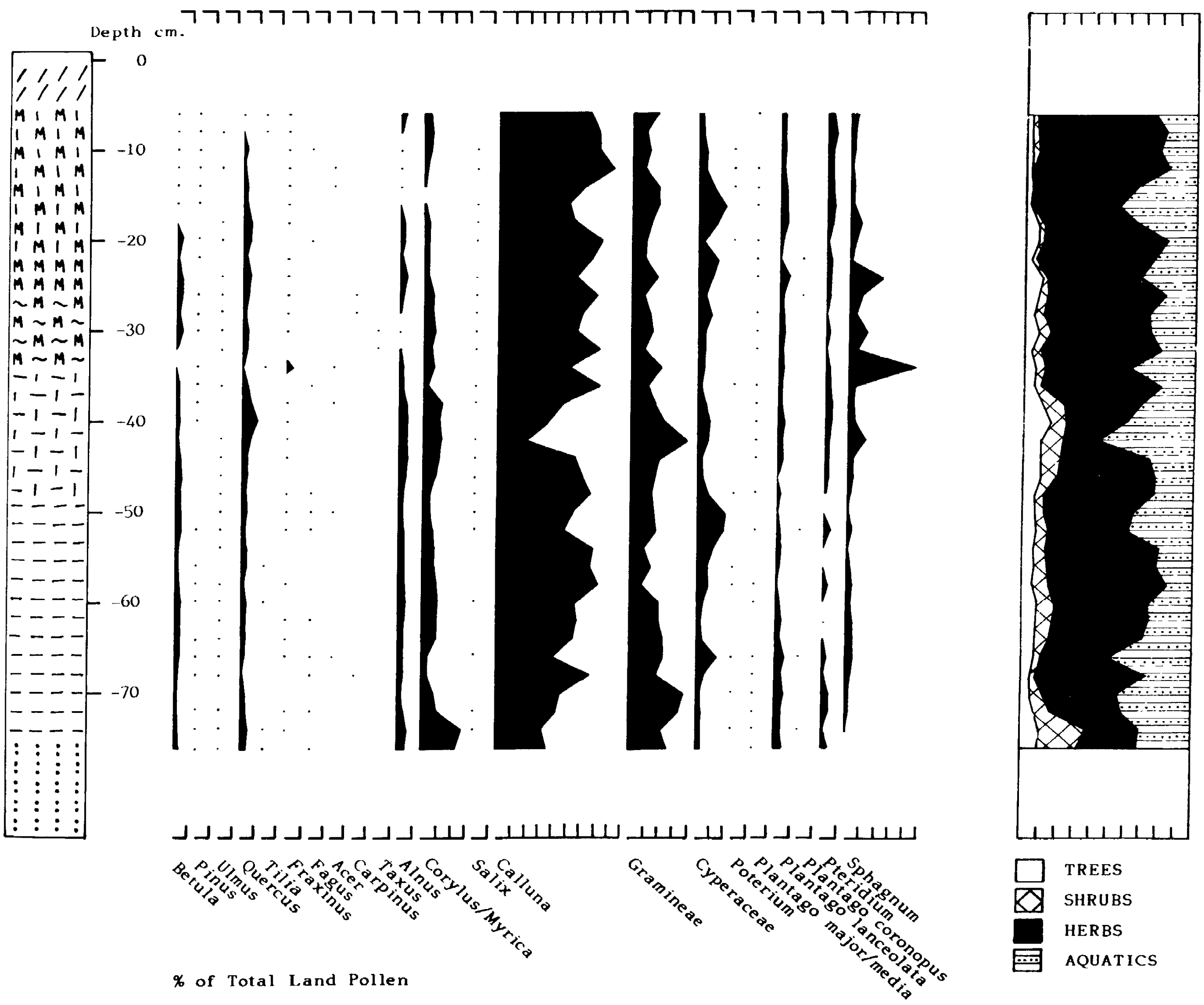


Figure 22 A pollen diagram at Seavy Slack. (Selected diagram: for original refer to J D Innes)

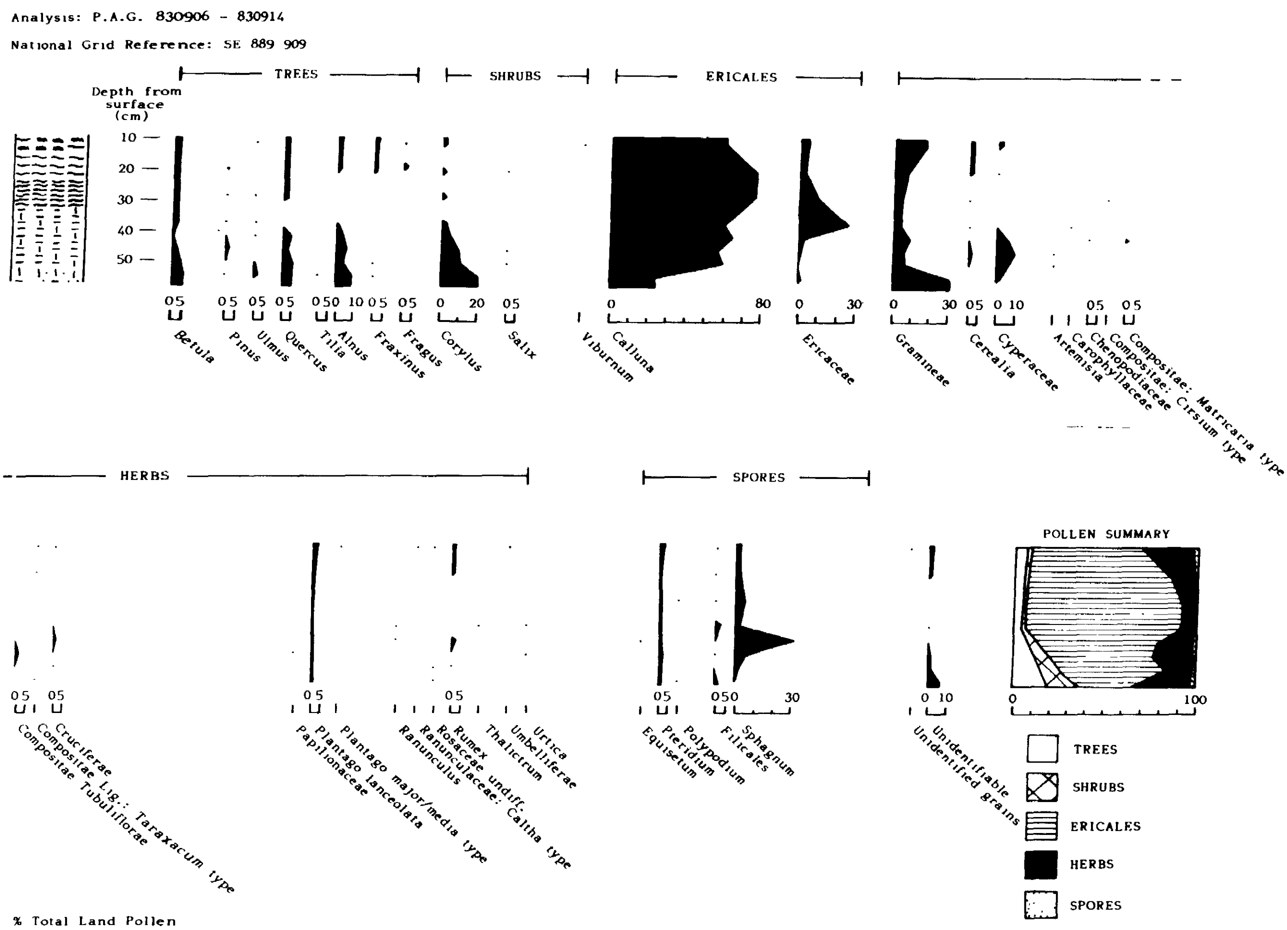


Figure 23 Pollen diagrams at Dargate Dykes

Iron Age inhabitants would have been well placed to exploit both the soils suitable for arable cultivation on the lower ground and the extensive grazing lands of the central moors. There is no need to postulate deliberate clearance of woodland for grazing on the high moors, as sheep or cattle grazing would effectively prevent woodland regeneration without resort to the use of the axe. The evidence from the pollen diagrams suggests just such a mixed agriculture, with a greater overall emphasis on pastoral farming, which is in keeping with the archaeological evidence for land use. The development of villas or native farms in the Romano-British period, probably stimulated by the presence of garrisons at Malton and York, might account for the increased emphasis on arable agriculture noted earlier at Fen Bogs towards the middle of Zone FB6. Again, the emphasis was on the Corallian rocks in the south of the region.

Another significant factor in the Iron Age and Romano-British periods would have been the development of iron smelting, as described in Chapter 6. Furnaces, such as those found at Levisham Moor, would have relied on charcoal for fuel. It has been suggested (Atherden, 1976a) that this might have involved clear-felling of substantial areas of woodland, leading to the sudden and dramatic decrease of tree pollen seen, for example, at Simon Howe Moss. On the other hand, it must be remembered that such furnaces may have served a very limited area, and may well have been less important in their impact on the local woodlands than the demand for fuel-wood for domestic use by a growing population. The interesting possibility arises also that woodlands were being managed by deliberate coppicing to provide wood for a variety of purposes on a sustained yield basis. This would have suppressed flowering of the tree and shrub species and

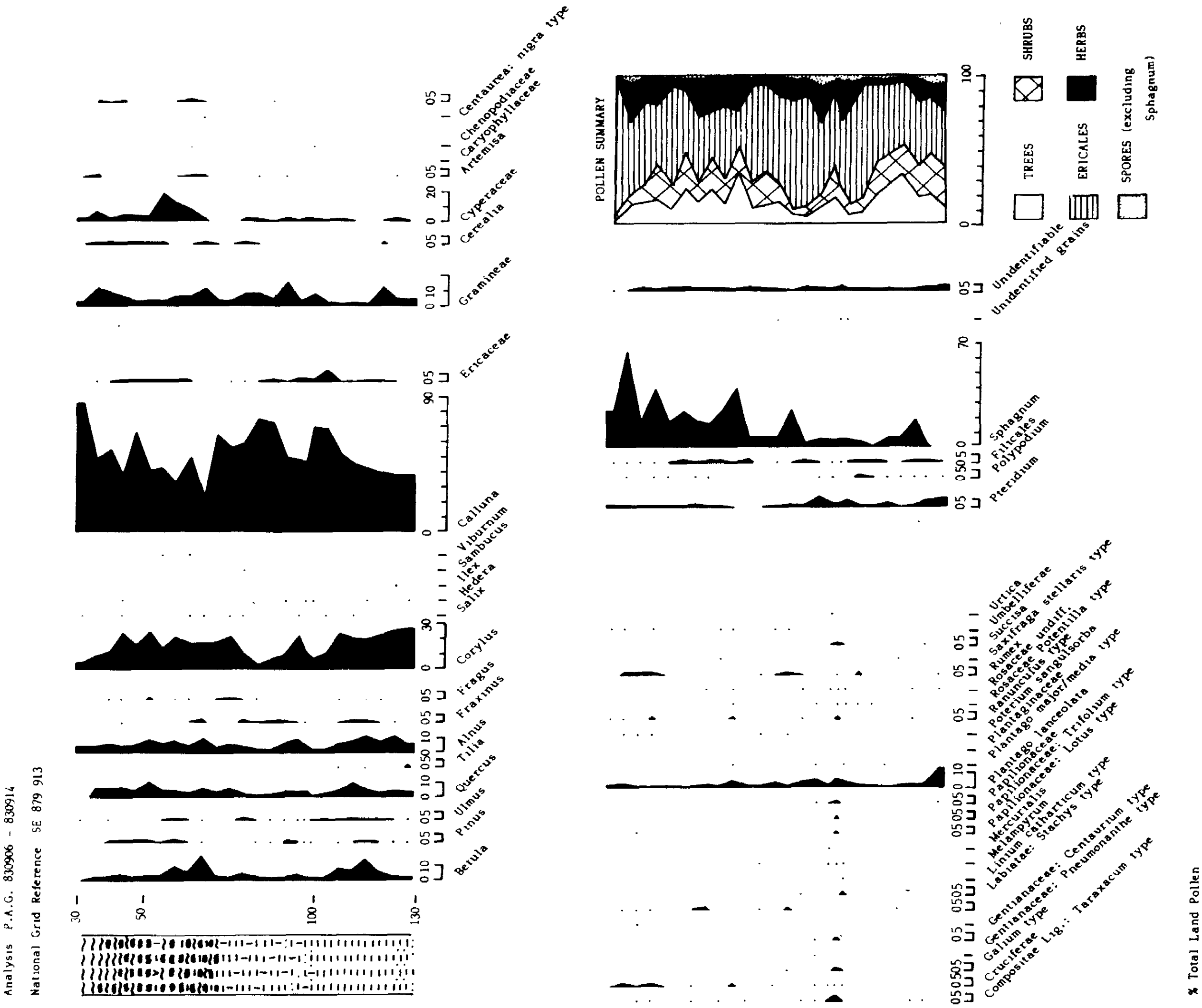


Figure 24 Pollen diagram at Yondhead Rigg

would be registered on the pollen diagrams as a decrease in tree and shrub pollen. Whatever the exact mechanism of change in the Iron Age and Romano-British periods, the scale of impact on the regional vegetation clearly indicates an increasing population and widespread exploitation of both upland and dale.

Changes in the soils

The changes in vegetation must have been accompanied by changes in the soils, although the evidence for these is less direct. Dimbleby's pioneering work on soils buried beneath Bronze Age barrows on the high moors established the nature of the change from pre-barrow forest soils, showing little sign of leaching, to the podzolized profiles characteristic of the area today, many of which show secondary features of surface gleying. However, this change cannot be dated exactly and there is no evidence as to whether it started as early as Iron Age times or even earlier. It seems probable, however, that the large-scale deforestation of the Iron Age and Romano-British clearances would have increased leaching of the soils and initiated such a change. In some areas soil deterioration may have started before the Iron Age, as is suggested by buried podzolized profiles under barrows on Cowesby Moor

(Abramson, 1981). Once leaching was accelerated, the nutrient status of the soils would quickly decrease and a fall in pH value would follow. This in turn would lead to less favourable conditions for the soil micro-organisms and a subsequent accumulation of raw litter, which would further increase the podzolization process.

Indirect evidence of the onset of podzolization comes from the heather curve on the pollen diagrams, as the dominance of heather nearly always leads to the development of a podzolized soil. Examination of the Fen Bogs diagram shows a significant rise in heather pollen at the end of the Romano-British period (Fig 17), and a similar expansion of moorland vegetation is seen in the corresponding zone at Simon Howe Moss (Fig 19). At Harwood Dale Bog (Fig 20) the heather curve is rising throughout zone HDB5, reaching a peak of 70% of total pollen at the top of the diagram. The rise of the heather curve in the top part of zone EB3 at Ewe Crag Slack may also be observed clearly (Fig 21). Podzolisation under a heather cover frequently leads to the development of an iron pan. Once formed, such a pan tends to impede the free drainage of water down the profile, leading to surface-water gleying. This evidence strongly indicates that the long-term effects of deforestation, whether by deliberate felling or by grazing pressure alone, were to lead to the spread of heathland vegetation on the uplands and the degradation of soils, involving a loss of base-status and a deterioration of drainage characteristics.

Conclusion

Thus the Iron Age and Romano-British periods emerge as the most significant of all the prehistoric periods for man's impact on the vegetation and soils of the North Yorkshire Moors. They represent the first extensive, long-term clearance in the eastern part of the region and probably in many other parts also, and changes were initiated during these periods which have not been reversed. After these periods, a limited regeneration of trees and shrubs is seen on the pollen diagrams, presumably concentrated in the valleys, but the rise of moorland pollen types shows clearly that much of the higher ground remained open and has never been recolonized by woodland. By the end of the period, something like the moorland landscape of today was beginning to emerge, although further periods of deforestation followed, for example during medieval times. It would be easy, however, to overestimate the importance of the Iron Age and Romano-British cultures themselves. It must be remembered that there is evidence for a climatic deterioration at the beginning of the Iron Age and that earlier cultures, such as the Bronze Age, had initiated the process of widespread vegetation change. The Iron Age and Romano-British periods may thus be viewed as the culmination of several millennia of increasing human impact on this upland area.

Limestone country

Most of the evidence for the palaeoecology of the uplands is from the moorland areas to the north of the oolite scarp. Attempts have been made to find deep deposits of peat in the more southerly hills, and indeed one such exists near Byland but was found in two independent investigations to be without recognizable pollen. Some small and shallow deposits of peat occur either as thin blanket peat (now mostly forested) or in valleys, and results from three of them are presented here for the first time. They are Seavy Slack (SE 901903, Fig 22), Dargate Dykes (SE 889909, Fig 23) and Yondhead Rigg (SE 879913, Fig 24). None of these diagrams has been radiocarbon dated (Simmons and Greatrex; Simmons and Innes; both forthcoming).

These three deposits were the closest that could be found to the linear dykes that traverse the landscape of this part of Yorkshire. It was hoped that some light could be shed upon the environment in which the dykes were constructed, but it has to be said that the amount of interpretation is rather limited, both in terms of vegetation history and chronology. The pollen spectra of Seavy Slack, for example, are closest in type to zone FB5-FB6 ie 2280-1530 bp, but no conclusions about Iron Age date should be drawn from that apparent correlation Likewise, Yondhead Rigg, at the base, looks like FB4, which starts in 3400 bp and therefore spans Middle and Late Bronze Age. What can be said more firmly is that all three yield evidence of open landscapes in which all the familiar traces of human activity like weed pollen, those of cereals, and the evidence of acid soils shown by *Calluna* pollen, are found. At some horizons, a calcicole like *Poterium sanguisorba* is also detected, suggesting that base-rich soils are also present in the vicinity of the sites. Overall, they add to the regional picture in suggesting that on the limestone hills as elsewhere the later prehistoric period was one in which the forest area had shrunk to remnants of a once-dominant ecosystem. Pollen analyses from buried soils beneath Bronze Age barrows on the Tabular Hills do not contradict this conclusion (Finney and Brewster, forthcoming).

6 Coda

The main outline of our story, whose detail is summarized in Fig 5, is clear. There are three main phases:

1 A pre-forest phase in which the vegetation was largely open and heath-like but which became forested mostly with deciduous trees in response to the amelioration of climate.

2 A stable state deciduous forest phase, established at the time of optimum climate during Flandrian II. This forest was typical of upland Britain, being dominated by oak and

hazel, and covered most if not all of the upland, though we are not certain just how total was the cover.

3 A disforestation phase when human activity, possibly in a time of climatic worsening, was responsible for the demise of most of the forest on the upland plateaux and some of the valley woodlands also, replacing it with agricultural land on a shifting or permanent basis, by grassland and heath, and allowing the formation of blanket bog.

One feature unites these phases: at no time since 10,350 bp (8400 bc), the date of the Kildale Hall aurochs-mire-charcoal complex, can we be sure that man had not been capable of altering the ecology of the region. For some periods we are virtually certain of this, of course: the later Mesolithic, the Bronze and Iron Ages and the Romano-British period. But for others, the evidence is thinner, more tentative and rather tantalizing, and never more so than in the earlier Mesolithic where we pick up hints of interference with vegetation during its period of succession from heath to high forest. The more we learn about the archaeology of the earlier Mesolithic, the more some man-directed change in among the natural successions seems likely. Again, the picture for the Neolithic is patchy and not well differentiated from terminal Mesolithic, and we could do with more closely dated pollen analyses here. More recent work, using the techniques of close resolution pollen analysis and a good density of radiocarbon dates, has been carried out at the North Gill site and will be published in due course by Simmons, Turner, and Innes.

Pollen diagrams from open and near-open uplands are difficult to interpret, but even so we can suggest that the Iron Age was without doubt the time of most extensive forest clearance. We are as yet uncertain as to whether the Bronze Age is a time of small or extensive clearances, or indeed both, but we do not think that it exceeded the Iron Age in intensity. Be that as it may, the division of prehistoric time into any set of periods must not obscure the fact that environmental change was virtually continuous, either from natural or man-made causes or a combination of both, with perhaps the period of slowest change in the wildwood of Flandrian II. Thereafter the magnitude of changes of vegetation and soil type is high and makes the present landscape an uncertain foundation for backward projection of factors of site, situation, and environment: wherever possible, direct site-related palaeoenvironmental evidence must be sought, rather than making extrapolated assumptions about the distribution of phenomena in the past. Even the shapes of the valley floor may have changed in prehistoric times: as K S Richards (1981) shows in Staindale, fluvial gravels 1.5m thick have accumulated above an alder stump dated to 4320 bc (HAR-3324), which may be calibrated to the fifth millennium BC. So Mesolithic and post-Mesolithic people may have altered even the geomorphology of the region — not surprising if we consider the changes in soil water balance and runoff resulting from forest removal.

So we know a lot, yet there is much to be found out. In the Vale of Pickering, for example, we are only at the start of the task of unravelling the human-environment relations in what was doubtless a complex and intricate mosaic of land, swamp, and open water. On the Moors, work as yet unpublished by Simmons, Turner, and Innes has further elucidated the human effect on vegetation during the later Mesolithic and Early Neolithic by using Close Resolution Pollen Analysis, which involves pollen counts every millimetre instead of the conventional 1 or 2 centimetres. This technique (see Simmons et al, 1989, for a brief introduction) reveals a wealth of detail about spatial and temporal change. Already, however, we can be confident when we say that we may use palaeoecological evidence to assert that not only are the North Yorkshire Moors now a man-made landscape but that they were certainly so in Neolithic and later Mesolithic times, and possibly changing in that manner in the earlier Mesolithic and terminal Palaeolithic. In his poem *Moors*, Ted Hughes (1979) says that they:

> Are a stage for the performance of heaven
> Any audience is incidental

But, in fact, this audience has had a major role in making the scenery.

Acknowledgements

Professor Simmons gratefully acknowledges the cooperation of A Greatrex, D J Lewis, C Pinder, S Smithson and the co-authors of this chapter in providing updated material and interpretations. We reiterate our thanks to those Research Councils and other learned bodies who have provided finance and also to the Vale of Pickering Research Trust for financing some of the individual pieces of work from that area, and the North York Moors National Park Committee for grants towards the work on the Tabular Hills.

Localities mentioned in Chapter 2

1 Pollen sampling sites

Bonfield Gill	SE 598958
Blakey Landslip	SE 674996
Bluewath Beck Head	NZ 735011
Burton Howes	NZ 607033
Collier Gill	NZ 786009
Dargate Dykes	SE 889909
Evan Howe Slack	NZ 923018
Ewe Crag Slack	NZ 695110
Fen Bogs	SE 853977
Foul Sike	NZ 916024
Gale Field	NZ 832005
Glaisdale Moor	NZ 728015
Harwood Dale Moss (Erdtman)	SE 9596
Harwood Dale Bog (Atherden)	SE 967988
Howdale Hill	NZ 646021
Kildale Hall	NZ 609097
Lady Bridge Slack	NZ 804018
Loose Howe	NZ 703009
May Moss	SE 876960
Moss Swang	NZ 806035
North Gill	NZ 726007
Seamer Carr (Scarborough)	TA 040830
Simon Howe Moss	SE 834978
Star Carr	TA 027810
St. Helena	NZ 683038
Tranmire Slack	NZ 766119
Trough House	NZ 704020
West House Moss	NZ 635095
Wheeldale Gill	SE 760997
White Gill	NZ 639026
Yarlsey Moss	NZ 762005
Yondhead Rigg	SE 879913

2 Other places

Bilsdale East Moor	SE 5997
Broxa	SE 9491
Danby Low Moor	NZ 7010
Egton High Moor	NZ 7500
Kildale	NZ 6009
Levisham Moor	SE 8292
Roxby	NZ 7616
Staindale	SE 8790
Westerdale Moor	SE 8690

3 The Upper Palaeolithic and Mesolithic periods

A seasonal pattern of group aggregation and dispersion is a very widespread characteristic of the kind of hunter-gatherer societies which first inhabited the area after the retreat of the ice. Martin (1974) found this to be the dominant pattern for an ethnographic sample of 90 such societies. Although it is by no means universal, we shall build our interpretations of Mesolithic sites in Yorkshire on aggregation/dispersion patterns, for it is difficult to interpret many of them other than as seasonal camps of varied sizes. We are fortunate that over much of the area there is sufficient environmental evidence to make plausible reconstructions of these patterns, basing them on the established data of plant and animal life and the seasonal calendar of plant yield and animal breeding and movement, as given in Chapter 2 and Figures 5 and 10. However, while such an ecological interpretation is clearly basic to our understanding, it is not the whole story. To be sure, if the settlement pattern does not enable the minimum subsistence requirements of the group to be met, then it must die in the short term, or move on. But the pattern must also allow the social requirements to be fulfilled, that is the arrangements for marriage and general communal harmony, if the group is to survive in the medium and longer terms. T D Price (1978) discussed the factors governing the optimum size of working hunting groups. The minimum size must be large enough to form a reproductive unit, but larger than a nuclear family because of unpredictable fluctuations in numbers. It must not be so large as to exhaust local resources and make impossible demands on mobility. But, Price continued, 'a subsistence unit cannot exist alone, however, it must function as a part of a larger breeding population to secure an adequate number of mates.' This view receives much support from anthropology. Conkey (1980) comments: 'There is more to aggregation/ dispersion than subsistence ecology . . . the social and ritual components of aggregations should not be minimised.'

It is clear that for several reasons we cannot assess sites of these periods in isolation, but only in relation to wider settlement patterns. This includes the pattern of the northward advance of settlement as the hunter/gatherers colonized from the south. At the interface between permanently settled areas and virgin territory we should expect to see (from south to north) three geographical zones, not necessarily in simple geometric patterns:

(A) The Settled Zone, with terrain occupied by both permanent and temporary settlements.

(B) The Exploitation Zone, perhaps some 25-75 km wide, with temporary seasonal camps based on the permanent settlements of the settled zone.

(C) The Exploration Zone, with a few reconnaissance camps only.

Unless we can conceive of mass migrations of total populations of hunter-gatherers, then the need of the migrating hunting groups to belong to a larger society can only be achieved by some such settlement structure. We shall see in the following sections that this conception does in a fair degree correspond to the pattern as we now know it in North Yorkshire.

1 The Late Upper Palaeolithic period (10000-7600 bc)

We have at present no record of Upper Palaeolithic (Creswellian) flints from the hills. It is difficult to be certain of their absence because of the indiscriminate removal of flints from moorlands, but the recent intensive studies have certainly failed to reveal them. There are, however, two small groups of flints from the north-east corner of the Vale of Pickering, from the neighbouring Flixton and Seamer Carrs near Scarborough. The nearest Creswellian site in eastern England is at Risby Warren in Lincolnshire (Dudley, 1949; Riley, 1978), some 70km south, though the Kirkhead Cave site in Cumbria is at a latitude similar to the North Yorkshire Moors.

The discovery at Flixton Carr (Fig 26) in 1948 showed that the Upper Palaeolithic hunters did penetrate at least into the southern fringes of the study area (J W Moore, 1954). Here a backed flint piece was found in a mud layer below a solifluction earth in association with the bones of several horses. The stratigraphical work of Walker and Godwin (1954) assigned the mud layer to the early part of pollen Zone III or the preceding Zone II, the vegetation being of grassland with birch and pine. At Site K on Seamer Carr (Fig 26) the Early Mesolithic site lay on top of aeolian sand varying in depth between 100 and 200mm which has been clearly dislocated by frost action. Beneath this deposit,

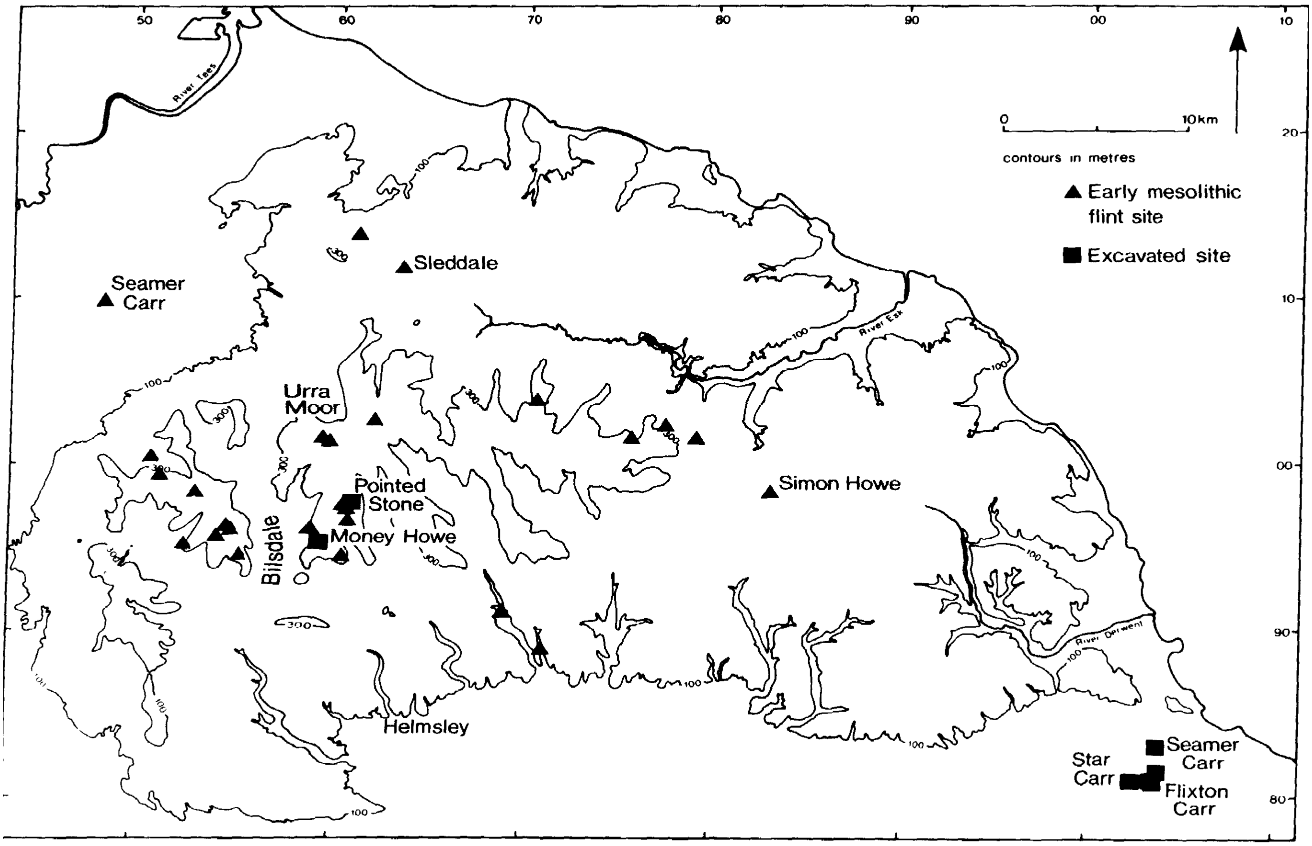


Figure 25 Distribution of Early Mesolithic sites (after R M Jacobi)

which is thought to be of Zone III date, a thin layer of peat has been dated to *c* 8350 bc and appears to be stratigraphically Zone II. The deposit sealed beneath the sand has produced some 500 pieces of worked flint and a stone-lined hearth. The material is characteristically Upper Palaeolithic (Schadla-Hall, 1987b). This discovery underlines the importance of the Flixton 2 site, as a Zone II site, and indicates the potential of the Vale for the archaeology of this period.

It seems therefore that in relation to the Late Upper Palaeolithic people, this area was in the Exploration Zone (C), activity being confined to sporadic forays into the southern fringe. Mellars (1974) comments on the versatility of the Creswellian hunters. They took a wide variety of animals, large and small, cold climate species including reindeer, open grassland species such as horse, and red deer. It is difficult to believe that they could not have lived successfully had they so wished in the open woodland of North-East Yorkshire which sustained a population of large animals, especially in the Alleröd warm period. The lack of occupation of this period in the study area therefore seems to be due to absence of population pressure or other reason to induce them to migrate northward from Lincolnshire. The Flixton/Seamer area, first explored by the Late Upper Palaeolithic hunters, was, however, to become an important habitation for the Early Mesolithic people many hundreds of years later.

2 The Early Mesolithic period *c 7600-6600* bc

The data on the Early Mesolithic period are presented in Table 2 and plotted on the map in Figure 25. Early Mesolithic sites are distinguished from the later by the differences in the microliths in the flint industries, as will be discussed in more detail. Briefly, the early microliths are generally larger and have simpler ('non-geometric') outlines than the later ones, as shown in Figure 27. The early sites can be broadly divided into two classes, lowland and upland. The data on the former comprise mainly those from the Star Can and Flixton sites investigated by J G D Clark (1954; 1972) and J W Moore (1950; 1954), which are the most completely preserved Mesolithic sites ever excavated in

Britain. They were found several feet below the modern ground surface on the north shore of the prehistoric Lake Flixton, and no doubt they are representative of more such sites which probably exist in the highly favourable situation on the northern margin of the Vale of Pickering from Helmsley eastward, and probably extending onto the areas now occupied by the North Sea. Recent excavations on and near the old shorelines at Seamer Carr, near Star Carr, have also shown concentrations of Early Mesolithic flints (Schadla-Hall, 1987a; 1988b; 1988a; 1988b). We can reasonably hope that more lowland sites will be found in the Vale of Pickering, and also in the Vales of York and Mowbray bordering the hills on the western side.

One or two minor surface sites have also been found on or near the Tabular Hills, but the upland sites are mainly concentrated on the sandstone moorlands, on and to the south of the central watershed. Data on these were assembled by Dr R M Jacobi, from his own excavations, from the excavations and surface finds of Mr. and Mrs G V Taylor and Mr and Mrs P Stonehouse, and from his study of earlier flint collections. Figure 25 is in fact nearly identical to that presented by Jacobi himself (1978). We must bear in mind that the site distribution on this map is based on the work of a very few assiduous fieldworkers and is therefore biased in various ways, and that it is also likely to be considerably augmented in future years.

The date-span for the Early Mesolithic in the area is a matter of considerable uncertainty. There are some radiocarbon dates for the sites, but it is not at all clear to what extent the characteristic flint industry overlapped in time with the preceding and succeeding hunter/gatherer periods. The dates currently available are:

Star Carr 7720 ± 120 bc (CAR 928); 7530 ± 100 bc (CAR 1025); 7550 ± 120 bc (OXA-1154); 7710 ± 110bc (CAR 930); 7750 ± 160 bc (OXA-1176) (Cloutman and Smith 1988)

Star Carr 7607 ± 210bc (Lab No Q-14) (Mellars, 1974)

Star Carr 7538 ± 350bc (Lab No C-353) (J G D Clark, 1954)

Money Howe, North Yorkshire Moors 7480 ± 390bc (Lab No Q-1560) (Jacobi, 1978)

Seamer Carr (Scarborough) 7380 ± 85bc (Lab No CAR 197) (Schadla-Hall, pers comm)

Seamer Carr (Scarborough) 6670 ± 80bc (Lab No BM1841) (Schadla-Hall, pers comm)

Seamer Carr (Scarborough) 7200 ± 95bc (Lab No CAR 196) (Cloutman, Chap 2)

Jacobi (1978) argues the case from these figures, coupled with Upper Palaeolithic industry dates of about 7900 bc from Anston Cave in South Yorkshire, for a rather late start to the Early Mesolithic period in North-East Yorkshire. Late, that is, by comparison with the early dates of this period in southern England (eg Thatcham has some dates prior to 8000 bc), but contemporary with Early Mesolithic sites on the Pennines (eg Lominot Site III 7615 ± 470 bc (Lab No Q-1187)). The flat radiocarbon curve at this period, however, precludes a definite proof of a difference between northern and southern England. The end of the Early Mesolithic period cannot be dated from sites within the study area, but, taking Britain as a whole, a date as late as 6600 bc is known for an Early Mesolithic site in Anglesey (Jacobi, 1976). Some Late Mesolithic Pennine sites date to about this time (Warcock Hill Site III 6600 ± 110 bc (Q-789), Broomhead Moor V 6620 ± 110 bc (Q-800) (Switsur and Jacobi, 1975)), though Filpoke Beacon in County Durham, a few miles north of the study area, dates to 6810± 410 bc (Q-1474, Jacobi, 1976). A Late Mesolithic flint assemblage from Seamer Carr (Scarborough), probably from a composite tool, has been dated to about 6000 bc (Cloutman, 1988). A date of 6600 bc reasonably represents the transition between the early and late periods. This is very approximately the date of substantial inundations of the North Sea, though the final severance of England from Continental Europe did not occur until later in the 7th millennium bc (Tooley, pers comm).

We now have in North-East Yorkshire some 30-40 sites of the early Mesolithic era, dating 7600-6600 bc approximately, which is proportionally commensurate with the 110-120 recorded for the much longer period of the Later Mesolithic (6600-3500 bc). We do not therefore see at present a vast difference in the rate of formation of Mesolithic sites between the earlier and later periods in this area, especially if we take into account the loss of early coastal sites by submergence in the North Sea.

The lowland site at Star Carr is extremely well known and well documented (J G D Clark, 1954) so that a description is unnecessary in this report. The excellent states of preservation of flint industry and animal and plant remains, and their detailed recording, make this the outstanding source of information for the British Early Mesolithic, so that it is not surprising to find it used as a source for reinterpretation many times, by Clark himself (1972) and in various aspects by Jarman (1972), Mellars (1976b), Jacobi (1978), Caulfield (1978), Pitts (1979), Mountain (1979), Simmons *et al* (1981), Andresen *et al* (1981), and Legge and Rowley-Conwy (1988). Clark's interpretation of the site, in the original 1954 report, was that it was occupied for periods in winter and spring and was abandoned during the summer, the evidence for seasonality being given as the growth of reeds above the occupation platform on the lake edge, and the presence of both shed and unshed red deer antlers, which implies occupation in about April and October-April respectively. The red deer was said by Clark to be the most important animal hunted, for food and for

Table 2 Early Mesolithic sites (north to south)

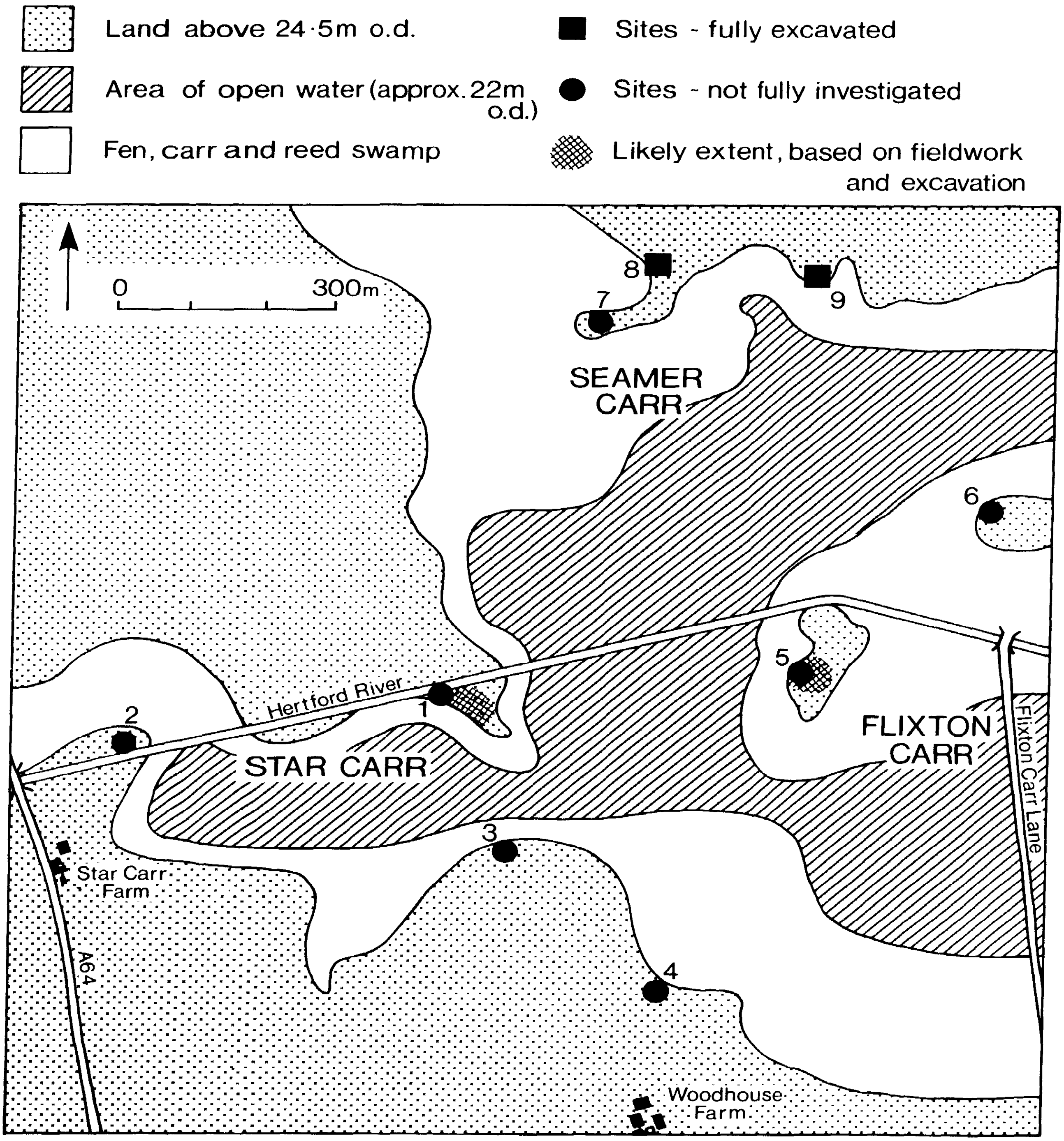
Place	OS Grid	Description	Reference
High Cliff Summit, Guisborough	NZ 610138	Blades, flakes, microliths, surface	Elgee, Middlesbrough Museum
Sleddale Side, North Ings	NZ 635115	Blades, flakes, microliths, surface	Burkitt collection, Cambridge
Stokesley, Seamer Carr	NZ 483098	Microlith, pick, surface	Spratt *et al* (1976)
Wolf Pit Howe	NZ 706037	1 microlith, surface	Elgee, Middlesbrough Museum
Greenhowe Moor	NZ 622025	Micro/blade core, blades/flakes, 8 microliths	Taylor
Egton Moor	NZ 775021	Blades, flakes, scraper, microliths, tranchet axe, gravers, micro and blade cores	Winstanley
Three Howes	NZ 792014	Blades, flakes, scraper, 26 microliths, surface, Taylor	
Yarlsey Moss	NZ 759014	7 micro and blade cores, 1000 blades/flakes, 9 scrapers, awl, 9 microliths, 7 micro-burins	York Museum
Badger Stone	NZ 595013	Blades, microliths, micro-burins	Taylor
Urra Moor	NZ 598012	Blades/flakes, 9 microliths, also geometric triangles	Taylor
Scugdale Nursery	NZ 519002	Microliths, surface	Taylor
N Arnsgill Ridge	SE 515992	Micro/blade cores, blades, flakes, scrapers, microliths, 4 sites in erosion patch	Taylor
Arnsgill Ridge	SE 533982	Micro and blade core, blades, flakes, microliths, surface	Taylor
Simon Howe	SE 831982	Adze sharpening flake	
Pointed Stone	SE 608975	Excavated	Taylor
Bransdale Ridge	SE 606974	Micro and blade cores, blades/flakes, 1 microlith, also geometric flints	Taylor
Bransdale Ridge	SE 605973	Flakes/blades, microliths, scrapers	Taylor
Bransdale Edge	SE 607966	Surface finds, microliths, blades, flakes, micro and blade cores	Taylor
Bilsdale W	SE 550962	Surface blades, flakes, microliths	Taylor
Bilsdale E	SE 590960	Blades/flakes, microliths	Burkitt collection, Cambridge
Bildsale E	SE 590690	Flakes, scrapers, gravers, micro and blade cores, blades	Taylor
Bilsdale W	SE 552960	Micro and blade cores, burins, flakes, microliths, surface	Taylor
Bilsdale W	SE 545955	8 microlithic and others, also geometric flints	Taylor
Money Howe	SE 595951	Excavated scrapers, microliths, micro/blade cores, blades	Taylor
Cow Ridge	SE 526951	Flakes, scrapers, gravers, 27 microliths, microburins	Taylor

Place	OS Grid	Description	Reference
Bilsdale E	SE 604945	(1) Blades, flakes, microliths, also geometric (2) Blades, flakes, microliths (3) Blakes, flakes, micro-burins	Taylor
Bilsdale W	SE 558944	Surface, micro/blade cores, blades, flakes, scrapers, 2 microliths	Taylor
Grouse Hall	SE 690908	1 microlith surface	Ryedale Folk Museum
Ox Close	SE 710887	1 microlith surface	Ryedale Folk Museum
Seamer Carr	TA 040830	Scatter of flints on old lake shore	Schadla-Hall (1987a; 1987b; 1988a; 1988b)
Flixton Site 3	TA 040813	Tranchet axes, cores, blades, flakes. microliths. scrapers	Scarborough Museum; Moore ,J W (1950: 1954)
Flixton Site 1	TA 034810	Blades, flakes, microliths, scrapers cores tranchet axes	
Flixton Site 2	TA 034810	Blades, flakes, microliths, scarpers	
Star Carr	TA 027810	Wide and prolific variety	Clark J G D (1954)

Note: Abbreviations: 'micro-core' means core with microlith scars, 'blade core' is a core with blade scars, 'micro/blade core' has both types of scar, 'micro and blade cores' means both types of core present.

preparing antler barbed spearheads, but a wide variety of remains of other animals was also found, both large (eg elk, aurochs, roe deer) and small (eg hare, fox, beaver). Clark reinforced his ideas in his 1972 appraisal and suggested that the summer camps of the group might have been on the North Yorkshire Moors, an idea which was soon afterward supported by Jacobi's (1978) work. Clark's ideas have been widely accepted, among others by Jarman (1972), Mellars (1976b) and Mountain (1970). Jacobi's (1978) views are also in general agreement, but he suggests from a simple fauna1 analysis that the animals on the site had been killed elsewhere; in this case only 25 deer are represented, compared with Clark's estimate of 80, the difference being a reflection of the antlers and skulls brought to the site. Jacobi also thought that occupation continued into early summer on account of the presence of newborn calves of elk and roe deer which must have been taken in May or June. Clark's conclusions have, however, come under more radical challenge in recent years, both with respect to seasonality of settlement and the dominance of the red deer. Simmons *et al* (1981) doubt whether absence in the summer months can be convincingly demonstrated, especially because of the presence of unshed antler of roe deer and the bones of the crane, a summer migrant. The most significant reinterpretation of Star Carr based on the re-analysis of large mammals (Legge and Rowley-Conwy, 1988) has called into question the original interpretation offered by Fraser and King (in Clark, 1954), which suggested that occupation took place from October to April. Legge and Rowley-Conwy suggested a minimum period of occupation of between May and August, almost the exact reverse of that originally proposed; they also suggest that the shed antlers cannot be included in any discussions of seasonality or indeed sex ratios. Their important re-analysis also proposes that the amount of meat available from the bone recovered from the site should be revised downwards, and they conclude, for different reasons from those of Andresen (1981), that the site is best interpreted as a hunting camp where meat was removed to a base camp elsewhere; their work, which includes a comparison with a Numamiut hunting camp, has thus not only underlined the importance of the original excavations at Star Carr, but also removed one of the major planks of our assumptions of the Early Mesolithic. There is little doubt that in the immediate vicinity of Clark's original excavation on Star Carr there is further evidence for human activity on an intensive scale, and it is also apparent that much of the site on the higher ground immediately north of Clark's excavation was destroyed by the construction of the Hertford river, so that the exact status of this important site remains unclear. It is also worth stressing that the analysis of the fauna1 remains alone (Legge and Rowley-Conwy, 1988) does not preclude occupation of the site at Star Carr all year round. Legge and Rowley-Conwy made the important point that red deer were likely to move around in extremely small numbers, and would not necessarily be a preference animal.

More recent excavations by Schadla-Hall (1987a; 1987b; 1988a; 1988b) within the Vale of Pickering and around Star Carr are indicating an increasingly complex series of occupations; two sites on Seamer Carr (C and K) have both produced evidence of temporary occupation, presumably representing



1 Starr Carr (Clark 1954; VPT fieldwalking and limited excauation; Moore (1950) site 4
2 Moore (1950) site 9; VPT subsequent excavation
3 VPD; VPT excavation
4 VPJ; VPT excavation
5 Moore (1950) site 1
6 Moore (1950) site 3; subsequent VPT excavation
7 Site D, Seamer Carr (Schadla-Hall, 1989)
8 Site K, Seamer Carr (Schadla-Hall, 1989)
9 Site C, Seamer Carr (Schadla-Hall, 1989)

VPT — Vale of Pickering Research Trust

Figure 26 Early Mesolithic sites located in the Vale of Pickering (T Schadla-Hall) more than a single incident, associated with relatively small quantities of fauna1 material. Neither of these sites is topographically in a similar position to Star Carr - both are a long way from open water. Palaeoenvironmental work in the Vale (Cloutman, 1988, Cloutman and Smith, 1988) has also finally established just how variable the local topography within the Vale is - and how small the water bodies probably were. The recent work of the Vale of Pickering Research Trust (Schadla-Hall, 1988a; 1988b; pers comm) has located at least two sites south of Star Carr (VPD and VPJ) on the other side of a small lake, and made it possible to fix the location of J W Moore's Site 9 (Moore, 1950) and also tentatively Moore's Site 3 (Moore, 1950). It is now increasingly clear that sites 3 and 1 are both on islands surrounded by water for part if not all the year; Site 1 can now be shown to cover an area of at least 1000 sq m from test excavations alone. Old models of seasonal movement, and indeed the assumption of Star Carr as some form of base camp, no longer seem to be so secure. A clear need is now emerging for further work to be done on additional fauna1 assemblages of the other known sites, as well as the flint analysis. Recent indications are that the peat deposits of the Vale are drying out at a rapid rate, and yet paradoxically this is one of the few areas in North Yorkshire where it might be possible to recover macro-fossil material which might also give some form of clue as to the vegetable content of Early Mesolithic hunter/gatherer diets. We must now turn, however, to the evidence of the upland sites.

Two important points need to be stressed concerning the environment of the high moors at this time, ie about 7500 bc. Firstly, neither they nor the upper reaches of the valleys were occupied by closed forests, as is made clear in Chapter 2. Whereas the lowland carried a thick forest predominantly of birch with willow, hazel, and pine as minor complements, the uplands were of birch and hazel scrub with a ground layer of smaller plants, particularly passes and bilberry. Mellars (1974) makes the point that the density of animal populations is generally much greater in open rather than in a closed forest. This may well be a reason for the evidently great attraction of the North Yorkshire Moors to Mesolithic peoples and why, as discussed in Chapter 2, the hunters sought to keep the terrain open by periodically burning the vegetation. The second point is that, although the climate was improving rapidly in the Early Mesolithic period, the open uplands would still have been extremely unattractive for much of the year owing to the very cold and exposed conditions. Estimates of prehistoric summer and winter temperatures are given for both highland and lowland zones by J A Taylor (1975). Although there must be some degree of uncertainty in the figures, there is no doubt that average winter air temperatures were much lower in the Early Mesolithic period than at present, by some 7ºC, and that whereas the difference between average summer and winter temperature is at present some 12º, it was of the order of 18º at that period. The high moors would therefore have been extremely unattractive to both men and animals in wintertime compared to the nearby lowland. Even at the present time, conditions on the moors are often harsh between early November and the end of April, and would have been so in Early Mesolithic times for much longer. If a seasonal settlement pattern is taken as the norm, then it seems reasonably certain that the upland camps could only have been occupied from about June to September inclusive. It now seems likely that lowland sites were used throughout the year and absences in the winter months seem improbable, unless they were caused by migrations southward, an unlikely intrusion into the hunting territory of other groups.

Our interpretation of the moorland sites must at this stage be tentative on account of the interim, and archaeologist-related, nature of Figure 25.

Table 3 Deepcar sites

Name and location	Microliths	Scrapers	Burins	Micro-burins
Lowland sites				
Brigham, E Yorkshire	69	53	14	0
Willoughton, N Lincolnshire	45	48	9	9
Hart, County Cleveland	3	7	5	—
Upland sites				
Money Howe, North Yorkshire Moors	115	3	3	33
Deepcar, Pennines	68	37	8	102
Lominot 2, Pennines	10	7	2	
Lominot 3, Pennines	34	24	0	22
Windy Hill, Pennines	33	24	8	27
Warcock Hill. N Pennines	60	32	5	23

Those known at present are concentrated on the high ground (above 350m) both to the west and east of Bilsdale and in addition there is a scatter of sites along the watershed from Urra Moor to Simon Howe. A good proportion of these sites also contain the geometric flints of the later period and there is a certain similarity between the distributions of Late and Early Mesolithic flints, as will he seen by comparing Figures 25 and 28. The main difference, apart from the greater numbers of late sites, is that the early sites are situated mainly on and to the south of the watershed, whereas the late sites are more symmetrically disposed both north and south of, as well as on, the watershed. The early sites which do lie to the north of the watershed as at Seamer Carr (Stokesley) and Sleddale are minor ones. In point of fact, there are very few early sites in northern England north of the Cleveland watershed. Jacobi (1978) is able to enumerate only three sites north of the river Tees from Monkwearmouth, Gateshead and Spindleton, Northumberland, all minor and rather doubtful ones. But Weyman (1984) also describes a collection by Trechman from Hart, near Hartlepool, of 524 flints as Early Mesolithic. It seems therefore that during the Early Mesolithic period, Zone (A) of permanent and temporary settlement moved to a northern limit at the Vale of Pickering, Zone (B), of exploitation sites only, extended north from here to about the line of the watershed, and Zone (C), unoccupied except for exploratory sites, perhaps for some 100km northward. As with the Late Upper Palaeolithic situation, there appears to be no environmental factor which would have prevented the hunting groups from living further north, had they so wished, and an absence of population pressure for northward migration seems a reasonable deduction.

While the distribution of sites in the north/south direction seems understandable, that in the east/west direction is not so at the present stage of discovery. If some Star Carr hunters migrated to the hills in the summer months, then one would expect their sites to be found in the eastern parts of the moors, where at present they are unknown. The anomaly appears to be a function of the areas searched and recorded, rather than a true reflection of Early Mesolithic activity.

Jacobi (1978) has given some details of the excavation results of three upland sites, from his joint work with Mr and Mrs G V Taylor at Pointed Stone 2 and 3 at 410m above sea-level, and from the Taylors' at Money Howe at 340m, some 3km south- west across the moor from Pointed Stone. All three sites were about 30sq m in area, scatters of flint and boulders on the sandy surface below the eroded moorland peat, and differing in detailed geometry. There were no stake holes, and the presence of hearths had to be inferred from concentrations of fire-cracked flint. They are difficult to interpret, if only for the reason that it is uncertain how many times they were occupied. The important information therefore consists in the analyses of the flint industries, about 2000 and 5000 flints from Pointed Stone 2 and 3 respectively. The Pointed Stone sites have Star Carr type microliths, about 50% obliquely blunted points, 20% triangles, and 20% elongated trapezes. There are, however, very important differences between the ratios of different worked flints between the Pointed Stone and Star Carr sites:

(1) The microlith/scraper ratio for Pointed Stone 2 and 3 are 15:l and 8:1, compared with 0.6:1 for Star Carr.

(2) The numbers of micro-burins at the Pointed Stone sites are commensurate with the numbers of microliths, but at Star Carrs they comprise only about one tenth of the microlith numbers.

(3) Whereas the number of burins at Star Carr were commensurate with the numbers of scrapers and microliths, there were none at Pointed Stone 2 and only one from Pointed Stone 3. Thus there is little evidence of bone- or antler-working at Pointed Stone.

It has been reasonably concluded by Jacobi (1978) that whereas the Star Carr site was concerned with butchering and the preparation of hunting equipment, the upland sites were concerned mainly with hunting, using flint equipment made on the site, and with only a small amount of domestic activity. The new interpretations and discoveries in the Vale of Pickering, however, make this conclusion less certain. Perhaps the best interim interpretation is of upland hunting camps and in the lowlands camps with various functions, probably with people permanently in the area.

The Money Howe site, dated to about 7500 bc, has an Early Mesolithic industry, slightly different from Star Carr, but more similar to that excavated on the southern Pennines at Deepcar (Radley and Mellars, 1964). The 'Deepcar' microliths comprise almost entirely obliquely blunted points, some of which are different from their Star Carr equivalents in having retouch on both edges of the points, and some of which have retouch along a complete edge of the microlith, both features missing at Star Carr. It was thus possible for Jacobi to distinguish in the uplands the two types of Early Mesolithic flint industry, the 'Star Carr' sites and about twenty 'Deepcar' sites, but there does not seem to be any difference in the geographical distribution of the two types. As with 'Star Carr' sites, there are important differences between the flint industries of upland and lowland 'Deepcar' sites, as shown in Table 3.

It is clear that the Money Howe site, with its high microlith/scraper ratio, should be regarded, like the Pointed Stone sites, as a hunting camp with little food preparation, and its high proportion of micro-burins indicates that the microliths were made on the site. The upland sites contrast strongly with the lowland, which have equivalent numbers of microliths and scrapers and low numbers of micro-burins, closely resembling the numerical proportions of the industry at Star Carr itself.

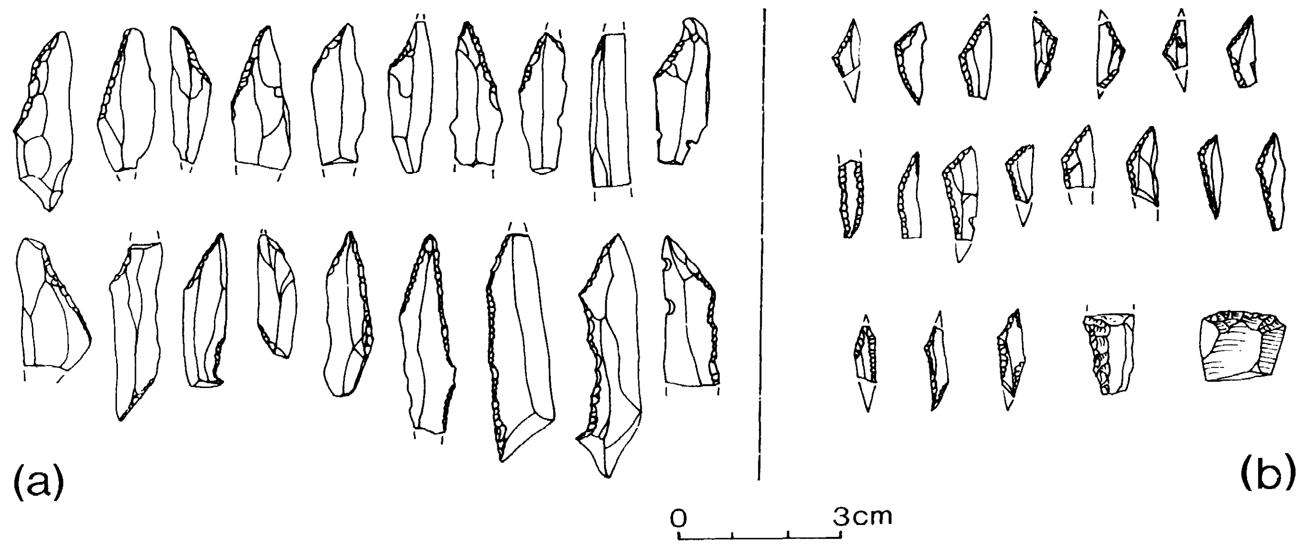


Figure 27 Comparison of (a) Early and (b) Late Mesolithic microliths

Thus there are in northern England both lowland sites concerned with food and weapon preparation and upland hunting stations of both 'Star Carr' and 'Deepcar' types, The lowland 'Star Carr' sites are at the type-site itself and at Flixton and possibly at Seamer Carr (Scarborough), though the latter is uncertain at present, and there are several lowland sites in North Lincolnshire; the upland 'Star Carr' sites are on the North Yorkshire Moors and at least one is known on the Pennines at Warcock Hill South (Radley and Mellars, 1964). The lowland 'Deepcar' sites are at Brigham in East Yorkshire (Manby, 1966), Willoughton in North Lincolnshire (Armstrong, 1932), and Hart in County Cleveland (Weyman, 1984); there are a number of upland 'Deepcar' sites both on the North Yorkshire Moors and on the Pennines. Jacobi (1978) and Radley and Mellars (1964) observe that the 'Star Carr' sites use translucent flint of unknown origin, while on 'Deepcar' type sites mainly the opaque white flint of East Yorkshire and Lincolnshire was worked. The 'Deepcar' and 'Star Carr' hunters seem to have had similar lowland territories and their upland hunting sites are in the same areas of the Pennines and the North Yorkshire Moors. The few radiocarbon dates available tend to suggest that the two groups were contemporary. A possible explanation of their territorial overlap is that in the Early Mesolithic we are seeing a frontier situation in northern England, so that hunting was of an entrepreneurial character in true frontier fashion, with no established territorial divisions. If this is so, we should expect a somewhat different pattern in the Late Mesolithic period when North-East Yorkshire was not on the northern limit of settlement.

What is undoubtedly true is that from the earliest human settlement in this area an economy was established which exploited the whole terrain, both highland and lowland. We shall see this repeated in different forms for all the succeeding periods.

3 The Late Mesolithic Period, 6600-3500 bc

The long era of the Late Mesolithic spans the greater parts of two climatic periods, the Boreal and the Atlantic, during which there was a vast change in the environment, as discussed in detail in Chapter 2. The average temperatures which had started to rise very rapidly in the Early Mesolithic, continued this trend in the Late Mesolithic. In its last two millennia, at the time of the 'optimal' post-glacial climate, average temperatures were in fact one or two degrees centigrade above those of the present day (J A Taylor, 1975). The birch woodland on the moors changed first to a pine-hazel forest and finally in the Atlantic period (4700 bc onward) to a mosaic of open mixed oak woodland with transient open areas of grass and heath land in which the closed forest did not apparently reach the highest ground. In the valleys and on the surrounding low-lying areas there was a similar and rather earlier development, but here the forest was more varied in composition and probably formed a thicker canopy than the forest on the higher hills. Interference by Late Mesolithic groups is more apparent in the open hill woodland, where there is good evidence of repeated forest burning, soil erosion by wash down the hill slopes, and the beginning of peat formation, perhaps connected with human activity. The open hill woodland would seem to be the most productive for hunting (Mellars, 1976a) and possibly for gathering of hazel nuts, for the hazel flourishes best in the open woodland and regenerates vigorously after burning. From about 6000 bc the climate on the

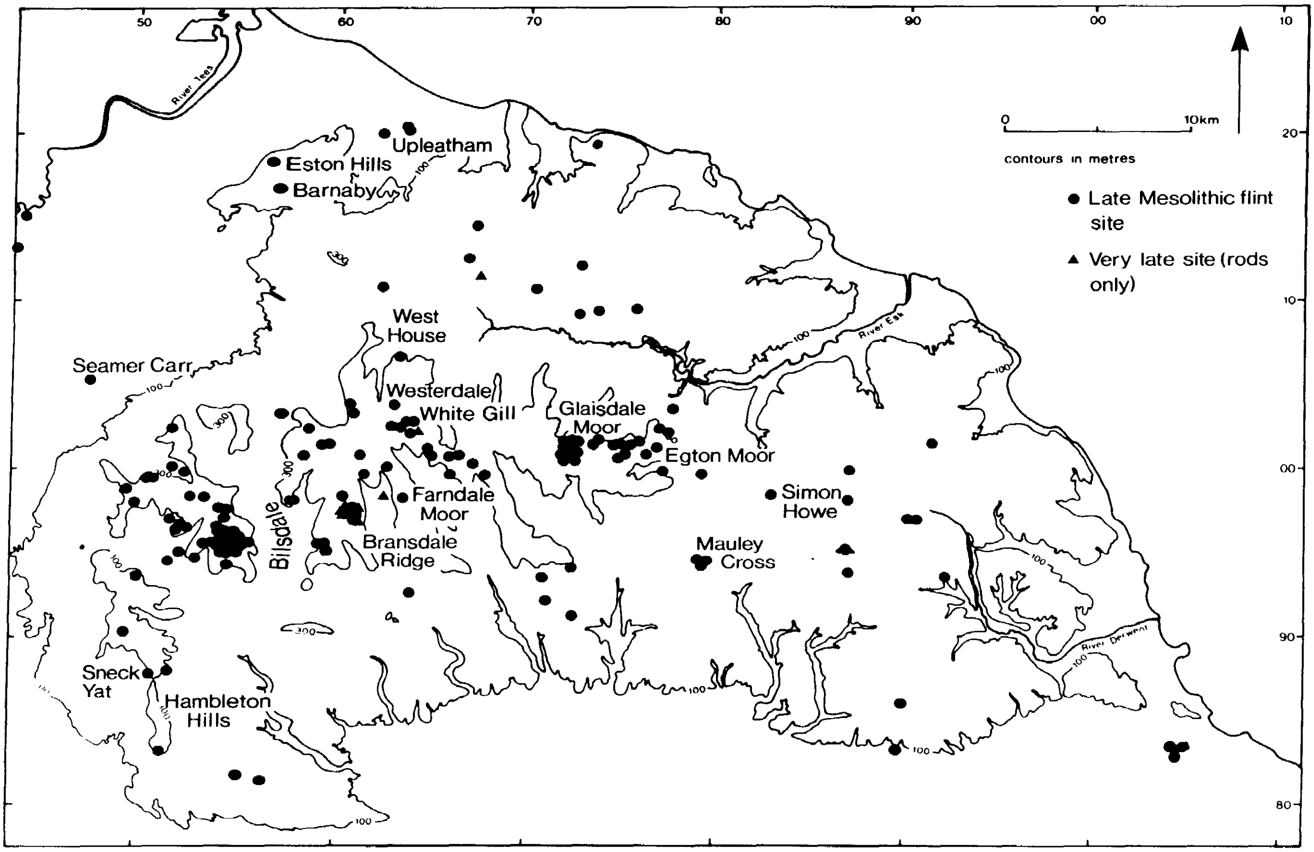


Figure 28 Distribution of Late Mesolithic sites

hills would have been similar to that of the present day, and indeed from 5000 bc would have been warmer, so that activities could be extended there over many months.

During the Late Mesolithic period the British Isles became completely populated, even, it is argued, overpopulated (Bradley, 1978), leading, for example, to greater use of coastal resources. North-East Yorkshire was therefore no longer a frontier zone and fell completely into the settled zone (A) of permanent and temporary camp sites. This is apparently reflected on the local scene by a more balanced distribution of sites in this period, as shown in Figure 28. Compared with the Early Mesolithic period, we have major sites to the north of the watershed, as well as on, and to the south of it, and there are major Late Mesolithic sites at intervals along the Durham and Northumberland coasts.

The later Mesolithic flint sites are differentiated from the earlier by the forms of the microliths; other types of flint artefacts are not diagnostic. A detailed description of the flint industries is not necessary in this review, but comparison of the early and late microliths is given for reference in Figure 27. The reasons for the change from the early large, simple microliths to the late small, varied forms are not understood at present, but they are likely to be complex in view of the diverse possible uses of microliths (D L Clarke, 1976). It may partly reflect a change from heavy standardized projectiles to lighter, more varied ones, and this in turn may be a function of hunting tactics in the more dense forest conditions of the Later Mesolithic and perhaps more reliance on taking smaller animals as population pressure grew; or, as suggested by Mellars (1976b), the smaller microliths might have been used in replacement of the early antler barbs. It is a complex problem which might be studied experimentally. There is also some evidence for greater use of microlithic rods in the last stages of the Late Mesolithic (Switsurand Jacobi, 1975). Rocher Moss Site II and Dunford Bridge B, both in the Pennines, produced only rod microliths and no triangles, and were dated 3880 ± 100 bc (Q-1190) and 3430 ± 80 bc (Q-799). Sites with predominance of microlithic rods are known on the North Yorkshire Moors, particularly on Bransdale Ridge (Jacobi, pers comm), and also at Westerdale (Radley, 1969) and Simon Howe (Hayes, 1988, 16–19).

The date-span of this period is somewhat uncertain, and the extent of overlap with the Early Mesolithic and with the Neolithic may be considerable. A date about 6600 bc seems appropriate for the commencement (see above), and the dates given in the previous paragraph indicate an overlap into the Neolithic, which is now generally taken as starting at about 3500 bc. Certainly there is much evidence of continuous use of the locations of the upland and lowland Mesolithic sites, from the Early Mesolithic through the Late Mesolithic to the Neolithic and even to the Bronze Age, as shown by the presence of projectile flints of all these periods on the sites (see Figure 31 and Tables 2; 4-6). Their presence can hardly be fortuitous, for the same is found on the Durham and Northumberland Mesolithic sites (Weyman 1984, 49), and indeed widely throughout Britain.

An accurate classification of the Late Mesolithic sites is scarcely possible because of the indiscriminate and usually unrecorded removal of flints (Hayes, 1988, 1). From the present data, we may however allocate the sites broadly into three groups.

Very large moorland flint areas

Some of the sites on the high moors recur repeatedly in the records of collectors, and it is apparent that we are dealing with areas which were revisited by the hunters many times. White Gill, for example, is a large amphitheatre containing many small flint sites, each a few metres across, although large areas of flint are also found, for example at Nab End Moor (Radley, 1969a). Sites are also repeatedly recorded from Sneck Yat, Bilsdale West, Bilsdale East, Bransdale Edge, Westerdale Moor, Farndale Moor, Glaisdale Moor, Egton Moor, Simon Howe and Mauley Cross, all sites except the last named being on the watershed. The Mauley Cross site is a concentrated oval area of flints 400m north-south, by 250m east-west. Simon Howe is also a restricted area 150m by 50m. Hayes (1963) comments that many of the scatters on the high ridges are plentiful in flint and within a few square feet in area. Investigators on the Pennines have also shown that many Mesolithic sites occur 'in groups or clusters, sometimes of over 50 find spots on a single hillside' (Jacobi et *al*, 1976). These authors also record a reduced forest cover on the southern Pennine uplands, where the Mesolithic sites are concentrated, and evidence of periodic forest burning, an environment similar therefore to the Late Mesolithic in North-East Yorkshire.

Badley (1969a) records classifications of samples of the flint industries from three of these large sites. Out of 7700 flints collected in an area 50m across at White Gill, 837 were microliths, compared with 18 scrapers, 6 burins, 132 long blades, and 70 other tools. At Farndale Moor, from 2100 flints, 58 were microliths, 2 scrapers, 3 burins, 157 long blades and 18 other tools. From 2000 flints at Mauley Cross 229 were microliths, 8 scrapers, 2 burins, 15 blades and 19 other tools. Clearly there are vast preponderances of microliths. Hayes' (1988) descriptions of Simon Howe and Bransdale Ridge sites also show a great numerical preponderance of microliths over scrapers and other tools. In Mellars' (1976b) general classification scheme for British Mesolithic sites, we can think of these as extensive concentrations of Type I and Type II sites and with regard to their industries as Type A (microlith-dominated assemblages).

Lowland sites

The best-known lowland sites of the later Mesolithic are those in the Upleatham complex (Spratt *et al*, 1976). Though these comprise only ploughed-out flint sites, they had not been discovered previously, and yielded good samples of complete industries. They were balanced (Mellars Type B) industries, and the variety of tools gave the impression of diverse activities on the site, of which food preparation was important, as witnessed also by the large number of flint hearthstones. It is difficult to assess the original size of ploughed-out sites, but whereas Upleatham II was a confined circular area of some 1250 sq m, Upleatham I was 6000 sq m. Possibly the former had been a small Class I site, the latter a Class II. The flint was mainly the mottled grey Wolds flint, similar to that found on the moorland sites. The situation, on the crest of the Upleatham Hills, a northern outlier of the North Yorkshire Moors, enabled it to be a visual link between the high moors and the Durham coast, north of the river Tees. The Upleatham sites themselves can be classed as coastal, lying only two miles inland from the present coastline. Other lowland sites of this type are on the Eston Hills, an outlier of the Cleveland Hills, and at a Bronze Age ritual monument at Street House (Vyner, 1988a).

Riverine and lake sites

There is a certain amount of evidence of Mesolithic activity from the Tees basin: a human skull and red deer bones were found in the alluvium -10m OD beside the river at Billingham, and part of a tree trunk hollowed out by human agency, probably a fire-making device, came from the same layer at Ormesby (Agar, 1954). Scatters of flint, including microliths, have been found on the high ground immediately adjacent to the flood plain of the river, between Thornaby and Yarm (Spratt *et al*, 1976). These are diffuse dispersions of flint, rather than evidences of major settlement, more consistent perhaps with periodic visits to fish the salmon runs. It is of course impossible to know whether this is the only kind of site on the river, since others might well exist well below the present ground surface, and in any case most of the river banks have been heavily urbanized and industrialized, Search along the banks of the Leven, an almost entirely rural tributary, has however so far only yielded odd flints of uncertain age. The same impression of minor activity was gained from searches around the small prehistoric lakes. West House Carr at Kildale yielded no flint finds of any kind either on the surface or by probing with a large auger; Seamer Carr near Stokesley was surrounded on all sides by scatters of flint, and the north bank gave a Star Carr type microlith and a Late Mesolithic pick, but no major concentrations. The rivers and small lakes therefore seem to have been visited sporadically and were not the scene of settled domestic sites, as far as our present knowledge goes. However, Schadla-Hall (pers comm) has recently discovered three Late Mesolithic flint sites on the north shore of Lake Pickering (Table 4) at Seamer Carr, and more flints on the peat areas here. Thus the evidence is accumulating of Late Mesolithic settlement around the margins of the Vale.

Simmons (1980) has correlated substantially the same site information given above with the palaeoenvironmental information of the period, suggesting a pattern of annual movement, of the Mesolithic groups, and has summarized the argument on p27 and in Figure 10. In total, it is a pattern of aggregation and dispersion suitable for exploiting the resources of the whole terrain, analogous to that proposed by Jacobi (1978) for the Early Mesolithic period.

Thus, the ecological approach provides a reasonable account of what we see in the archaeological record for the Mesolithic period, and is clearly basic to our understanding. Some aspects of the subject are none the less open to further questioning. Why are there such great concentrations of sites where groups seem to have returned repeatedly? Were they always hunting the same prey and were the animals always in the same locations? Why did many of these camps continue in use at least into the Beaker period (2000–1500 bc) when the environment of the area and the subsistence activities, both fundamental to the ecological argument, had undergone great changes? Why are so many of the camps precisely on the watershed, in the vicinity of the later round barrows — conspicuous positions, one would think, for the hunters? The watershed location of flint sites is a frequent occurrence and cannot simply be related to the exposure of moorland sites by erosion, for it also occurs with the ploughed-out sites on the Hambleton Hills.

Another dimension to settlement pattern is its social implication. It has been argued (see above) that hunting groups cannot exist permanently in isolation from larger populations, and that this is an important factor in the aggregation and dispersion pattern. In the greater population of the later Mesolithic we might expect that there could be territorial divisions of the hunting terrain, a feature evidently missing from the Early Mesolithic scene on the North Yorkshire Moors. The most likely boundaries would be the watershed dividing the hills, with northern and southern sectors for groups living on those sides. The watersheds, in addition to being the most natural and easily defined boundaries, would be in the most open parts of the forest. The camps on the watersheds would therefore be in the best positions for summer assembly areas when groups would congregate from the surrounding lowlying areas. On the whole they are readily accessible from north and south for groups travelling up the spurs onto the watershed. Bilsdale West, Bransdale, Farndale, and Glaisdale Moors are particularly accessible, and Mauley Cross is an ideal meeting place on a main north-south communication route, later used by the Roman road. The assembly areas would be the scene of the very necessary activities of marriage-making, peace-making, transfer of people between hunting groups, formation of hunting strategies, ritual activities, exchange and barter (eg of the Wolds flint from the south), all well attested in the ethnographic literature on hunter-gatherers. (Possibly the summer would also be the best season in which to gather for the controlled burning of the open forest of the high moor.) This conception provides a fuller understanding of the location and continual use of the very rich flint areas on the watersheds and goes some way to explaining their persistent occupation into later periods. Lowland sites both north and south of the moors also continued into the Neolithic and Beaker ages, for example at Barnaby on the Eston Hills and at Seamer Carr near Scarborough. If the annual round of aggregation/dispersion had a ritual and social element, in it, then it was likely to persist, even after the hunting had become ancillary to the main subsistence methods of herding and agriculture. Bradley (1978) has pointed out how hunting can assume a ritual significance for agricultural communities. It seems likely therefore that the persistence and location of the large upland sites can be partly explained by their role in social integration, both in the Mesolithic period and also later when the hunting for subsidence declined in importance. A more thorough study of Mesolithic site formation and continuation is needed to test this tentative view.

By the end of the Mesolithic period we see a terrain fully exploited by hunter-gatherer methods, conceivably even over-exploited, if we accept the evidence for soil deterioration at this time. It was a situation in which the needs of a g-rowing population could be met by introducing the more land-intensive Neolithic subsistence methods.

Table 4 Late Mesolithic sites

Place	OS Grid	Description	Reference
Upleatham Sites 1 and 2	NZ 636201	Ploughed microliths, scrapers, cores	Spratt *et al* (1976)
Upleatham Site 3	NZ 622199	Ploughed site, incomplete; microliths, scrapers, cores	
Street House	NZ 739189	3 sites with microliths	Vyner (1988a)
Eston Nab	NZ 568183	Microliths and flakes in hillfort	Elgee (1930); Vyner (1989)
Barnaby	NZ 572167	Prolific site, with Neolithic flints	Elgee (1930)
Ingleby Barwick	NZ 433133 to 437151	Microliths, scrapers, cores, above flood plain of R Tees	Spratt *et al* (1976)
Commondale	NZ 670124	Microliths, core	Burkitt collection, Cambridge
Easington Moor	NZ 729120	Microliths, flakes	Spratt (unpublished)
Commondale, Brown Hill	NZ 674114	2 sites, microliths, blades, cores	Elgee (1930)
Danby, Siss Cross	NZ 704107	Many microliths	Atkinson J C (1863); Elgee (1930)
Kildale, Brown Hill	NZ 623107	Several flints in barrow	Ashbee and Apsimon (1956)
Glaisdale Moor	NZ 758099	Mesolithic assemblage	NYSMR 2605
Danby Beacon	NZ 737093	Microliths, small site	Elgee (1930
Hutton Rudby, Folly Hill	NZ 475072	Single microlith, in collared urn barrow	Close collection, Middlesbrough
Holiday Hill	NZ 631067	14 microliths from arrow	Close (1975)
Stockdale Moor	NZ 630038	Microliths	Winstanley/Unwin; CBA gazetteer
Ingleby Greenhow	NZ 604038	Microliths and flakes	Hayes (1963)
Egton, Grange Head	NZ 778035	Microliths/blades	Jacobi information
Burton Howes	NZ 607033	Small scatter, 20 microliths	Close collection, Middlesbrough; Hayes (1963)
Hasty Bank	NZ 575031		Hayes collection, Hutton le Hole
White Gill	NZ 640027	Very large site; C14 date 2945 ± 75 bc (C1170)	Radley (1969a); Hayes (1988)
Farndale Moor	NZ 636027 to 660005	Many prolific sites	Radley (1969a), Hayes (1963)
Westerdale Moor	NZ 633025	Many prolific sites	Unwin; CBA gazetteer
Stony Rigg	NZ 630025	Microliths	Leeds Museum
Howe Moor	NZ 519025	1000 flints, microliths	Gibson; Middlesbrough Museum; Hayes (1963)
Ingleby Greenhow, Round Hill	NZ 587023	Microliths, 2 rods, 7 triangles	Close collection, Middlesbrough
Egton	NZ 770023 NZ 775021	Large site	Winstanley/Unwin; CBA gazetteer
Westerdale	NZ 640020	Many sites in this area	Thornley/Hayes; CBA gazetteer
Glaisdale/Danby	NZ 727019	Many sites	NYSMR 2637
Glaisdale Head	NZ 738018	Mesolithic assemblage	NYSMR 2635
Danby High Moor	NZ 729016	Microliths	Hull Museum NYSMR 2620
Urra Moor	NZ 596015	Small scatters of flint	Morris
Yarlsey Moss	NZ 759014 NZ 749006		Hayes; CBA gazetteer
Egton	NZ 750013, NZ 748014	Small sites, microliths	CBA gazetteer
Billerhow Dale	NZ 914013		CBA gazetteer

Place	OS Grid	Description	Reference
Glaisdale High Moor	NZ 722012	Axe, Late Mesolithic/Early Neolithic	NYSMR 2626
Cock Heads	NZ 720010	10 sites in this area, mainly with microliths	NYSMR 2623, 2630, 2632, 2633-4, 2636
Botton Head	NZ 693013	Wide scatter, microliths	Hayes (1963)
Farndale Moor	NZ 648010		Radley (1969a)
Egton High Moor	NZ 754012, NZ 770010, NZ 764008	8 sites in this general area	CBA gazetteer; Radley (1969a)
Stone Ruck	NZ 718008	Microliths, scrapers	Jacobi
Egton, Yarlsey Hill	NZ 751007	Small site	Hayes; Radley (1969a)
Urra Moor, Broad Ings	NZ 585007		Taylor
Eskletts and Brimshaw	NZ 665007	Excavated site, 300 flints, 8 microliths, 2 scrapers	Radley (1969a); Hayes (1963, 1988)
Bransdale	NZ 613007		Hayes (1963)
Glaisdale High Moor	NZ 717-729/ 001-020	Many prolific sites in this area	CBA gazetteer
Farndale Moor	NZ 650007, NZ 672001	Many prolific sites	Radley (1969a); Jacobi
Scugdale	NZ 520000	145 flints, microliths	CBA gazetteer; Williams; Middlesbrough Museum
Cammon Stone	NZ 627000	Small site, microliths	Hayes (1963)
Widow Howe Moor	SE 871998		Taylor
Wheeldale	SE 773998		Taylor
Scugdale	SE 526998	Small site, blades, flakes	Hayes (1963); Williams; Yorkshire Museum
Bransdale	SE 613996		Hayes (1963)
Egton High Moor	SE 793996	45 flints, microliths	White (1978)
Farndale	SE 660995		Hayes
Blakey	SE 679995	Microliths and scraper	Hayes (1963)
Whorlton	SE 507993, SE 410993, SE 530983		Pollard; Morris; CBA gazetteer
Scarth Wood Moor	SE 466991	Core and blades beneath Bronze Age barrows	Batey
Snilesworth	SE 495987	170 flints, 3 microliths	Dowey; CBA gazetteer
N of Bransdale Ridge	SE 603982		Taylor
Simon Howe	SE 831982	Many prolific sites	CBA gazetteer; Hayes (1988)
Osmotherley Stones	SE 535981		Taylor
Ousegill Head	SE 634981	Excavated site, 100 flints, 15 microliths, 10 scrapers axe trimming flake	Hayes (1988)
Whorlton Moor	SE 500980	Several small sites	Hayes (1963)
Lilla Rigg, Goathland	SE 870980		Whitby Museum
Nab End Moor	SE 480980		Pollard
Cow Ridge	SE 545977		Taylor
Bransdale	SE 608976, SE 608975, SE 604975	Many prolific sites	Morris; Hayes (1963, 1988); Taylor

Place	OS Grid	Description	Reference
Bransdale (continued)	SE 606974, SE 608974, SE 607974, SE 609973, SE 609968		
N of Cow Ridge	SE 547975		Taylor
Cow Ridge	SE 548970		Taylor
Prod Hills	SE 520970	3 microlith traingles, leaf and barbed-and-tanged arrowheads	Morley (1970)
High Woof Howe	SE 902968, SE 904968		Taylor
N end of Arnsgill	SE 524967		Taylor
Arnsgill Ridge	SE 528966, SE 522964		Taylor
Cow Ridge	SE 544966, SE 540962, SE 547961, SE 545960	Large crescentic microliths, Hayes (1963); Taylor	
Bilsdale West Moor	SE 550960		Yorkshire Museum; Taylor
Shooting House Moor	SE 553959		
Parci Gill	SE 558956, SE 540956, SE 537955, SE 549954	7200 microliths	Taylor
Bilsdale E Bilsdale W	SE 595955, SE 546953, SE 552952, SE 548952	Medium site, 50 microliths	CBA gazetteer; Taylor; Pollard
Peat Moos	SE 549952	5000 flints, 27 microliths, 200 scrapers, barbed-and-tanged and leaf arrowheads	Clarke D (1973)
Parci Gill	SE 553952		Taylor
Hawnby	SE 548952, SE 547952	Prolific site	Radley (1969a); Dymond (1964)
Bilsdale W	SE 550960, SE 552951	Several sites	Yorkshire Museum; Taylor
Bilsdale E	SE 597950, SE 595955	Several sites	Taylor; CBA gazetteer
Blakey Moor, Saltergate	SE 870950	Small site, 1 microlith	Chambers; CBA gazetteer
Cow Ridge	SE 526950, SE 532947, SE 515945	Microliths and flakes	Hayes (1963); Pollard; Taylor
Pickering, Trigger Castle	SE 793946	Small site, 2 microliths	Radley (1969a); Scarborough Museum
Stape	SE 796945	Small site, 3 microliths	Hayes; Middlesbrough Museum
Mauley Cross	SE 795945	Very large site, collected over many years	Radley (1969a); CBA gazetteer; Hayes (1988)
Hawnby	SE 548943	Medium site, 25 microliths	Radley (1969a)
Lastingham	SE 725940	75 flints, 2 microliths	Hayes; CBA gazetteer
Blakey Topping	SE 873938	56 flints, several microliths	Hayes (1967b)

Place	OS Grid	Description	Reference
Hutton-le-Hole	SE 708935 SE 710920	1 microlith at each	CBA gazetter
Wykeham	SE 922935	123 flints, 3 microliths	Rutter (1963) Scarborough Museum
Spaunton	SE 725910	1 microlith	Hayes (1964a)
Steeple Cross	SE 494902	Mesolithic/Neolithic flint	Hayes (1963)
Murton	SE 519878	Small site, 2 microliths	Hayes (1963)
Sneck Yat	SE 508877	Mesolithic/Neolithic, large site, known since 1905	Dunn and Spratt (unpublished); Hayes (1963)
Ebberston	SE 900860	Small site	microliths
Ebberston, Alfred's Cave	SE 898833	14 flints, 1 microlith	CBA gazetteer
Sutton Brow	SE 515830	Small site, microlith, scraper	Radley (1969a)
Wass Moor	SE 556817	Odd finds of flints including microliths	Radley (1969a); Hayes (1963)
Scawton Moor	SE 568813	Small site with microliths	Hayes (1963)
Sweetbeck Pig Farm	TA 029828	Occupation site	Schadla-Hall (pers comm)
Hopper Hill	TA 037823	Flint site	Schadla-Hall (pers comm)
Rabbit Hill	TA 0348821	Occupation site	Schadla-Hall (pers comm)

Note: Much of this information is in the Gazetteer of Mesolithic Sites in England and Wales, CBA Research Report 20 (1977). Dr R M Jacobi kindly gave access to his record cards for the area, and where no further reference is given with a name, the information came from this source.

Table 5 Very late Mesolithic sites (microliths comprise rods only)

Place	OS Grid	Description	Reference
High Brown Hill, Commondale	NZ 674114	Micro/blade cores, blades/flakes, microliths, micro-burins	Elgee; Middlesbrough Museum
Westerdale Moor II	NZ 640020	24 rods	Radley (1969a)
Cockayne	SE 625982	Blades, flakes, 36 microliths, micro-burins	Taylor
Bransdale footpath	SE 604976	Blades, flakes, microliths	Morris
Near Pointed Stone	SE 604975	300 microliths, blades, flakes	Taylor
Bransdale Ridge	SE 605975	Blades, microliths	Taylor
Bransdale Ridge	SE 609974	Micro/blade cores, blades, flakes, microliths	Taylor
E Bilsdale Moor	SE 604974	Micro/blade core, blades/flakes, gravers. microliths	Taylor
Bransdale Ridge	SE 605973	Blades, flakes, microliths	Taylor
Bransdale Ridge	SE 604973	Micro/blade cores, blades/flakes, microliths	Taylor
Bransdale Ridge	SE 606973	as above	Taylor
Bransdale Ridge	SE 604973	as above	Taylor
E Bilsdale Moor	SE 609968	over 50 rods	Taylor

Note: References with name only are taken from D R M Jacobi's record cards

Table 6 Later flints on Mesolithic flint sites

Place	OS Grid	Description	Reference
Upleatham	NZ 636201	Leaf-shaped arrowhead	Spratt *et al* (1976)
Eston Nab	NZ 568183	Mesolithic to Early Bronze Age flints	Vyner (1989)
Eston	NZ 578183	Microliths, and later flints in Bronze Age barrow	Cleveland County Archaeology Section (1989)
Street House	NZ 739182	Late Neolithic tranchet arrowheads with Mesolithic flints	Vyner (1988a)
Barnaby	NZ 572167	Tranchet arrowhead	Spratt *et al* (1976)
White Gill	NZ 640027	Petit tranchet derivative arrowheads, polished flint axe, leaf and barbed-and-tanged arrowheads, plano-convex knife	Radley (1969a); Hayes (1988); Spratt (1974)
Cock Heads	NZ 729016	Petit tranchet arrowheads	Bartlett, (1969)
Farndale Moor	NZ 648010	Several petit tranchet arrowheads	Hayes (1988)
Simon Howe	SE 831982	Leaf-shaped and 2 petit tranchet arrowheads	Hayes (1988)
Nab End Moor	SE 580980	Large scrapers, petit tranchet arrowheads	Radley (1969a)
Ousegill Head	SE 634981	Leaf-shaped arrowhead (found 1910)	Hayes (1988)
Bransdale W	SE 603975	6-8 (?) barbed-and-tanged, 3 (?) leaf, and transverse arrowheads	Hayes (1988)
Prod Hills	SE 529970	Barbed-and-tanged and leaf' arrowheads	Morley (1970)
Peat Moss	SE 549952	Barbed-and-tanged, tranchet and leaf arrowheads	Clarke D (1973); Radley (1969)
Mauley Cross	SE 794944	Tranchet arrowheads and possibly leaf-shaped, many scrapers, 3 leaf arrowheads, microliths	Hayes (1988)
Steeple Cross	SE 494901	Mesolithic/Neolithic site	Dunn & Spratt (unpublished)
Appleton-le-Moors	SE 744885	Mesolithic/Neolithic/EarlyBronze Age site	Hayes (1977)
Sneck Yat	SE 508877	Very large Mesolithic/Neolithic site	Dunn & Spratt (1981); OS 6" map

4 The Neolithic period (3500-1700 bc)

Immediately to the south of the study area lie the chalk Wolds of East Yorkshire, which together with Wessex rank as the major English Neolithic settlement territories. Its long barrows, occupation sites, pottery, and prolific stone axes have been intensively studied by Manby in the past 30 years (Manby, 1963; 1974; 1976; 1979), a major contribution to British Neolithic studies. The settlement on the limestone Tabular Hills, only about 10 km north of the Wolds, must be seen as part of this major Neolithic area, and there is evidence of appreciable activity also in the intervening Vale of Pickering. The Neolithic archaeology of the Tabular Hills is similar to that of the Wolds, though less intensive, but to the north of these hills the evidence of settlement is considerably more sparse and seems to be of a rather different character, as will be seen later.

The best general idea of the pattern of settlement for the total Neolithic period (ie 3500-1700 bc) can be obtained from the distribution of stone axes shown in Figure 29 (see also Table 7). The most striking feature, as observed by Elgee (1930), is the almost complete absence of these axes from the high moors. There is a medium concentration on the boulder clay area to the north, though it is possibly somewhat under-represented in the coastal area where there is other evidence of Neolithic settlement. There are appreciable numbers in the dales, particularly in the lower reaches of Eskdale and in south-facing Farndale and Bosedale. The densest concentration is on the Tabular Hills, particularly on the eastern end, but it is also considerable in the central area around Kirkbymoorside and on the western end at Boltby. There is a scatter of axes

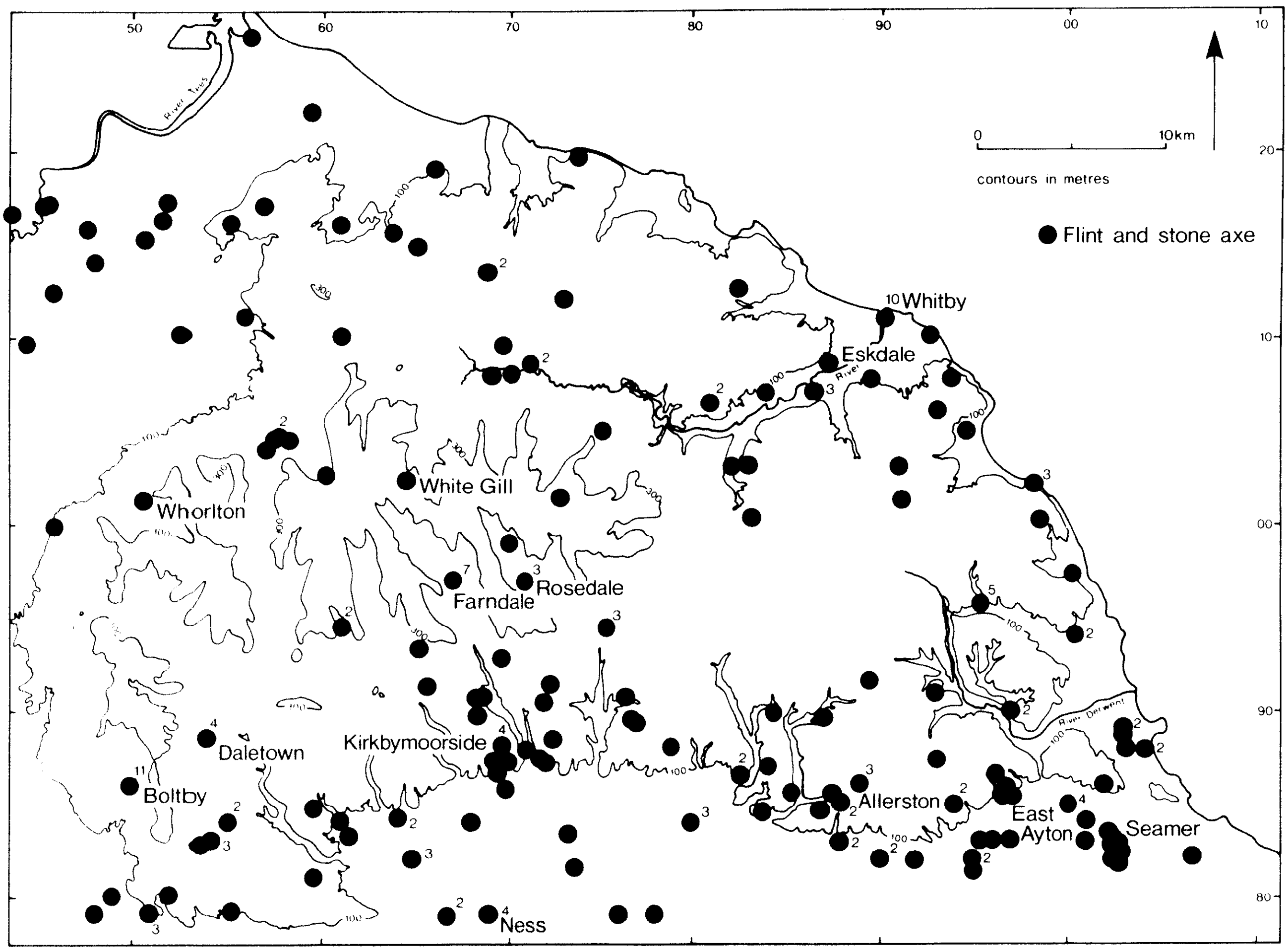


Figure 29 Distribution of Neolithic stone axes

Table 7 Neolithic axes

Place	OS Grid	Description	Reference
Dormanstown	*c* NZ 557265	Stone, Group VI	Middlesbrough Museum
Kirkleatham	NZ 593220	Greenstone	Spratt (1979)
Skelton	*c* NZ 660190	Stone	Elgee (1930
Street House	NZ 736196	1 Greenstone, 2 Quartz dolerite	Vyner (1984)
Park End. Middlesbrough	NZ 518172	Stone	Middlesbrough Museum
Barnaby Moor	*c* NZ 570170	Stone	Middlesbrough Museum
Thornaby	*c* NZ 450170	Greenstone	Middlesbrough Museum
Thornaby	*c* NZ 450170	Igneous	Middlesbrough Museum
Thornabv	*c* NZ 430166	Flint	Elgee (1930) (annotation)
Stewart Park, Middlesbrough	NZ 515161	Stone	Parks Dept, Middlesbrough
Guisborough	*c* NZ 610160	Igneous	Middlesbrough Museum
Upsall	*c* NZ 550160	Flint	Elgee (1930); Middlesbrough Museum
Acklam	*c* NZ 475157	Stone, Group XVIII	Middlesbrough Museum
Guisborough, Spa Wood	*c* NZ 638155	Greenstone	Elgee (1930). Middlesbrough Museum
Coulby Newham	NZ 506151	Fragment 7.2 x 5.0cm	Brown (1978)
Aysdale Gate	NZ 651148	Stone	Hayes (pers comm)
Stainton	*c* NZ 480140	Stone	Elgee & Elgee (1933)
Moorsholm	*c* NZ 689136	1 flint, 1 greenstone	Hayes (1964a)
Yarm	NZ 418126	Small greenstone	Cleveland County Archaeologist
Barnby	*c* NZ 825125	Stone	Whitby Museum
Hilton	NZ 456123	Stone	Brown (1974)
Scaling	*c* NZ 730120	Stone	Whitby Museum
Yarm	*c* NZ 415120	Greenstone	Sheffield Museum
Whitby	*c* NZ 900110	9 stone, 1 flint	Yorkshire Museum
Great Ayton	*c* NZ 560110	Greenstone	Elgee (1930)
Bankside Farm, Kildale	NZ 610100	Greenstone	Close (1974)
Highlights, Saltwick	*c* NZ 928101	Greenstone	Elgee (1930) (annotation)
Tanton	NZ 527100	Stone, Group VI	Spratt (1977a)
Coulby Newham	NZ 508145	Greenstone	Middleshrough Museum
Glaisdale Low Moor	NZ 750050	?	North Yorkshire Sites and Monuments Record
Seamer Carr, Stokesley	NZ 482098	Flint	Spratt (1978)
Danby Low Moor	NZ 697096	Stone	Agar (1973)
Danby	*c* NZ 710085	2 stone	Middlesbrough Museum
Sleights	NZ 871084	Stone	Hayes (pers comm)
Castleton	NZ 690080	Stone	Hayes (pers comm)
Castleton-Danby	*c* NZ 700080	Flint	Whitby Museum
Hawsker Bottoms	*c* NZ 936079	Greenstone	Whitby Museum

Place	OS Grid	Description	Reference
Sneaton	NZ 894078	Stone	Hayes (pers comm)
Newbiggin	*c* NZ 840070	Greenstone	Whitby Museum
Sleights	*c* NZ 865070	3 stone	Yorkshire Museum
Egton	*c* NZ 810065	2	Yorkshire Museum
Ling Hills, Robin Hood's Bay	*c* NZ 928060	Stone	Elgee (1930)
Thorpe, Robin Hood's Bay	*c* NZ 945050	Flint	Whitby Museum
Ingleby Greenhow	NZ 581046	Stone	Middlesbrough Museum information
Ingleby Greenhow	NZ 575045	Borrowdale	Spratt (1977b)
Ingleby Greenhow	NZ 577046	2 Borrowdale	Spratt (1977b)
Ingleby Greenhow	NZ 570040	Stone	Middlesbrough Museum
Fylingdales	NZ 910030	Flint	Whitby Museum
Murk Esk	*c* NZ 820030	Stone	Elgee (1930)
Allan Tops	*c* NZ 830030	Stone	Elgee (1930)
Ingleby Greenhow	NZ 601027	Flint	Hayes (1964a)
Peak	NZ 980025	3 flint	Yorkshire Museum
White Gill	NZ 640027	Flint	Hayes (pers comm)
Peat Hill	NZ 729013	?	NYSMR 2667
Fylingdales	NZ 910013	Stone	Hayes (1965)
Whorlton Moor	NZ 506012	Flint	Middlesbroucgh Museum
Thornhill Intake, Goathland	NZ 833002	Greenstone	Dodsworth (1973)
Stainton Dale	NZ 985001	Greenstone	Rutter (1970a)
Near Mount Grace Priory	SE 456988	Flint	Hayes (pers comm)
Cloughton	TA 002973	Greenstone	Scarborough Museum; Hayes, information
Rosedale	*c* SE 710970	3	Elgee (1930)
Farndale	SE 670970	3 flint, 4 stone	Hayes (1963)
Harwood dale	SE 955958	Greenstone	Whitby Museum
		3 flint, 1 stone	Yorkshire Museum
		1 flint	Scarborough Museum
Bransdale	SE 612947	2 flint	Elgee annotation; Middlesbrough Museum
Hartoft	SE 754944	3 flint	Hayes (pers comm)
Rudland, Bog House	SE 653934	Flint	Hayes (1963)
Lastingham	SE 697927	Flint	Haves (1964b)
Crosscliff, Allerston	SE 896915	Unpolished flint	Rutter (1969)
Fadmoor	SE 657913	Flint	Hayes (1963)
Spaunton	SE 723911	Stone	Middlesbrough Museum
Wykeham	*c* SE 930910	Flint	Rutter (1964c)
Farndale, Lowna	SE 686907	Flint	Hayes (1963)
Gillamoor, Lowna Mill Field	SE 685906	Greenstone	Hayes (1964a)
Cropton	SE 762906	Stone	Hayes (pers comm)

Place	OS Grid	Description	Reference
Spaunton	SE 720904	Stone	Hayes (pers comm)
Hackness	*c* SE 970900	2 Greenstone	Leeds Museum; Scarborough Museum
Lockton	*c* SE 843900	Stone	Whitby Museum
Scarborough	*c* TA 0389	Greenstone	Malton Museum
Gillamoor	SE 685898	Flint	Hayes (1977)
Dalby	SE 868897	Greenstone	Rushton (1976)
Cawthorn W	SE 770892	Flint	Hayes (pers comm)
Wilsons Wood, Scarborough	?	Flint	Scarborough Museum
Scarborough	*c* TA 030890	1 stone, Group VII 1 stone	Keen & Redley (1971) Yorkshire Museum
Hutton-le-Hole	*c* SE 7090	Sandstone	Malton Museum
Spaunton	SE 723884	Greenstone	Hayes (1965)
Hutton-le-Hole	SE 695880	2 flint	Hayes (pers comm)
	?	2 stone	Hull Museum
Daletown	SE 536885	4 stone (2 Group VI, 1 coarse tuff; 1 unidentified)	Keen & Radley (1971); Hayes (1963); Hull Museum
Nova, near Pickering	*c* SE 790880	Flint	Elgee & Elgee (1933)
Falsgrave	*c* TA 030880	Group VI	Keen & Radley (1971); Scarborough Museum
Scarborough	*c* TA 040880	Greenstone 2 stone	Keen & Radley (1971); Hull Museum Leeds Museum
Hutton/Lastingham Hutton (Lingmoor)	SE 710879 SE 718874	Greenstone Flint	Hayes (1964a) Hayes (1964a)
Ebberston	SE 903873	Group VI	Keen & Radley (1971)
Appleton-le-Moor	SE 720872	Greenstone	Leeds Museum
Kirkbymoorside	SE 694872	Greenstone	Hayes (1969)
Sawdon Moor, Barrow 1	SE 93508590	Greenstone axe on subsoil below kerb	Finney & Brewster forthcoming
Kingthorpe	*c* SE 8487	Dark brown flint	Malton Museum
Kirkbymoorside, Tinley Garth	SE 694866	Greenstone	Hayes (1963)
Pickering	SE 825866	1 greenstone, 1 flint	Leeds Museum; Hayes (pers comm)
11 km E of Pickering	?	Greenstone, with food vessel	Bateman (1861); Keen & Radley (1971); Sheflield Museum
Ancat Farm	SE 963865	Stone	Rutter (1964a)
Kirkbymoorside, Park Lane	SE 698871	Stone	Hayes (pers comm)
Seamer	*c* TA 020860	Greenstone	Keen & Radley (1971); Scarborough Museum
Boltby	*c* SE 500860	11 axes	10 Leeds Museum; 1 Settle Museum
Scamridge	*c* SE 890860	1 flint, 2 stone	Evans (1897); Yorkshire Museum
Kirkbymoorside, South Field	SE 698859	Greenstone	Hayes (1963)
Blansby Park	*c* SE 8287	2 flint	Hayes (1988) (at Harrison, West Park Farm)

Place	OS Grid	Description	Reference
Hutton Buscel	SE 966858	Flint	Scarborough Museum
Pexton Moor	SE 855857	Black stone	Green (1968)
Hutton Buscel	SE 967856	Limestone	Keen & Radley (1971)
Hutton Buscel	SE 969854	Greenstone	Rutter (1964a)
Allerston Warren	*c* SE 875855	Stone	Yorkshire Museum
Givendale, Allerston	*c* SE 880850	1 stone, 1 greenstone	Hayes (1964a; pers comm)
Ayton East Field	*c* TA 000850	4 flint in long barrow	Elgee (1930)
Sawdon	*c* SE 940850	Flint	Elgee (1930)
Sawdon Beck Farm	*c* SE 940850	Stone	Yorkshire Museum
Allerston Warren	SE 877847	Retained by owner	Yorkshire Archaeological Society Register, 1982, 168
Thornton Dale, Nab Gate	SE 869847	Greenstone	Hayes (1968a)
Thornton Dale, Monklands	SE 838846	Flint	Hayes (1968a)
Helmsley, Stilton House	SE 598846	Flint	Hayes (1963)
Irton	TA 006942	1 flint 1 greenstone	Hayes (pers comm) Scarborough Museum
Beadlam	?	Greenstone	Malton Museum
Beadlam Grange	SE 642842	1 flint, 1 greenstone	Hayes (1967b)
Irton	TA 010841	Unpolished flint	Rutter (1969)
Helmsley	*c* SE 610840		Scarborough Museum
Pickering	*c* SE 800840	1 greenstone 2 stone	Keen & Radley (1971) Yorkshire Museum
Scawton	*c* SE 550840	1 flint 1 greenstone	Hayes (1963) Yorkshire Museum
Welburn	*c* SE 680840	Greenstone	Hayes (1963); Scarborough Museum
Seamer	TA 023835	Greenstone	Keen & Radley (1971)
Helmsley	SE 614834	Greenstone	Hayes (1963)
Marton	SE 732833	Greenstone	Hayes (1965)
Allerston	*c* SE 880830	1 stone, 1 flint	Yorkshire Museum
Wykeham	*c* SE 960830	Group VI, part axe	Keen & Radley (1971); Scarborough Museum
Wykeham	*c* SE 960830	Flat-sided axe	Grove (1939)
Hutton Buscel	?	Flint	Scarborough Museum
Hutton Buscel	*c* SE 970830	Group VI	Keen & Radley (1971); Sheffield Museum
Seamer	*c* TA 010830	Group VI	Keen & Radley (1971); Yorkshire Museum
Seamer	TA 026830	Group VI	Keen & Radley (1971); Scarborough Museum
Scawton Moor	SE 540830	2 greenstone	Hayes information
Scawton		1 flint	Hayes (1963)
Ruston	SE 955830	Flint	Elgee (1930)

Place	OS Grid	Description	Reference
Seamer	TA 023829	Tuff	Keen & Radley (1971) Scarborough Museum
Hambleton House	SE 535828	Stone	Hayes (pers comm)
Seamer	TA 025828	Sandstone	Keen & Radley (1971); Scarborough Museum
Seamer	TA 028824	Group VI (near)	Keen & Radley (1971); Scarborough Museum
Seamer		5 flint	Scarborough Museum
Seamer	TA 026821	Group VI	Keen & Radley (1971); Scarborough Museum
Cayton	TA 067821	Stone	Keen & Radley (1971)
Ebberston	*c* SE 900820	Group VI	Manby (1965)
Snainton	*c* SE 920820	Stone	Yorkshire Museum,
Below Ebberston	*c* SE 900820	Flint	Elgee (1930)
Seamer Carr	*c* TA 025820	Flint	Yorkshire Museum
Harome	SE 650820t	3 stone	Hayes (1963; pers comm)
Brompton	*c* SE 950820	Group XVIII	Keen & Radley (1971); Scarborough Museum
Brompton	*c* SE 950820	Group VI	Middlesbrough Museum
Brompton Carr	*c* SE 950815	Stone	Yorkshire Museum
Normanby	*c* SE 735815	Stone	Elgee (1930)
Sproxton, Hollin Bower	SE 597810	Stone	Hayes (1963)
Oldstead	*c* SE 520800	Group VI	Keen & Radley (1971); Yorkshire Museum
Osgoodby	*c* SE 490800		Evans (1897)
Barugh	*c* SE 760790	Elgee (1930); Yorkshire Museum	
Kilburn	*c* SE 510790	3	Elgee (1930)
Kirby Misperton	*c* SE 780790	Stone	Yorkshire Museum
Byland	*c* SE 550790		Radley (1974); Scarborough Museum
Thirleby	*c* SE 480790		Evans (1897)
Cayton	?	Flint	Yorkshire Museum
Nunnington	*c* SE 668790	2 polished limestone	Evans (1897)
Ness	*c* SE 690790	4 stone	Elgee (1930)
Ampleforth	?	Flint	Elgee (1930); Yorkshire Museum

across the Vale of Pickering, with several in the vicinity of Ness. The date-span of metamorphic stone axes is from 3250 bc to 1750 bc (Smith I F, 1979), and although polished flint axes are known in earlier contexts in Ireland and continental Europe, the great majority of them appear to have been produced within the same period.

Following Manby (1979), it is instructive to quantify the density of axe finds, as in Table 8.

Thus, although the density of axe finds on the Tabular Hills is only about one-seventh of the figures for the Yorkshire Welds, they are rich by comparison with the North Midlands. The boulder clay areas and the Vale of Pickering, less dense than the Tabular Hills, compare about equally with the North Midlands. The sandstone moorlands have only a few axes in some hundreds of square km; some are flint axes, as at White Gill and Whorlton Moor.

Although these distributions must in a general way represent the densities of Neolithic activity, it is by no means clear what these activities were. Simpson (1979) argued that stone axes were more likely to be used for woodworking than forest clearance, on the grounds that burning and grazing would be an easier method for the latter. But the argument is more difficult to sustain in North-East Yorkshire, where forest burning apparently was confined to the Mesolithic period (Chapter 2). Nevertheless, it seems from the absence of axes on the high moors, where temporary clearances were in progress throughout the Neolithic, that the primary purpose of axes was not for tree-felling. Given the prestige and exchange value of axes (J G D Clark, 1965), it seems likely that they would be kept in the settlement areas and ultimately abandoned there when they were made obsolete by metal axes after the Neolithic period. Manby (pers comm) has, however, shown that the distribution of the completely polished stone axes, which he allocates to the Early Neolithic period, corresponds with the overall distribution of axes. Thus we cannot, see any difference between the distribution of early and late axes. (The distribution pattern of bronze axes is also not dissimilar from that of stone axes.) Whatever the uses of the stone axes, whether as agricultural implements or woodworking, they seem to represent. settlement distribution. The axes seem to be inseparable from the totality of settled Neolithic life.

It is worthwhile, therefore, to examine the local densities of axe finds in more detail, especially since, as will be seen in subsequent chapters, the pattern of settlement indicated by the stone axes is reproduced similarly for later prehistoric periods by a variety of artifact and site distributions. The major factors which seem to dominate early agricultural settlement are those of climate and soil. Other considerations which undoubtedly affect individual settlement locations, such as access to raw materials, water and communication routes, are not so important in the geography of the general pattern as those which determine the productivity of the basic subsistence techniques. With regard to climate, J A Taylor's (1975) graphs indicate that, although the beginning of the Neolithic period was somewhat warmer than at the present day, by one or two degrees centigrade, it was a time of falling temperature, so that for the end of the period the averages are about equivalent to modern times. There is a certain amount of evidence, particularly the prolific presence of alder in the lowland forests, that the rainfall may have been greater than at the present day (A G Smith, 1981). Thus the climate would have permitted growth of cereal crops on the hills up to 300m, as occasionally happens today. The damp conditions would tend to avoidance of the heavy boulder clay soils and the floor of the Vale of Pickering for agriculture, but, if cleared, would make them attractive for pasture, the latter more especially in summer. With regard to soil conditions, the well-drained limestones would be exceedingly attractive to the early farmers, as elsewhere on the calcareous areas of England. The Tabular Hills could be farmed over long periods by early methods, because their fertility could be restored by fallowing when necessary; on the sandstone areas, however, the poor drainage and acid conditions would soon lead to an irreversible infertility. Not all the Corallian of the Tabular Hills is equally attractive, for it comprises a rather complex pattern of limestone and calcareous grit. The area near Boltby, where there are axe concentrations, for example, is limestone, and there is a particularly favourable outcrop of limestone in the east between Allerston and Seamer Carr, a prolific prehistoric area at all periods. We may therefore tabulate the climatic and geological factors of the various parts of the study area (Table 9). The table shows that the most favourable areas for mixed agricultural settlements are on the limestone hills, particularly on the low hills at the eastern end. There was appreciable Neolithic activity in the Esk valley, and to a lesser degree in Cleveland and the Vale of Pickering, where climate and soil were not entirely unfavourable. The sandstone hills seem to be devoid of permanent settlement where both are adverse. We shall see this pattern repeated many times in the distribution maps for other Neolithic artefacts and for those of later periods.

The coastal region is a significant, Neolithic area, although axe finds have been comparatively sparse.

Table 8 Comparison of axe finds

	Average axe finds per sq km	Percentage of flint axes of total no
Boulder clay area	0.08	24
Lower Esk valley	0.20	6
Tabular Hills, eastern area	0.30	40
Tabular Hills, central area	0.20	35
Tabular Hills, western area	0.20	21
Vale of Pickering	0.08	25
Yorkshire Wolds (Manby, 1979)	1.70	17
Lincolnshire (Moore C N, 1979)	0.08	26
Leicestershire (Moore C N, 1979)	0.04	14
Nottinghamshire (Moore C N, 1979)	0.06	23
Derbyshire (Moore C N, 1979)	0.12	6

Table 9 Climatic and geological features

Area	Surface Geology	Height (m)	Annual rainfall (mm)*	Axe finds per km	Possible Neolithic subsistence activities
North and east boulder clay	Boulder clay	30-250	700	0.08	Pastoral
Lower Esk Valley	Alluvium/boulder clay	0-170	800	0.20	Pastoral/fishing
Sandstone moorlands	Jurassic sandstone	250-470	1100	nil	Hunting/pastoral
Tabular Hills Eastern		70-230	800	0.30	
Tabular Hills Central	Corallian limestone and sandstone	70-220	1000	0.20	Mixed farming (?)
Tabular Hills Western		170-330	1000	0.20	
Vale of Pickering	Lacustrine	20-80	760	0.08	Summer pastoral

**Average rainfall l916-50, adapted from recording site data in British Rainfall,1958*

The important, recently excavated, long barrow at Street House betokens settlement on the cliffed coast between Saltburn and Whitby. Between the mouth of the Tees and Saltburn, the offshore peat beds were created by minor fluctuations in sea-level in the Neolithic period, as at Hartlepool, just to the north (p12). The Hartlepool peat beds show evidence of woodland clearance and pastoral and agricultural activities in the Neolithic (Tooley, 1978). The same is probably true of the peat beds south of the Tees, and there is a Neolithic flint site (unpublished) on the sand dunes at Marske, 3km north-west of Saltburn. Palaeobotanical evidence for the other parts of the area are restricted to the sandstone moors and the boulder clay areas, where mainly small reversible clearances are seen throughout the Neolithic. Only late in the period are there indications of small-scale cereal growing. There are at present no pollen analyses for the Neolithic period on the Tabular Hills, either from peat deposits or from soils buried below barrows. Simmons and Greatrex (forthcoming) have shown that pollen from peat at Yondhead Rigg was 20% arboreal at the Early Bronze Age level at the base of the peat. But cereal pollen was very low until later periods. Similarly pollen from a buried soil dated 1535 ± 90 bc below a barrow at Wykeham Moor was 40% grasses, and non-arboreal pollen greatly exceeded arboreal, though there was no cereal pollen (Finney and Brewster, forthcoming). Bush and Flenley (1987) however, found cereal pollen at Willow Garth on the Wolds from *c* 1900bc onward. Cereal culture on the Tabular Hills in the Neolithic therefore remains unproven. It has sometimes been found that areas of Early Neolithic agriculture have reverted to forest in the Late Neolithic (Bradley, 1978), which may have some bearing on the apparent absence of cereal pollen on the Tabular Hills in the Bronze Age.

1 The Early Neolithic period (3500-2500 bc)

The data on the Early Neolithic period, apart from the stone axes, is confined to evidence from barrows, pottery from pits and ditches, and flint sites. There are no known Neolithic houses in the area, no causewayed camps or cursus. The evidence is conveniently divided into two groups: first the barrows and pottery which convey a concept of a settled life-style with possible connotations of territorial organization of farming country (Renfrew, 1973), hardly at all connected with the Mesolithic culture; secondly, the existence of Early Neolithic flints in the Mesolithic flint areas on both high and low ground, which seems to indicate a continuation of the Mesolithic aggregation/dispersion pattern and is thus intimately connected with that pattern of life. Dimbleby (1962) and Radley (1969) have previously suggested the coexistence of Neolithic and Mesolithic cultures in this area.

The long barrows and cairns of the area have been reviewed by Manby (1970) and are listed in Table 10 and shown on Figure 31. These also include six records of earthworks which might possibly have been long barrows, three of them not far from the newly excavated Street House long cairn. The Street House cairn (Fig 30) was discovered in a prominent position, viewed from the landward side, on the coast. It had a wooden facade at its eastern end, and eastward from this was a forecourt and five posts, which seemed to be the end of a cerem-

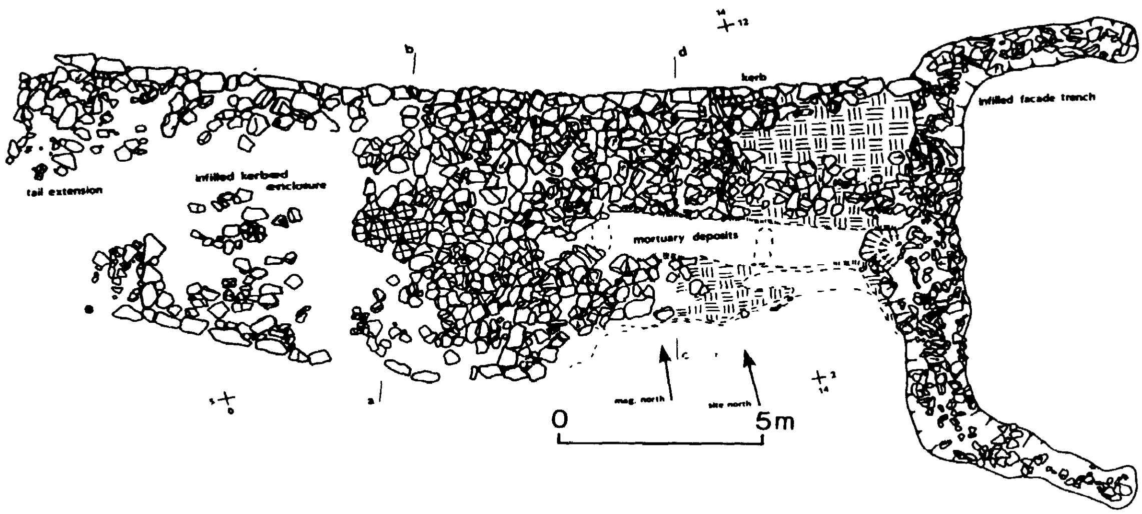


Figure 30 Street House long cairn (B E Vyner)

onial avenue which probably ran further eastward. Westward from, and at right angles to the facade lay a rectangular stone and timber mortuary structure about 7m x lm, in which were many fragments of partly burnt human bones and a semi-articulated skeleton. Westward of this was a near-rectangular kerbed enclosure some 7m x 6m metres, with a paved area and entrances on the east and west. It appears contemporary with the other structures, and as it contained no bones or evidence of cremation was interpreted as the area for bodies to be laid out to disintegrate. It is a feature found in the long barrows at Great Ayton, Seamer, and elsewhere. Later the facade and mortuary structure were destroyed by fire, and a trapezoidal cairn (21m x 6m x 21m x 9m) some two stones deep was laid over the complex. During the Bronze Age, a kerbed round barrow was built over its eastern half, a common occurrence in Yorkshire (Manby, 1970). Finds included two stone axes, undecorated Grimston sherds, mainly from the upper fills of the facade trench, and sherds of Grooved Ware in a pit with a collared urn, In the round barrow were three collared urns, the base of a fourth, and several cupstones. A collection of 20 jet V-perforated buttons was found as an isolated unstratified deposit in the west of the long cairn. The details of fourteen radiocarbon dates are given in the excavation report (Vyner, 1984), but these have had to be recalculated owing to a systematic laboratory error. The date of construction of the long barrow is now given as 4720 ± 50 and 5070 ± 50 bp (BM 1969N and 2061N) and 3470 ± 50 bp (BM 2007N) for the interface between it and the round barrow. The only other date for a long barrow in the area is 3090 ± 90 bc for East Ayton barrow (NPL 73).

There is otherwise little structural or chronological information from this area, apart from the interesting chambered cairn on Great Ayton Moor (Hayes, 1967a). This was excavated in the 1960s and found to contain within the main cairn a rectangular chamber (5m x 2m) with an entrance passage. No artefacts were found in the chamber but there was considerable burning on the subsoil in a pit. Manby (1970) suggested that the chamber is a stone version of the normally wooden mortuary house, and the stone 'tail' is to be compared to a long-barrow. Continued use of the site is seen in secondary accessory cup cremations in the main cairn, and collared urn cremations in two ring cairns built adjacent to it.

The geographical distribution of long barrows (see Fig 31) tends to confirm the Neolithic settlement pattern indicated by the polished axes. They are, or rather were, most numerous on the eastern end of the Tabular Hills, less so in the central and western sectors; they are found on the northern boulder clay area, and there is the one example at Great Ayton Moor in Cleveland. Despite their poverty of evidence and dating, they suffice to confirm settled Neolithic life in these areas. Like the round barrows of the Bronze Age, some long barrows must have been destroyed in the medieval ploughlands near the present villages, as shown for example by several Langhows among medieval field names.

The pottery most clearly associated with the early Neolithic period is the undecorated Grimston ware which spans mainly 3500-2250 bc but persists to the end of the Neolithic period; the Peterborough decorated ware (3000-1600 bc) also overlaps both the Early and Late Neolithic (see Fig 31). The Grimston ware finds in the area are listed in Table 11. Seven of the finds, from Pockley, Irton, Ayton, Newton, Sawdon Moor I and II, and Ampleforth, are from below round barrows, found in the last stages of excavation on the old land surface or in pits and

Table 10 Long barrows and cairns

Place	OS Grid	Description	Reference
Street House	NZ 736196	Found beneath Bronze Age round barrow; constructed 3120-2770 bc	Vyner (1984)
Newton Mulgrave	NZ 776143	A very mutilated long cairn	Unpublished
Ellerby Bank Top	NZ 796139	A possible long barrow	1856 OS map
Barnby	NZ 827130	Possible long cairn, not now visible	OS card index (1955)
Great Ayton Moor	NZ 594115	Chambered cairn, no finds	Hayes (1967)
Danby	NZ 715109	A possible long barrow	OS card index (1958)
Bransdale	SE 608968	Stony cairn with orthostats	Hayes (1963)
Kepwick	SE 491903	Burials, no artefacts	Greenwell (1877)
Cropton	SE 767894	Probably 2 in this area	Elgee (1930)
Kirk Howe, Gillamoor	SE 684897	A possible long barrow	Hayes (1975b)
Kirkbymoorside	SE 681869	A possible long barrow	Hayes (1963)
Scambridge	SE 892860	Human bones calcined and uncalcined, no artefacts	Greenwell (1865)
Scamridge	SE 903860	Rob Howe, visible as air photo	Rutter (1967b)
Scamridge	SE 903859	Small barrow, visible as air photo	Rutter (1967b)
East Ayton	TA 000864	Human bones with Neolithic flint hoard, 3080 ± 90 bc (NPL 73)	Conyngham (1849); Vatcher (1961)
Wykeham Forest	SE 884843	Trapezoid barrow, 30m length, width 7-11m	Pacitto (pers comm)
Wass	SE 563802	Burials on lowest layer, plain pottery below	Greenwell (1877)

ditches below it. They seem to be unconnected with the barrow rituals which were of later dates, and probably are the relics of occupation sites. They appear therefore to represent long-lived settlement areas, and show that some barrows at least were constructed on or near the earlier dwelling sites. Another collection of Grimston ware comes from the forecourt area at Street House, and appears to be a relic of the ritual proceedings, as also in the ritual areas of the long and round barrows on Seamer Moor (Finney and Brewster, forthcoming).

Neolithic flints have been found on a number of Mesolithic sites, unfortunately none in a stratified context. Leaf-shaped arrowheads have occurred on all types of Late Mesolithic sites - on the lowland site at Upleatham, on the large moorland sites at Mauley Cross and White Gill, and at the isolated sites at Ousegill Head and Peat Moss (see Table 6). This evidence implies that the aggregation/dispersion pattern of the Mesolithic culture continued in its entirety, in so far as we know it at present, into the Early Neolithic period. Indeed, as we shall see, until the end of the Neolithic in about 1700 bc. Manby (pers comm) makes the further point that the characteristic Early Neolithic working tools such as laurel leaf blades and sickles are concentrated on the Tabular Hills; the Neolithic flint technology associated with the Mesolithic sites is concerned, it appears, almost entirely with the arrowheads.

The remains of the Early Neolithic period therefore comprise one series concentrated mainly on the more fertile limestone soils indicating permanent settlement; they are the long barrows and the very few pottery sites together with the many polished axes. These seem to be almost entirely divorced from the Mesolithic culture and they are mainly on terrain well suited to settled farming. None of the long barrows has yielded microliths. Kilham long barrow on the Yorkshire Wolds produced Late Mesolithic microliths from pits below the old land surface, from an entirely different environment from that of the Neolithic flints (Manby, 1976). Alfred's Cave, a small limestone cave near Ebberston, produced microliths and small sherds of Grimston ware, but the stratigraphy of the cave deposits is not clear (Lamplough and Lidster, 1959). On the other hand we find Neolithic flints on the high moors on the Mesolithic hunting stations and both flints and axes on the lowland Mesolithic sites,

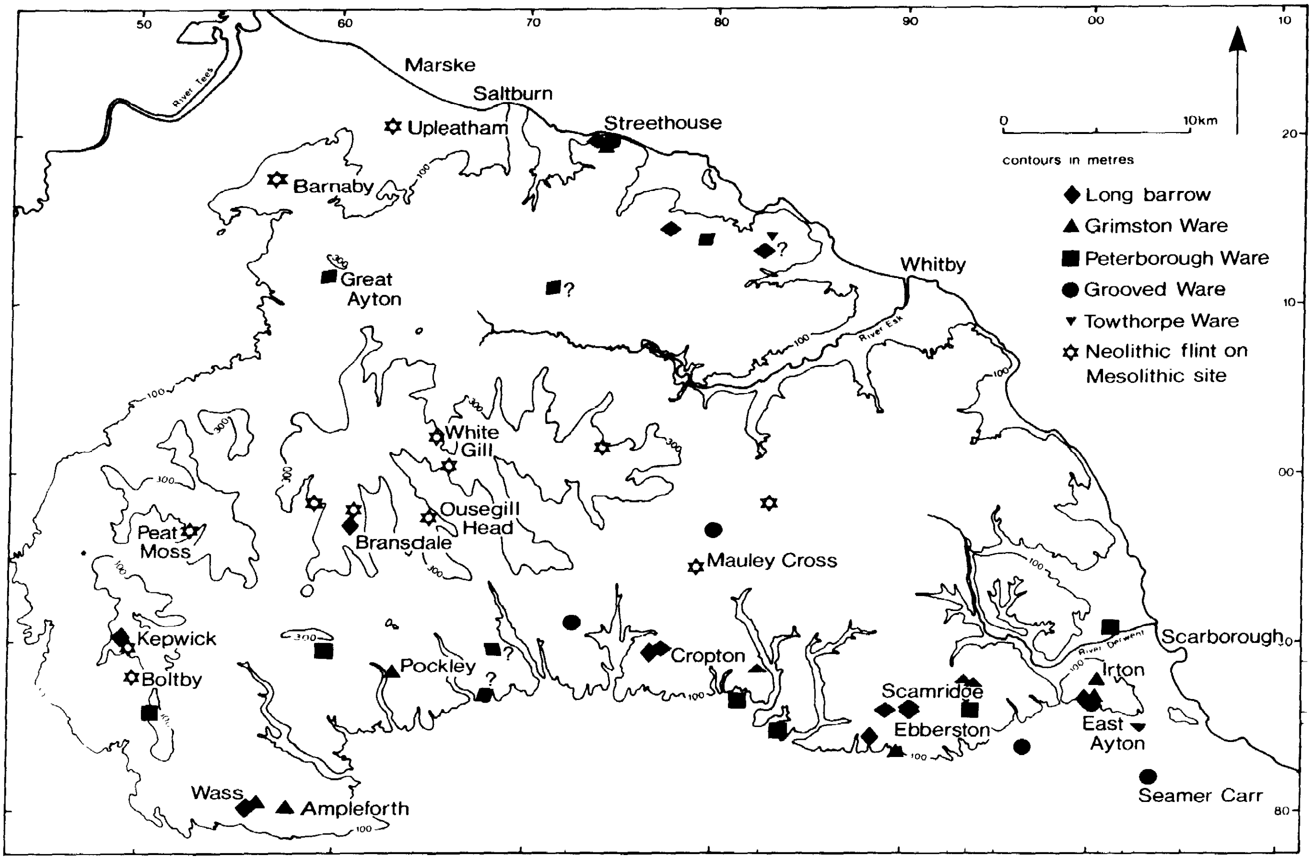


Figure 31 Distribution of Neolithic pottery, flints, and long barrows

particularly Barnaby on the Eston Hills, and Seamer Carr at Scarborough. But there is a noticeable absence of Neolithic pottery from the upland and lowland flint sites. It appears that the aggregation /dispersion pattern continued, but the participants only adopted those aspects of the Neolithic technologies connected with hunting. We seem therefore to see three life-styles in the Neolithic; first, the settled Neolithic farming on the limestone hills; second, as there is little evidence of cereal culture in the many pollen analyses from the north of the area, one must think there of a predominantly pastoral farming pattern; and third, people both from the north of the area and the south seemed to continue in the traditional Mesolithic seasonal migrations, apparently little affected by Neolithic technology and settled economy.

There is now much discussion of whether a Neolithic lifestyle (agriculture, pastoralism, stone technology, pottery, large permanent houses), or parts of it, were introduced by settlers from continental Europe, or were developed by the indigenous Mesolithic people. Williams (1989) showed from a critical review of the radiocarbon dates that four northern Mesolithic sites overlap in time with two southern Neolithic sites in the period 6400-5820 BP (5592-5280 bp), a fact which could support either hypothesis. Case (1969) argued that some of the earliest British Neolithic settlements had a fully mature and non-experimental mixed economy, which makes it highly likely that the system was introduced from continental Europe. Whittle (1977), however, showed that no one area on the continent had an exact parallel with the British Neolithic with regard to stone artefacts, house forms, monument sites, and flint mining methods. (One might counter that immigrants would certainly have to change some aspects of their technology in their new environmental and social conditions.) It is obviously possible to transfer technologies without the movement of large numbers of people; what does not seem so likely is the transfer of a whole new way of life, involving social and religious changes, into a conservative society in a short period, without movement of fairly large groups of people.

Williams (1989) also accepts as authentic three records of cereal pollen prior to the elm decline at 5100 ± 100 bp. These are at Soyland Moor in the

Table 11 Grimston ware

Place	OS Grid	Description	Reference
Street House	NZ 736196	Forecourt of long barrow	Vyner (1984)
Newton Rawcliff	SE 823890	Round barrow, pottery from old land surface	J L Kirk (unpublished) Castle Museum, York
Pockley	SE 630881	In pit below round barrow which contained a coffined inhumation	Pacitto (1970b)
Irton Barrow V	TA 005876	Undecorated Neolithic pottery in pit or ditch below oval cairn which had food vessel cremation	Simpson (1974); University of Leicester
Seamer	TA 000864	Bowls smashed on burial area of round barrow	Simpson (1963); University of Leicester
Ayton East Field long barrow	TA 000864	Pottery from mortuary enclosure forecourt, 3080 ± 90 bc (NPL 73)	Vatcher (1961)
Ayton East Field round barrow	TA 000864	Bowls in burial area	Manby (1988)
Seamer Moor	TA 01968617	Towthorpe rims	Finney & Brewster (forthcoming)
Sawdon Moor	SE93508590	Small group of sherds of at least 3 Vessels	Finney & Brewster (forthcoming)
Sawdon Moor II	SE 93658555	Small group of Grimston Sherds and Towthorpe rim	Finney & Brewster (forthcoming)
Ebberston, Alfred's Cave	SE 898833	Small sherds with microliths	Lamplough & Lidster (1960)
Wass	SE 563802	Plain pottery, probably Grimston, recorded below long barrow	Greenwell (1877)
Ampleforth	SE 580800	On old land surface beneath round barrows which seem to be of Late Bronze Age date	Wainwright and Longworth (1969); Yorkshire Museum
Barnby Howes	NZ 830138	Towthorpe Ware	Ashbee & Apsimon (1956)

Pennines (Williams, 1985), Cashelkeelty on the west coast of Ireland (Lynch, 1981) and North Gill on the North Yorkshire Moors (Turner and Simmons, pers comm). The first two records date to about 5830 bp, and that at North Gill is still to be confirmed. We must therefore take seriously the possibility of cereal growing in the Late Mesolithic period.

Our evidence in North Yorkshire is of a series of flint sites both upland and lowland with unstratified Mesolithic and Neolithic flint types and a series of Neolithic ceremonial sites sometimes covering domestic debris but with no Mesolithic associations. This seems to imply an intrusive alien culture and the adoption of parts of its flint technology by the indigenous Mesolithic people. Undoubtedly the Mesolithic people contributed their hunting and food gathering to the new economy (Hillman, 1981), and possibly their knowledge of small-scale cereal culture. It still seems doubtful whether the full Neolithic life could have been achieved quickly without their cooperation with groups experienced in settled mixed farming and its ancillary skills.

2 The Late Neolithic/Earliest Bronze Age (2500-1700 bc)

British prehistorians currently divide the Early Neolithic from the later at 2500 bc, being the approximate time at which the great long barrows and causewayed enclosures ceased to be built, and round barrows and henge monuments came into vogue. It would seem to be a time of social and ritual reorientation. Whittle (1978) and Bradley (1978) have pointed to a number of forest regenerations at about this time on terrain which had been occupied for considerable periods by cereal agriculture and pasture, and Bradley suggests that this may be in a general way related to the decline of the building of enclosures and long barrows, reflecting a less intensive land use in the later Neolithic. The palaeobotanical evidence for the regeneration phases is drawn mainly from Ireland and western England, and it is therefore appropriate to review evidence from North-East Yorkshire.

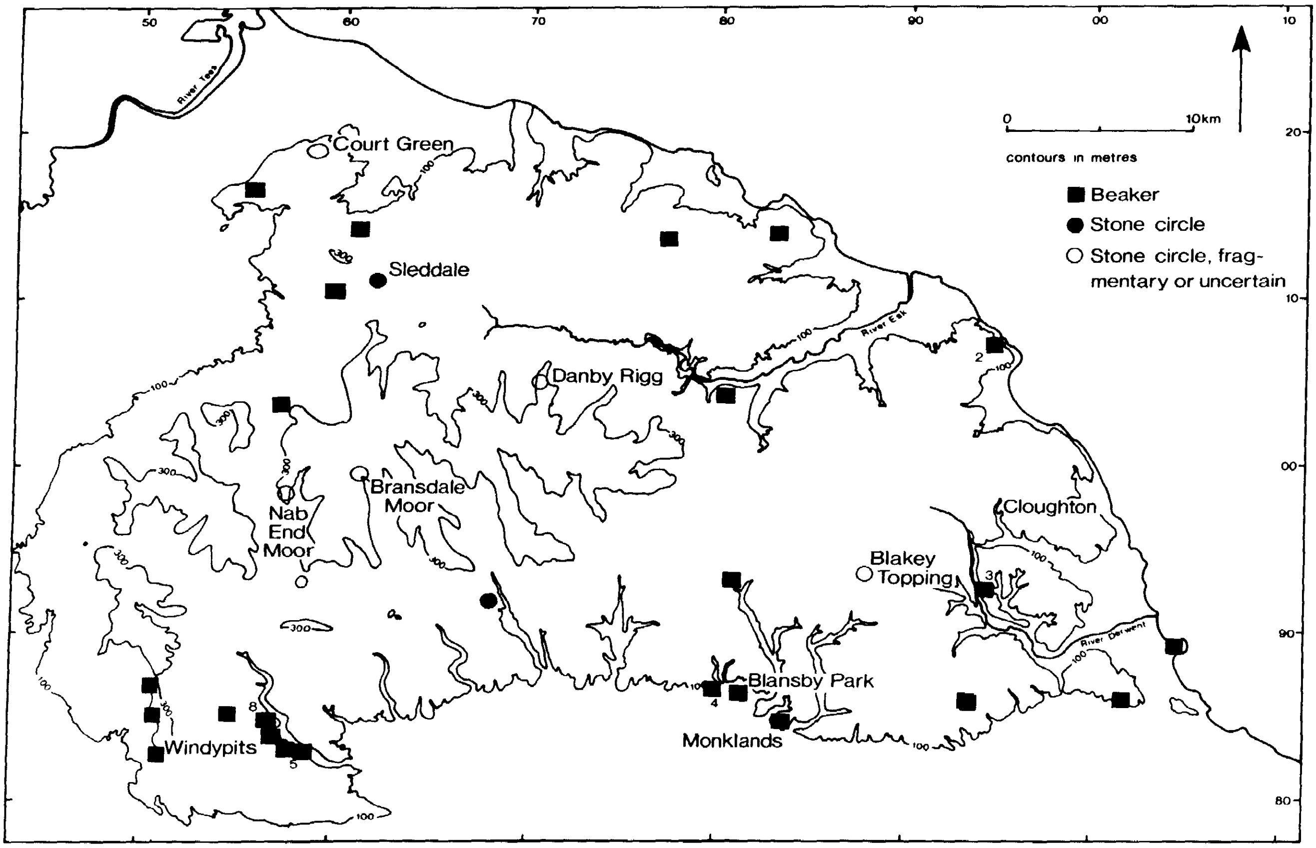


Figure 32 Distribution of Beaker pottery and stone circles

Unfortunately, the evidence is very thin. We have no pollen analysis for the Late Neolithic in or near the Tabular Hills. The Star Carr sections terminate at the alder increase in the Early Neolithic, and peat formation on the Corallian only started in the Early Bronze Age, And we have no long-term clearances for the Early Neolithic in the many analyses for the sandstone moorlands. ‘Ri be sure, there are regeneration phases on the moors, such as at Collier Gill 1936 ± 79 bc (BM 428), but these are reafforestations of small temporary clearances and not to be taken as evidence of major changes of subsistence strategy. If there was excessive pressure on the resources of the densely occupied Yorkshire Wolds by 2500 bc, then we might expect to find palaeobotanical and archaeological evidences of an outward movement into the North Yorkshire Moors in the later Neolithic period from this date onward. We have little such evidence at present; the palaeobotanical evidence from the sandstone moors is for the continuation of temporary clearances in the Late Neolithic, with a minor introduction of cereal growing. Much the same picture is presented by the work on the Late Neolithic (1750 bc) ritual monument at Street House. Ard-marks below the monument and saddle querns within it betoken small-scale agriculture but the pollen from soils shows that the environment was grass and woodland (Vyner, 1988a). Not until the Early Bronze Age is there evidence for a major increase in pressure in the moors. The archaeological evidence for the Late Neolithic, reviewed below, apart from the cessation of the long barrows, need not be interpreted in any way other than progressive cultural and economic development. The numerous corded beakers from the Ryedale Windypits might, however, be taken as evidence of increased settlement in the dales in the Late Neolithic period (see below). The Whittle/Bradley hypothesis does not therefore find much support from North-East Yorkshire, but future developments such as radiocarbon dates for the moorland cairnfields and for the palaeobotanical data could alter this position.

The archaeological evidence for the later Neolithic period comprises that of pottery finds, funerary and ritual sites, Late Neolithic flint types, and the flat bronze axes and daggers which appear contemporary with the beakers late in the period. They are listed in

Table 12 Peterborough ware

Place	OS Grid	Description	Reference
Boltby	SE 507859	Found by T Lord, excat location unknown	Manby (pers comm); Settle Museum
Blansby Park	SE 814865	Central hollow below round Barrow	Rutter (1973)
Sawdon Moor I	SE 93508590	Many sherds of Mortlake style, of at least 10-12 vessels	Brewster (1967); Finney & Brewster (forthcoming)
Sawdon Moor II	SE 936858	Mortlake-style pottery below barrows	Brewster (1967) from Manby (1988); Finney & Brewster (forthcoming)
Monklands, near Scarborough	SE 836846	Disturbed central area of round barrow which contained beaker burial	Kirk (1912); Manby (1956); Yorkshire Museum
	?	Pottery from barrow near Scarborough	Lamplough (unpublished)
Ampleforth	SE 596797	In a ploughed field	Willmot (1937; 1938)

Tables 12-14 and 16-18 and plotted on Figures 32-36. The Neolithic stone axes, many of which are from the later period, have already been reviewed.

Peterborough ware has been found on the Tabular Hills between Boltby on the extreme west and Scarborough on the coast. Dating from 3000bc to 1600 bc, it overlaps the Early Neolithic and the period of Grooved ware and beakers. Like the early Grimston ware, much of it comes from the base of round barrows (cf Table 12), and the Boltby and Ampleforth material, though not from barrows, was found in their vicinity. This seems to imply the construction of barrows at or near the Neolithic dwelling sites. The later Grooved ware, not entirely confined to the Tabular Hills, comes mainly from occupation, and at barrow sites is probably not funerary (Table 13). It is contemporary with the Beaker pottery (*c* 2100-1600 bc), which has a much wider distribution throughout the area (Table 14, Figure 32). Of the 55 beakers and beaker sherds, 17 originate from the Windypits in Ryedale (Hayes, 1963; 1987). These are limestone fissures which contain occupation remains from Beaker to Roman periods, but where funerary vessels such as collared

Table 13 Grooved ware

Place	OS Grid	Description	Reference
Street House	NZ 736196	Sherds of 2 vessels; upper fill of façade trench	Vyner (1984)
Street House	NZ 739189	2 sherds in levels above ritual monument	Vyner (1988a)
13km N of Pickering		Bateman (1861); Manby (1974); Sheffield City Museum	
Spaunton	SE 725910	2 sherds under medieval hall	Hayes (1964a)
Seamer Moor	TA 000864	In a groove outside a round barrow	Simpson (1963); Manby (1974)
Sawdon Moor II	SE 93648555	Rim sherd	Finney & Brewster (forthcoming)
Wykeham	SE 967838	6 sherds of a small flat-bottomed vessel in a pit below Anglian site	Moore & Manby (1962); Scarborough Museum
Seamer (Manham Hill)	TA 038820	Many vessels from occupation site destroyed by cultivation	Wainwright & Longworth (1971); Scarborough Museum

Table 14 Beaker pottery

Place	OS Grid	Type (Clarke D L, 1970)	Comment	Reference
Street House	NZ 739189		4 sherds in various parts of ritual monument	Vyner (1988a)
Mount Pleasant, Eston Hills	NZ 558165	S3 (E)		Sockett (1971)
Kemplah Top, Guisborough Moor	NZ 607141	SH3 (C)		Hornsby MSS 273, Cleveland County Archaeologists
Barnby Howes	NZ 830138	AOC and N4	I	Ashbee & Apsimon (1956)
Newton Mulgrave Moor	?	SH4 (B)	C	Anderson MSS, Liverpool Museum 32 - 36
Nanny Howe, Kildale	NZ 598103	N 2		Hayes (1966a)
Gnipe Howe	NZ 93400856	?	Rim sherd	Finney & Brewster (forthcoming)
Fylingdales	NZ 945071	2 beakers	I, cist burial	Anderson MSS, Liverpool Museum 23
Egton Bridge, Orchard Hills	NZ 803041	E	I ?	Greenwell (1865; 1877)
Clay Bank, Ingleby Greenhow	NZ 573036	N 3	I	Pacitto (1970a)
Raindale	SE 810930	E		Yorkshire Museum
Broxa	SE 943926	2W/NR, N/NR	C	Stickland (1950); Lamplough collection
Scarborough, Castle Hill	TA 045890	S2/W		Clark D L (1970)
Hesketh Moor	SE 507868	S1, S2E	I	Denny (1865); Leeds City Museum
Pickering	c SE 800865	S2, S1		Elgee (1930); Yorkshire Museum; Kendall collection
Pickering	c SE 800865	SH4 (C), N/NR	I	Bateman (1861)
Blansby Park	SE 814865	AOC	?	Rutter (1973)
Irton Moor	TA 00698755	2AOC	Sherds	Commbs (forthcoming)
Hutton Buscel I	SE 95908720	?	Body sherd	Finney & Brewster (forthcoming)
Seamer	TA 01968617	N/NR	About 100 sherds	Brewster (1967); Finney & Brewster (forthcoming)
Sawdon I	SE 93508590	Parts of S3 and S3/S4 Beaker rim	Neolithic pottery	Finney & Brewster (forthcoming)
Sawdon II	SE 93658555	Small sherds	Neolithic pottery	Brewseter (1967); Finney & Brewster (forthcoming)
Boltby Monklands, Thornton Dale	SE 511851	S 1	I	Smith M J B (1978)
	SE 836846	S1, N2	I	Kirk (1912)

I Inhumation
C Cremation

Beakers from Ryedale Windypits (Hayes (1987))

Windypit	OS Grid	Type (Clarke D L, 1970)
Ashberry	SE 570848	1 Large AOC 1 AOC rim 4 AOC bases 1 corded ware body sherd 1 PTC beaker
Antofts*	SE 582830	1 AOC beaker 2 AOC rims 1 AOC body sherd 1 PFB beaker 1 PTC fragment
Bucklands	SE 588828	1 AOC rim and base
Slip Gill	SE 575836	1 Handled beaker
Fissure near Hawnby		1 AOC body sherd

**Radiocarbon date 1750 ± 150 bc*

AOC All-over-corded beaker
PTC Point toothcomb impressed beaker
PFB Protruding foot beaker

Table 15 Varieties of beaker forms

Form	No in study area	Approximate dating bc*
All-over-corded (AOC)	14	2100-1800
European Bell Beaker	4	200-1700
Wessex/Middle Rhine (W/MR)	2	1780-1650
North British/Middle Rhine (N/MR)	0	1800-1650
North British/North Rhine (N/NR)	3	1750-1550
Primary Northern (N1)	0	1750-1650
Developed Northern (N2)	1	1680-1600
Primary Southern (S1)	5	1650-1600
Late Northern (N3)	1	1630-1530
Developed Southern (S2)	3	1600-1530
Late Southern (S3)	2	1550-1480
Late Southern Handled (SH3)	1	1550-1480
Final Southern (S4)	2	1500-1400
Final Southern Handled (SH4)	2	1500-1400

** According to Clarke's (1970) tentative scheme* urns are absent. The discoveries might be taken to indicate increased settlement in Ryedale in the late Neolithic. The other 38 beakers are from barrow excavations and have a mainly lowland distribution, rather similar to that of Neolithic axes. Most came from the Tabular Hills, especially the eastern section, and there are a few from the Esk valley and Cleveland (Figure 32). Their distribution map seems to confirm the concept of barrow construction at this period in the settlement areas. They take a wide variety of forms, as shown in Table 15.

The numbers of all-over-corded beakers are high on account of twelve of these being found in the Ryedale Windypits. Leaving these aside, there is a fairly even spread of beaker types from barrow excavations. They do not seem to have a recognisable geographical distribution according to typology, but seem to represent a steady spread of Beaker pottery technique throughout the later Neolithic/ earliest Bronze Age into the Early Bronze Age, whether by diffusion of ideas or of people being uncertain. At all events this spread was only in the traditional settled Neolithic areas. Beakers are not found on the high sandstone moors either in the round barrows or on the hunting stations which still survived there.

Manby (pers comm) has also observed that the Late Neolithic flint tools, such as edge-polished flint knives of discoid and flake forms and chisels, are not found on the high moors, but are concentrated on the Tabular Hills, with some in the coastal areas (eg Street House Ritual Monument, Vyner, 1988a) and in Cleveland. The tranchet and petit tranchet arrowheads, which are now thought to be most numerous in the Late Neolithic from their associations with Grooved ware (Wainwright and Longworth, 1971), are by contrast often found on the Mesolithic sites, reproducing the situation found with the leaf-shaped arrowheads. They are found on lowland sites such as Barnaby, on the large moorland sites at Mauley Cross and White Gill, and on the isolated moorland sites such as Peat Moss (see Table 6). Barbed-and-tanged arrowheads, though fewer in number, are also recorded from White Gill, Bransdale, and Peat Moss, and a plano-convex knife from White Gill. The seasonal hunters on the high moors did not usually have the Late Neolithic knives and chisels, but seemed to adopt those parts of the new flint technology applicable to hunting. The aggregation/dispersion which may have had its origin in the Early Mesolithic evidently continued into the Late Neolithic - a

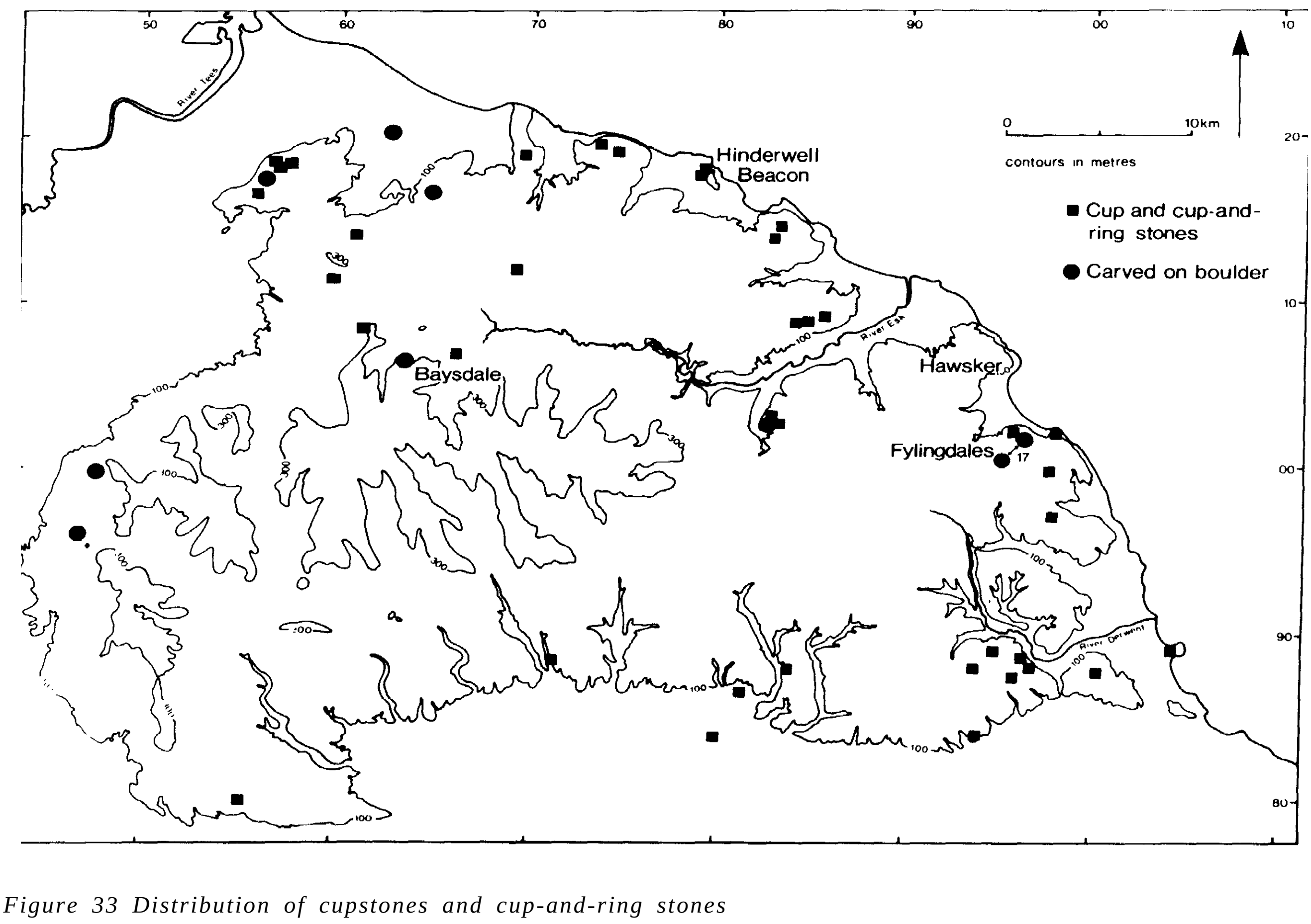


Figure 33 Distribution of cupstones and cup-and-ring stones

Table 16 Cupstones and Cup-and-ring stones

Place	OS Grid	Type	Comment	Reference
Upleatham*	NZ 624202	C	19 Cups, 3 grooves on barrow kerb stone	Goddard *et al* (1974)
Boulby	*c* NZ 745190	C	Several cupstones	Hornsby Laverick (1918)
Brotton, Howe Hill	NZ 695189	C/R C	24 cup and one cup-and-ring stone in barrow	Hornsby & Stanton (1917)
Street House	NZ 736196	C	6 cupstones from Bronze Age round barrows Neolithic long cairn	Vyner (1984)
Stret House	NZ 739189	C	11 cupstones in capping layer of ritual monument with collared urns	Vyner (1988a)
Eston Nab hill fort	NZ 567186	C	10 cupstones in palisades and rampart	Elgee (1930; Vyner (1988b)
Eston Hills	NZ 574184	C	Stone with single cup in barrow	Goddard et al (1978)
Eston Moor	NZ 568182	C/R C	1 cup-and-ring stone, 4 cupstones in drystone wall	Aberg & Spratt (1974)
Eston Hills*	NZ 564174	C	Boulder with cup Marks	Heslop (Cleveland County) (unpublished)
Mount Pleasant	NZ 558165	C/R	With beaker	Sockett (1971)
Hinderwell beacon	NZ 793178	C	150 cupstones with food vessel and urn	Hornsby & Laverick (1920)
NE of Hinderwell Beacon	*c* NZ 793178	C	With food vessel	Hornsby & Laverick (1920)
Airey Hill, Guisborough*	NZ 644167	C	6 cup marks on barrow kerbstone	Spratt *et al* (1972)
Whinney Howe, Lyth	NZ 833145	C	Cupstones with food vessel	Greenwell (1890)
Guisborough, Kemplah lop	NZ 607141	C	With handled beaker	Hornsby MSS 273 Cleveland County Archaeologist
Barnby Howes	NZ 030138	C	Barrow kerbs	Ashbee & Apsimon (1956)
Moorshoim	NZ 691120	C	30 cupmarks on barrow kerbstone	Hayes & Smith (1976)
Great Ayton Moor	NZ 598114	C/R	Cup-and-ring stone in floor of Iron Age hut	Tinkler & Spratt (1978)
Aislaby, Galley Hill	NZ 858091	C/R	Whitby Museum	Elgee (annotation, 1930)
Swarth Howe	NZ 843089	C	In barrow cist	Anderson MSS, Liverpool Museum
Aislaby	NZ 850088	C	2 cup-marked rocks	Feather (1970)
Kildale	NZ 612087	C	Cupstone in Park Dyke	Close in Hayes (1964a)
Crown End	*c* NZ 660070	C	Cupstone in drystone wall	Elgee (1930)

Place	OS Grid	Type	Comment	Reference
Baysdale*	NZ 632068	C/R	2 cup-and-ring marks on boulder	Close in Hayes (1964a)
Allan Tofts, Goathland*	NZ 829030 NZ 832028 NZ 829027	C/R	3 cup-and-ring stones	Hayes (unpublished)
Ravenhill, Staintondale	NZ 981012	R	With urns and accessory cup	Tissiman (1851)
Hawsker with Stainsacre and Fylingdales*	NZ 963018 to NZ 952004	C/R C	17 rocks marked with cups, cups-and-rings and other symbols	Kendall (1935); Feather (1966; 1967)
Near Moor, Whorlton*	SE 474998	C/R	2 cup-and-ring stones in small cairn in field System, all one cupstone earthfast	Goddard *et al* (1980)
Standing Stone Rigg, Cloughton	SE 980970	C/R	6 cup-and-ring stones	Scarborough Museum; Tissiman (1852)
Thimbleby Moor*	SE 460960	C	Cupmarks on boulder	Brown & Spratt (1977)
Hutton Buscel Moor	SE 949890	C	Two cups on stone on arrow	Smith D (1972)
West Ayton	SE 966884	C	In urn barrow	Tissiman (1851)
Hutton-le-Hole, Ling Moor Barrows	SE 713883	C	6 cup-marked stones associated with urns and axe hammer	Hayes (1978)
Cross Dyke	SE 838879	C	On surface of Cross Dyke	Spratt (1989)
Irton Moor	TA 005876			Simpson (1974)
Irton Moor	TA 007875	C	Food vessel sherds	Coombs (1974)
Blansby Park	SE 814865	C	With beaker and urn sherds	Rutter (1973)
Sawdon Moor 1	SE 93508590	C	2 cupstones in kerb	Finney & Brewster (forthcoming)
Sawdon Moor II	SE 93658555	C	In kerb of early construction phase post - 1500 ± 906 bc	Finney & Brewster (forthcoming)
Scarborough	?			Hayes (1978); Scarborough Museum
Pickering	?	C		Bateman (1861)
Wykeham Moor	?	C		Greenwell (1877)
Wass Moor	?	C	Many cupstones in 3 excavaed barrows	Greenwen (1877)

Note: There are also cup-and-ring stones from Stoupe and Brow Moor in Whitby Museum (approx NZ 960020), The Yorkshire Museum (York) has a record of a cup-and-ring stone from Peak (near Robin Hood's Bay, approx NZ *980020?), recorded in the Yorkshire Phil Soc J (1895).*

* *carving on exposed boulder*
C cupstone
C/R cup-and-ring stone

Table 17 Flat bronze axes

Place	Comment	Approx datespan bc	Reference
Lockton	Group III	1800-1500	Elgee (1930); British Museum
Scarborough	Group III?	1800-1500	Elgee (1930); Sheffield Museum
Box Hill, Irton	Group IV; incipient flanges	1550-1400	Manby (1965); Scarborough Museum

Note: For definition and chronology of groups of flat axes see Burgess (1974), 191-4. Dates of bronze artefacts are usually given in calendar years BC because there are few radiocarbon dates, and the dating methods are therefore mainly relative. In order to keep the dates of bronze artefacts in Tables 16-17, 20, 21, 24 and 26-35 consistent with those used in the rest of the volume, they are converted to bc dates (uncorrected radiocarbon dates) as if they were radiocarbon dates.

Table 18 Bronze daggers

Place	Comment	Approx datespan bc	Reference
Loose Howe, NZ 702008	Camerton-Snowshill type with urn cremation Merthyr-Mawr type	1900-1500	Elgee & Elgee (1949)
Kirkdale	Blade only		Elgee (1930)
Cawthorn	Butterwick type with barrow inhumation	1900-1550	Bateman (1861)
18km E of' Pickering (Scamridge?)	Masterton type with barrow inhumation		Bateman (1861)
Brompton, Three Tremblers S	Cressingham type (Armorico-British)	1700-1450	Greenwell (1865; 1877)
Cayton	Group I Dirk	1350-1250	Burgess (1968)

Note: For classification of bronze daggers see Gerloff (1975)

Table 19 Artefacts of the Late Neolithic/earliest Bronze Age

	Neolithic axe finds per sq km	Beakers	Flat axes	Daggers	Peter-borough ware sites	Grooved ware sites	Cup and cup-and-ring stone sites
North and east boulder clay area	0.08	7 [1]	—	—	—	—	12
Lower Esk valley	0.20	4	—	—	—	—	25 [2]
Sandstone moorlands	0.00	—	—	2	—	1	1
Tabular Hills, eastern	0.30	8	3	3	3	3	6
Tabular Hills, central	0.20	—	—	2	—	—	3
Tabular Hills, western	0.20	3 [3]	—	—	1	—	1
Vale of Pickering	0.08	—	—	—	—	—	—

1 *includes 3 sherds from Street House ritual monument*
2 *includes 17 on exposed boulders in the Fylingdales area*
3 *excludes 17 from Windypits*

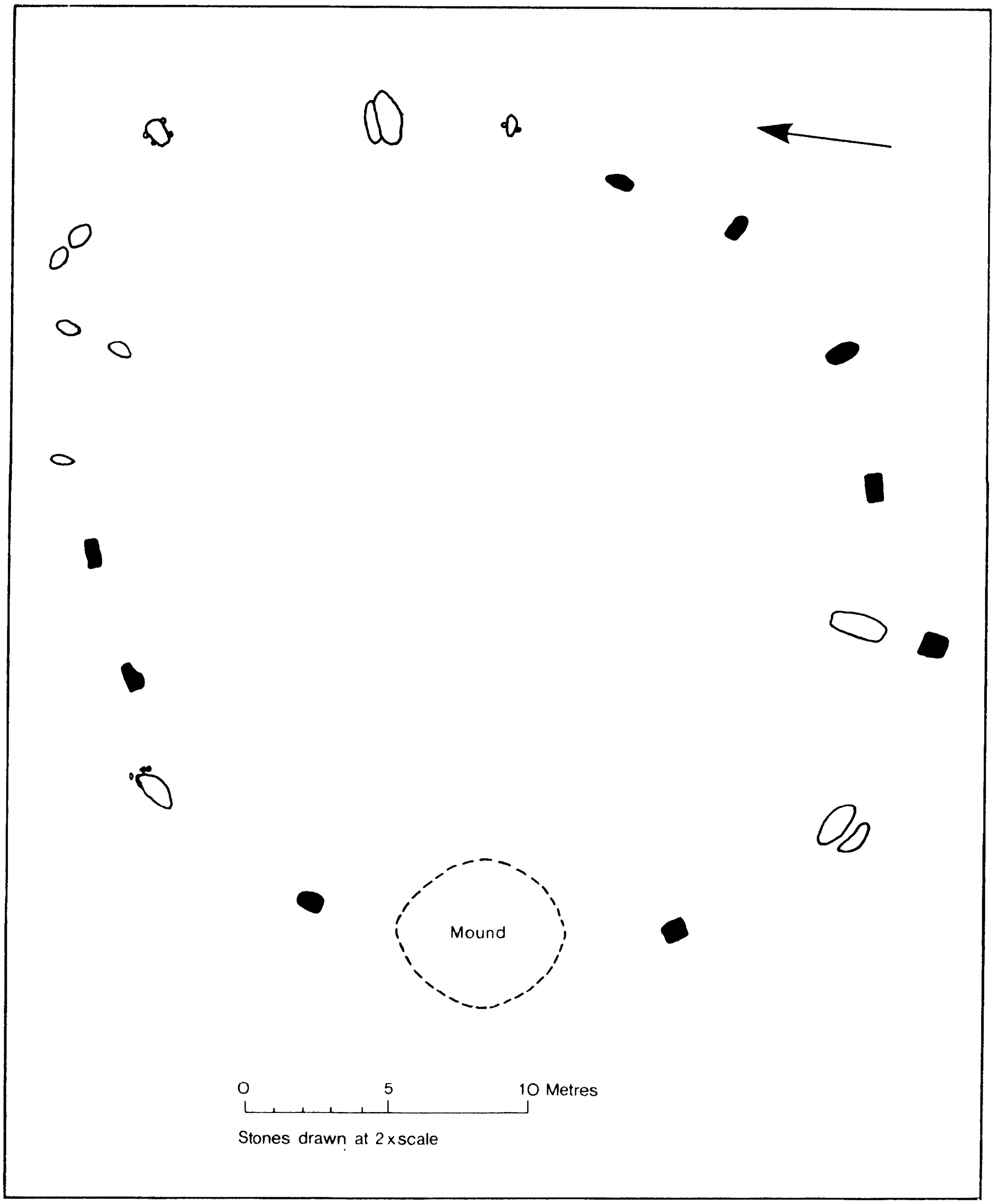


Figure 34 The stone circle at Sleddale (after W Pearson)

span of some 6000 years. This phenomenon seems widespread in Britain, though not much commented on in the literature. It appears to occur in Lincolnshire, for example (Riley, 1978).

Table 16 and Figure 33 summarise the information on cup and cup-and-ringstones. Most of them come from barrow excavations, some of which, like Hinderwell Beacon with 150 carvings, were very prolific. Some are found on earth-fast boulders on the sandstone areas, with a particularly high concentration of 17 stones in the area between Hawsker and Fylingdales, which was presumably some kind of cult centre (or the home district of a cup-and-ring hobbyist!). The carvings have not been found in the barrows or on boulders on the high moors, with the exception of a cup-and-ring stone on the moor above Baysdale. All the other stones are on the lower, peripheral hills, in much the same areas as the beaker burials. Their dating is a matter of some conjecture but R W B Morris, who has studied them widely, guessed (in litt) that most of them may date 2000-1400 bc, ie from the last part of the Neolithic period through the Early Bronze Age, roughly contemporary with the beakers. The six

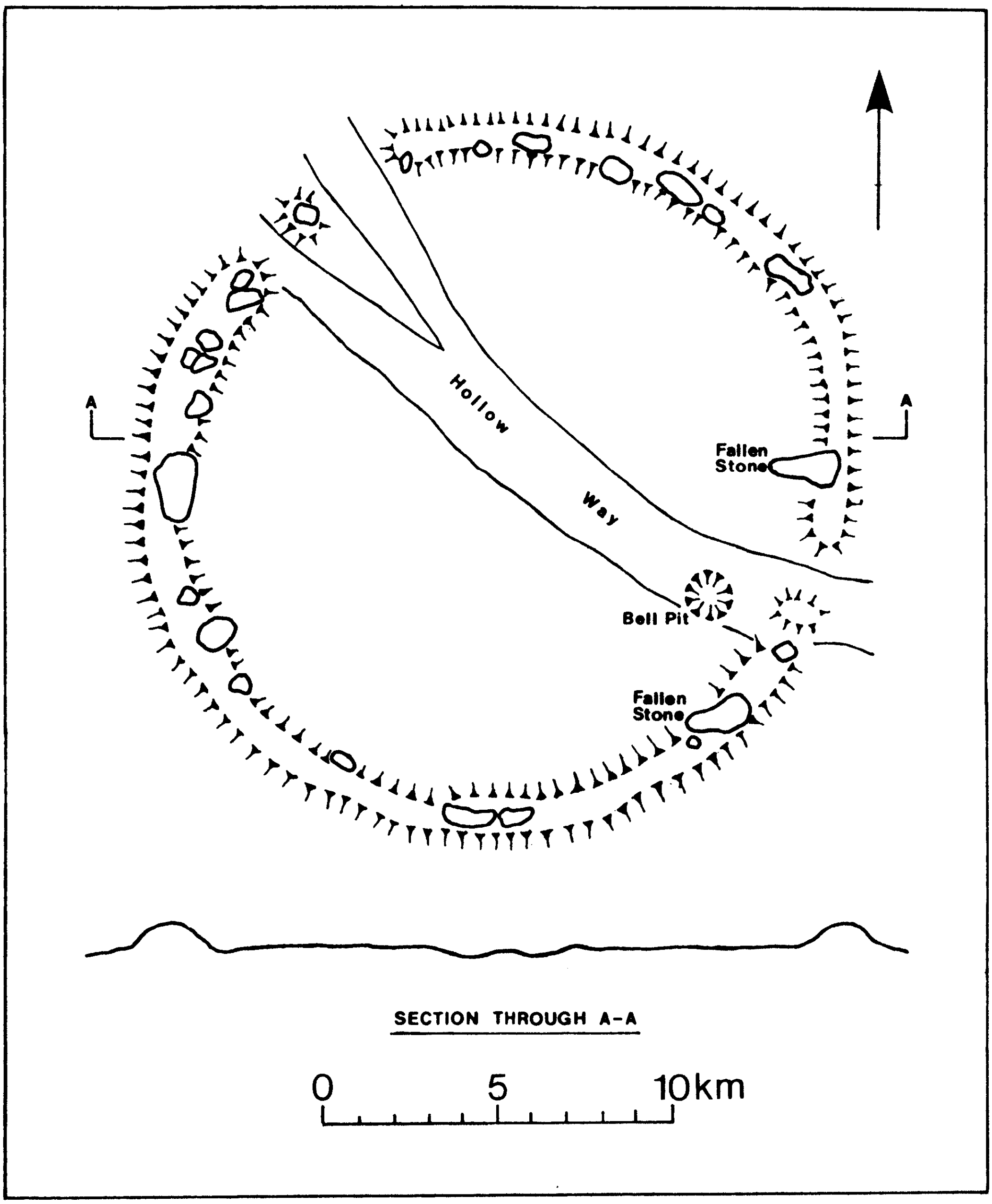


Figure 35 The stone circle at Harland Moor (after R H Hayes)

cupstones from the round barrows on top of the Neolithic long cairn at Street House must date after the start of Bronze Age funerary activity, ie after 1340 bc (Vyner, 1984). The eleven cupstones from the Street House ritual monument all come from the capping levels of the central feature (Vyner, 1988a). Although the wooden posts of the monument date to 1750bc, the capping is a later feature, containing two collared urn cremations.

Apart from the beaker and cupstone evidence, there is little further information on building round barrows in the Late Neolithic period. Simpson (1963) found both Grimston and Grooved wares associated with a round barrow on Seamer Moor, which had a burnt mortuary house containing two skeletons. Manby (1974) identified Grooved ware from an early excavation by Ruddock north of Pickering, recorded by Bateman (1861), the sherds having been preserved in Sheffield Museum.

Ceremonial stone alignments have not been found on the North Yorkshire Moors and it is not possible to be very explicit about the distribution of the few stone ceremonial circles. Most of those reported in the older literature have been damaged or destroyed

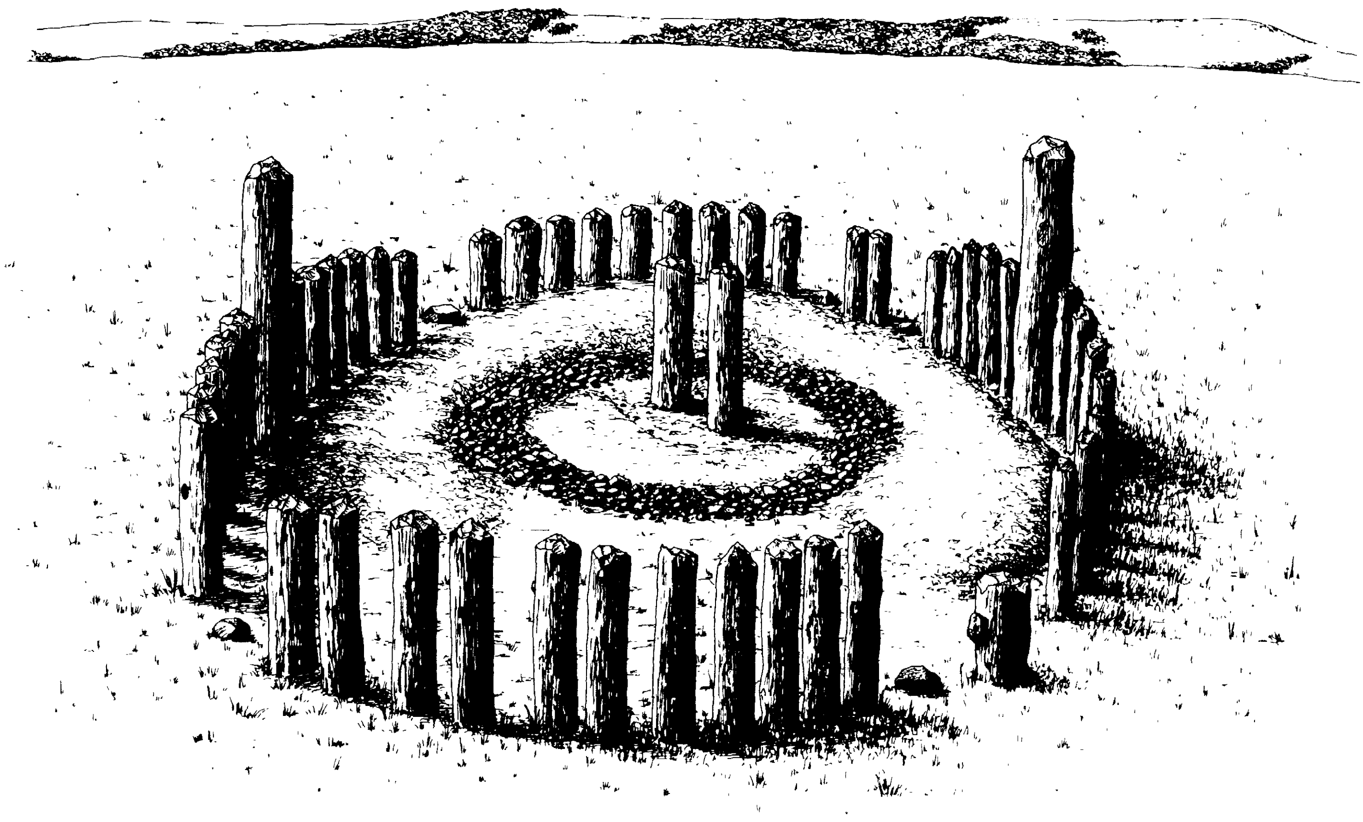


Figure 36 Reconstruction of Street House ritual monument (B E Vyner)

and their authenticity cannot be confirmed at the present time without detailed site work. Two which survive in fair condition are at Sleddale (NZ 637108) and Harland Moor (SE 676926; Figure 32; 34; 35). Both, according to Burl's (1976) chronology, date between 1900 and 1400bc. The Sleddale circle, originally discovered by Elgee and since surveyed by the Teesside Archaeological Society, is an oval arrangement of small orthostats up to 0.6 m high, some 35 m on the major axis, and 29 m on the minor axis. Trial trenches have been dug in the centre, but there were no finds. At Harland Moor the arrangement is circular with a diameter of 18 m, with orthostats up to about lm high. It has not been excavated, and standing at present in thick heather is difficult to study easily. Other possible circles listed by Burl (1976) are at Blakey Topping (SE 873934), Bransdale Moor (SE 604998), Danby Rigg (NZ 708065) and Nab Ridge (SE 575979), the last being the 'Bridestones', fairly certainly a robbed-out barrow kerb as is the circle at Bransdale Moor and another at Cloughton SE 982970. According to Ord (1846) there was also a stone circle at Court Green (NZ 587186) on the eastern end of the Eston Hills, but nothing is visible there today. Whether or not we accept all the possible circles as genuine, the distribution appears to be on high ground, but not on the central watershed or the Tabular Hills.

In excavating what appeared to be an eroded round barrow, Vyner (1988a) discovered a circular palisaded ritual monument (Fig 37). It consisted of an outer ring of four separate arcs of timber palisades, an interrupted concentric clay bank within it, and within that again a circle of small sandstone rubble containing a central pit, the setting for two upright timbers. The timbers of the outer palisade were carefully arranged by size and contained two major uprights, diametrically opposed. The date of construction was 1750bc, but it had a short life, the timbers being extracted after perhaps 25 years. Its ritual use continued, however, for there were beaker fragments in the overlying rubble, into which, some centuries later, were incorporated cupstones and two cremations in collared urns. Few of these monuments are known, but there is a close parallel at Whitton Hill in Northumberland, also dated to about 1750 bc (Miket, 1985). This and the excavation at Street House long barrow illustrate the

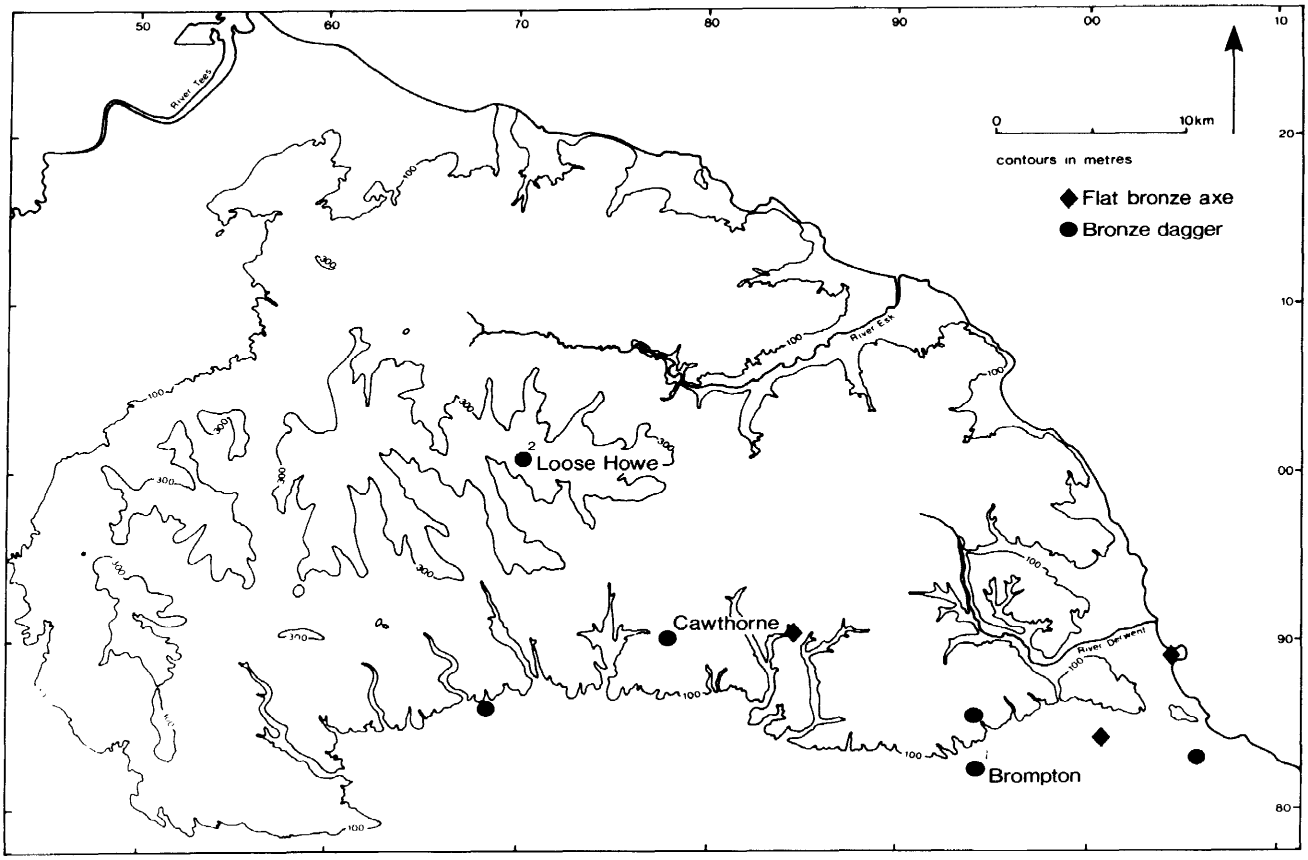


Figure 37 Distribution of bronze daggers and flat axes

valuable information which can result from investigating eroded prehistoric mounds. They also show the continuity of prehistoric activity on these sites, from the Mesolithic onward, a very frequent phenomenon on the North Yorkshire Moors and elsewhere. This site produced microliths, transverse arrowheads and knives, a mixed Late Mesolithic-Late Neolithic assemblage.

The bronze artefacts contemporary with the beakers are flat axes and daggers both of which date approximately 1900-1400 bc, though the classification of the North Yorkshire daggers in Table 17 tends to place them in the early part of this period. The distribution of this early bronze work is peripheral to the moors, as shown in Figure 37, confined in fact to the eastern and central sectors of the Tabular Hills, apart from the two daggers found in the Loose Howe tumulus. The culture of these areas was more advanced than elsewhere in the region on account of its richer agriculture, a key factor in providing investment for innovation of new technology, and probably also of its favourable position for communication to the south. The point is brought out well if we tabulate the artefacts of the Late Neolithic/Earliest Bronze Age (Table 19).

The people of the Tabular Hills - which, to judge from the long barrows, had been the most prosperous area in the Early Neolithic period - seem if anything to have increased their cultural lead over the rest of the area in the later Neolithic/earliest Bronze Age period. Small-scale agriculture, shown by cereal pollen, was gaining hold in the other areas, however, foreshadowing greater changes to come in the Early Bronze Age. In the Late Neolithic/earliest Bronze Age we witness apparently the last of the migrants moving seasonally between the lowlands and the high moors; the barbed and tanged arrowheads on the seasonal flint sites seem, as far as we know, to represent the final phase in the use of these sites. They too were to be overtaken by the activities of the Early Bronze Age and their effects upon the ecology.

5 The Bronze Age

1 The Early Bronze Age, 1700-1300 bc

There is at present no general consensus among prehistorians on the chronological subdivisions of the Bronze Age in England against which to align a local survey. In many modern syntheses they are simplified to an earlier and a later Bronze Age. Megaw and Simpson (1979), for example, define the Early Bronze Age as spanning 2000-1300 bc, followed by the later Bronze Age, obviating a middle period. Burgess (1980) in a more complex scheme of subdivisions, sees 1700 bc as an identifiable point of 'far-reaching changes, not so much in settlement and economic systems as in burial and ritual traditions, a result of social upheaval'. He gives as evidence both the introduction of food vessels in inhumation graves, and then of urn cremations, and also the sealing off at this time of many chambered tombs. On the North Yorkshire scene there are, in addition to the changes in ritual, evidences for innovations in territorial boundary systems associated with the urn barrows, and with these, changes in subsistence methods shown by the field systems, and intensification of environmental changes. We therefore have strong local reasons for separating a discrete Early Bronze Age period at 1700 bc, ending it at 1300 bc, after which date there were further changes in burial rites, pottery styles, bronze technology, and territorial boundary systems.

In spite of the prolific remains in North-East Yorkshire, no settlement of the period has been discovered and dated, though several round huts are currently known (p110, 124, 127) in environments which suggest that they may date to the Bronze Age, and at Crossgates a roundhouse has been ten-

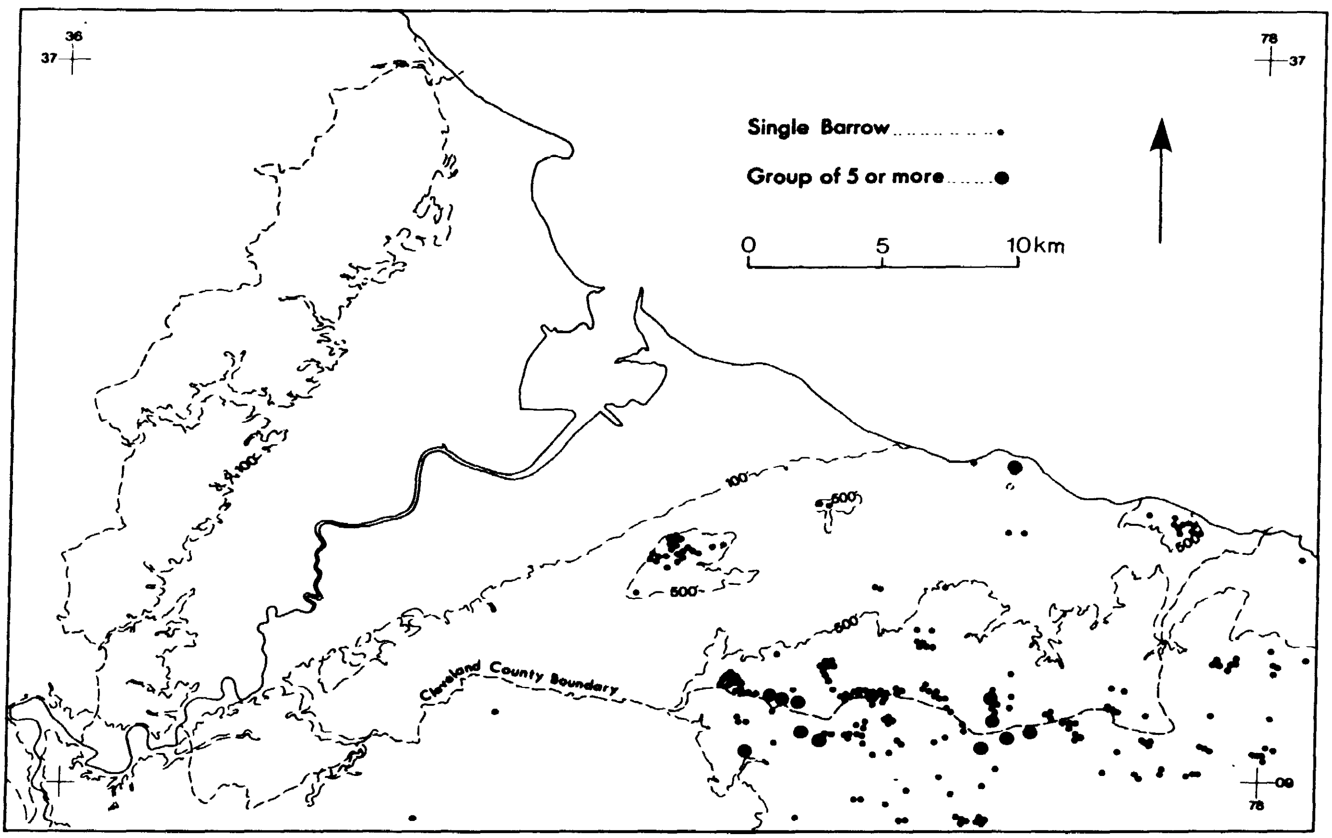


Figure 38 Barrow survey in County Cleveland (after G M Crawford)

tatively dated to the Late Bronze Age (Finney, 1989). The major sources for the period are the round barrows for ritual, ceramic, environmental and territorial data; artefact distributions which indicate areas of settlement; and field systems for information on subsistence methods.

The round barrows

It has not been possible to provide a complete distribution map of the huge number of round barrows in this area, in any case of doubtful interpretative value because of the destruction of many of them, especially on the Tabular Hills. In the area of the Scamridge Dykes, for example, Greenwell (1877) reported that there were numerous round barrows, but few indeed are to be seen there today, though many survive in the nearby Wykeham Forest. Knox (1855) said of the barrows: 'Many have been totally effaced from the land since the protecting Corn Laws were enacted in 1815.' A barrow survey has, however, been completed for County Cleveland by Crawford (1980) whose map is reproduced as Figure 38. The most striking features are the concentration of barrows along the Cleveland/North Yorkshire boundary on the watershed between the Esk valley and Cleveland and the paucity of barrows in Cleveland below 150m OD. Occasionally ditches of round-barrows show on air photographs in lowland Cleveland, but as the boulder clay yields comparatively few cropmarks of any period, this is not a very reliable indication of the numbers originally built on it. The same must be true of other low-lying areas. B J D Harrison (Leeds University, pers comm) has pointed out the very large number of medieval field names in Cleveland and the Vale of Mowbray ending in -hou or -howe, seeming to show the presence of barrows about the time the fields were named. For the Vale of Pickering, the current intensive studies at West Heslerton (Powlesland, forthcoming) are revealing barrows on the southern fringe of the vale, and there must be considerably more. The distribution of barrows generally across the area is seen in Figures 39 and 40, which show the funerary pottery, unfortunately almost completely unrecorded in the north-west of the hills, where there are many round barrows. To make a very broad generalization, the barrows are situated in the areas of settlement, as the latter are indicated by Neolithic and Bronze Age artefact distributions, and also in conspicuous lines along the crests of the watersheds, as shown on Figure 55, where there are no indications of permanent settlements of this period.

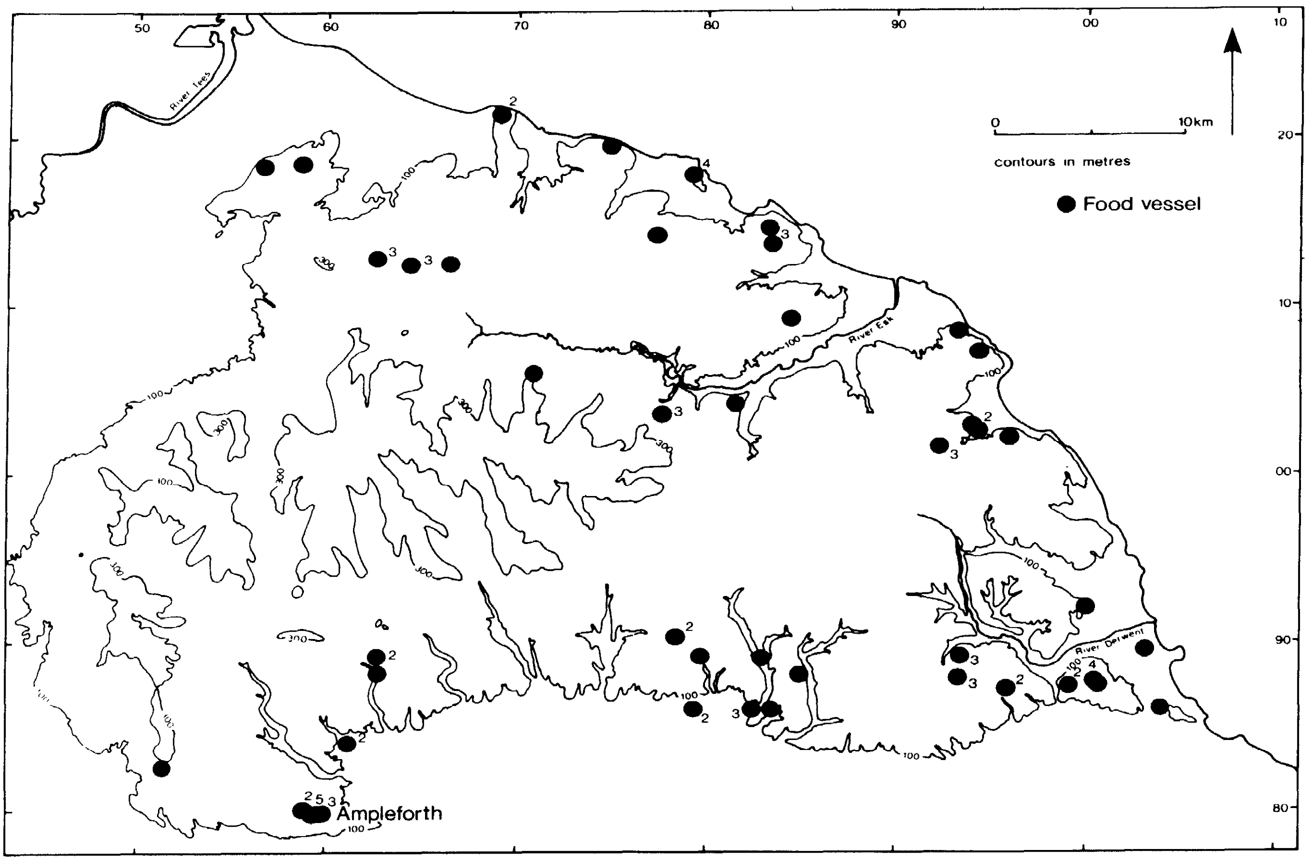


Figure 39 Distribution of food vessels

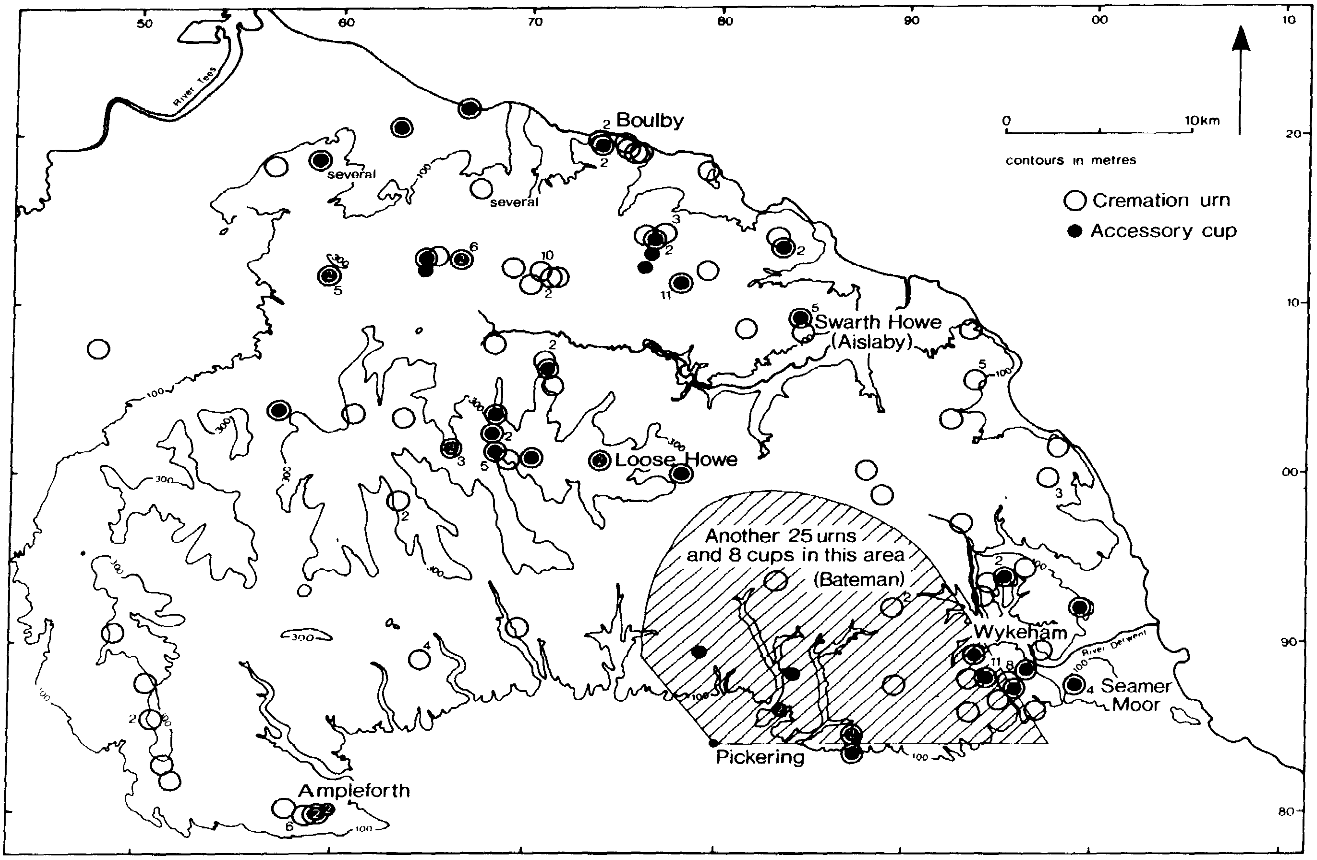


Figure 40 Distribution of cremation urns

The structure and contents of all the excavated round barrows in the study area have been analysed in a corpus by Margaret Smith (1984) which is the source of much of the data in this chapter. The barrows vary widely in diameter from 5.5m to 30.0m and up to more than 3m in height. They are built of earth, sand, turf, or stone, or any combination of these. Mrs. Smith has studied 210 excavated barrows, 175 of them producing evidence of Bronze Age origin, the remainder being without artefacts. The data on the 175 barrows are summarized in Table 22; they are supplemented by data from Tables 14, 16-18, 20, 21, 24 and 26-29 of this report.

All the beaker burials are inhumations, except cremations at Newton Mulgrave Moor and Broxa; food vessels have inhumations and cremations in proportion about 1:2; nearly all urn rituals are cremations, but two inhumations are also known.

Saddle querns are surprisingly rarely recorded in round barrows. There was one in the kerb of an urn barrow at Boulby (Hornsby and Laverick, 1918) and one in the body of a small undated barrow on Eston Hills (Goddard et al, 1978). Three have recently been discovered in the Bronze Age ritual monument at Street House (Vyner, 1988a). Some have been found in the vicinity of round barrows, as at Gallow Howe, Broxa, and Staintondale (Table 43). There are some radiocarbon dates for the round barrows, as given in Table 23.

The round barrow on Seamer Moor excavated by Simpson in 1960 certainly belongs to the Early Neolithic period, for it contained a mortuary house with cremations and dateable grave goods (Simpson, 1963; Megaw and Simpson, 1979). Possibly the Peterborough ware in the central multiple grave of the barrow at Blansby Park (Rutter, 1973) might indicate an inhumation earlier than the corded beaker in the same grave. At Monklands Barrows (Thornton Dale) there was also Peterborough ware in the disturbed central area of the barrow, which contained a beaker in its upper structure (Kirk, 1912). But as the date-span of Peterborough ware overlaps that of beakers, and because round barrows sometimes cover Neolithic domestic pits (eg Pockley, Wykeham Moor), attribution of the Blansby and Monklands barrows to the pre-beaker Neolithic is quite unproven. There is no doubt that round barrow construction started locally on a major scale in the

Table 20 Food vessels

Place	OS Grid	Type (Abercromby)	Comment*	Reference
Brotton	NZ 692213	2 Type 3	C	Hornsby and Stanton (1917)
Boulby	NZ 750195	Sherds		Elgee (1930; Elgee & Elgee 1933)
Court Green	NZ 588184	?	C	Crawford (1980)
Eston Nab	NZ 568183	2 decayed	C within hillfort	Elgee (1930); Vyner (1988b)
Hinderwell Beacon	NZ 793178	2 Type 2, 1 Type 3	C	Hornsby & Laverick (1920)
NE of Hinderwell Beacon	*c* NZ 793178	?	?	Hornsby & Laverick (1920)
Whinny Hill, Lythe	NZ 833145	3	?cist	Greenwell (1890)
Anderson 23, Newton Mulgrave	?NZ 771138	Type 2 and 3		Anderson MSS, Liverpool Museum
Lythe, Tom Yat's Field	NZ 832132	Sherds		Hornsby MSS, Cleveland County Archaeologist (inf M) Smith)
Prettyhut Howe Guisborough Moor	NZ 628127	3 ?	C uncertain F V	Atkinson J C (1864)
South Black Howe	NZ 665125	Type 6	Globular vessel	Atkinson J C (1864)
Hob on the Hill	NZ 646124	3	C	Atkinson J C (1863)
Anderson 1, Swarth Howe	SE 843089	Type 1a		Anderson MSS, Liverpool Museum
Gnipe Howe, Hawsker	NZ 934085	Type 2	C	Brewster (1973a); Finney & Diewstel (forthcoming)
Anderson 18, Fylingdales	?NZ 945071	Type 1a		Anderson MSS, Liverpool Museum
Danby Rigg	NZ 709060	1	C	Whitby Museum
Lease Mgg			Within Roman fort	Hartley (unpubhshed)
William Howe, Egton	NZ 777035	3	I	Greenwell (1865; 1877)
Robin Hood N	NZ 960021	?		Scarborough Museum
Evan Howe	NZ 925016	3	C	Trollope (1856)
Broxa No 1	SE 941928	2	C; 3 other unclassified FVs	Stickland (1950)
Broxa No 4	SE 943926	Undecorated		Stickland (1950)
Scalby Moor	TA 000920			Yorkshire Museum
Cawthorn	*c* SE 785901	2	I	Bateman (1861)
Cawthorn	*c* SE 785901	1 Type 1a, 1 Type 2	I	Bateman (1861)
Scarborough, Peasholm	TA 031896	1		Elgee (1930); Elgee & Elgee (1933); Scarborough Museum
Wykeham Forest	SE 937891	3	C	Greenwell (1865; 1877)
Haugh Rigg	*c* SE 799891	1 a	I location uncertain	Bateman (1861)

Place	OS Grid	Type (Abercromby)	Comment*	Reference
Oxclose, Barrow 2	SE 629891	2 unknown type	cist	Pacitto (1971)
Farwath, Pickering	SE 830890			Yorkshire Museum
Oxclose, Barrow 1	SE 630881	1 unknown type		Pacitto (1971)
Dalby Warren	*c* SE 850880	undecorated		Yorkshire Museum
Wykeham, Three Tremblers S	SE 936879	3	cist	Greenwell (1865; 1877)
Irton Moor V	TA 005876	Undecorated	C	Simpson (1974)
Irton Moor IV	TA 005876	1b, 2	C cist	Coombs (1974)
Irton Moor VI	TA 007875	?	?	Coombs (1974)
Osborne Lodge, East Ayton	SE 992874	2 Unclassified	I	Gwatkin (1938)
Hutton Buscel l	SE 95958720	2	C	Brewster (1967); Finney & Brewster (forthcoming)
Hutton Buscel II	SE 95908720	3	1 enlarged 1 Miniature	Finney & Brewster (forthcoming)
Weaponness	TA 04 86	?	Non-typical globular, ridged; now lost	Scarborough Museum
Kingthorpe	c SE 835860	l a	I cist, location uncertain	Bateman (1861)
Haggwood	c SE 795860	2	?cist, location uncertain	Bateman (1861)
Irton Moor IV	TA 00528765	4	Types 1, 2, 3, and enlarged FV	Conyngham (1849); Coombs (forthcoming)
Sawdon Moor I	SE 93508590	1 rim	Above old land surface	Finney & Brewster (forthcoming)
Thornton Dale	SE 830840			Yorkshire Museum
Helmsley	?		1 Type 2, l Type 3	Hayes (1963)
Sutton Bank	*c* SE 515825	Type 2	Found with jet bead, 1936	Malton Museum; Fawcett (1938)
Sproxton	SE 590797	1 Type 2		Proctor (1855)
Kirby Misperton	SE 780799			MSS Yorkshire Museum
Ampleforth, Barrow 1	SE 594798	?	? uncertain FV	Willmot (1937)
Ampleforth, Barrow 3	SE 595798	2 Type 1a, 2 Type 2, 1 Type 2a, 1 Taype 5	I	Willmot (1937; 1938)
Ampleforth, Barrow 4	SE 596798	T Type 2, 2 Type 3	C	Willmot (1937; 1938)
Very uncertain location				
1.6km N of Pickering		2	I	Bateman (1861)
10km E of Pickering		3	I	Bateman (1861)
11 km E of Pickering		1 a	I	Bateman (1861)
16km NE of Pickering		1a, 2	C	Bateman (1861)

C Cremation
I Inhumation

Table 21 Collared urns and accessory cups

Place	OS Grid	Comment*	Reference
Cat Nab, Brotton	NZ 669215	Urn with accessory cup	Crawford (1980)
Upleatham	NZ 630202	Urn with accessory cup	Young G(1817)
Street House	NZ 736196	4 urns, 1 accessory cup	Vyner (1984)
Boulby No 1	NZ 750194	Several urn sherds	Hornsby & Laverick (1918)
Street House	NZ 737193	2 urns, 1 accessory cup	Crawford (1980) (excavated by Hornsby)
Boulby No 4	NZ 750191		Hornsby & Laverick (1918)
Boulby No 7	NZ 756189		Hornsby & Laverick (1918)
Boulby No 8	NZ 758189		Hornsby & Laverick (1918)
Street House	NZ 739189	Sherds of 2 urns in covering layers of ritual monument	Vyner (1988a)
Court Green	NZ 588184	Several urns with accessory cup	Elgee (1930)
Eston Barrow	NZ 578183	Sherds of 3 urns	Cleveland County Archaeology Section (1989)
Eston Nab hillfort	NZ 568183	Single body sherd	Vyner (1988b)
Eston Hills	NZ 569180		Ord (1846)
Hinderwell Beacon	NZ 793178		Hornsby & Laverick (1920)
Glaphowe	NZ 674168	Several urns	Ord (1846)
Anderson 24/6, Newton Mulgrave	? NZ 772139	3 urns	Anderson MSS, Liverpool Museum/Anderson MSS, Liverpool Museum
Anderson 31/3	? NZ 764138	Base sherd	Anderson MSS, Liverpool Museum
Anderson 22/4	? NZ 770138	2 urns with accessory cup	Anderson MSS, Liverpool Museum
Barnby Howes W	NZ 830138	Sherds	Ashbee & Apsimon (1956)
Lythe, Tom Yat's Field	NZ 832132	2 urns with accessory cup	Hornsby MSS, Cleveland County Archaeologist
NW of Hob on the Hill	NZ 646125	Urn with accessory cup	Atkinson J C (1863)
Hob on the Hill	NZ 646124	Accessory cup	
Stanghow High Moor	NZ 651127	Urn and sherds	Atkinson J C (1863)
N Black Howes	NZ 665125	2 urns	Atkinson .J C (1863)
S Black Howes	NZ 665125	4 urns , 2 accessory cups	Atkinson J C (1863; 1864; 1874; 1891)
Anderson 2, Roxby	*c* NZ 763118	Accessory cup	Anderson MSS, Liverpool Museum
Dimmingdale	NZ 691120		Atkinson J C (1853). Ord (1846)
Black Howe	NZ 729118		Atkinson J C (1863)
Herd Howe	NZ 705118	10 urns	Atkinson J C (1864; 1874; 1891)

Place	OS Grid	Comment*	Reference
Great Ayton Moor	NZ 594115	5 urns, 2 accessory cups in ring cairns	Hayes (1967a)
Robin Hood Butts Central	NZ 710114	2 urns	Atkinson J C (1863)
Robin Hood Butts E	NZ 714114		Atkinson J C (1865)
Siss Cross	NZ 700110		Atkinson J C (1863)
Anderson 4/2, Ugthorpe Moor	NZ 7811	1 urn	Anderson MSS, Liverpool Museum
Anderson 7/5, Ugthorpe Moon	NZ 7811	2 urns, 2 fragmentary urns	Anderson MSS, Liverpool Museum
Anderson 8/6, Ugthorpe Moor	NZ 7811	3 urns	Anderson MSS, Liverpool Museum
Anderson 9/7, Ugthorpe Moor	NZ 7811	1 urn	Anderson MSS, Liverpool Museum
Anderson 10/8, Ugthorpe Moor	NZ 7811	Sherds	Anderson MSS, Liverpool Museum
Haw Rigg Danby	NZ 690107	Urn and sherds	Atkinson J C (1863)
Three Howes, Easington	NZ 739106	Urn with 2 accessory cups	Atkinson J C (1865; 1891)
Anderson 5/3, Ugthorpe	NZ 781103	1 urn, 1 accessory cup	Anderson MSS, Liverpool Museum
Aislaby Skelder	NZ 846089	Sherds	Kendall (1935)
Aislaby Moor	NZ 845089	2 urns	Anderson MSS, Liverpool Museum
Hutton Mulgrave	NZ 842089	2 urns	Anderson MSS, Liverpool Museum
Newholm Swarth Howe	NZ 843089	Urn with accessory cup	Anderson MSS, Liverpool Museum
24km N of Pickering	?		Bateman (1861)
Irton Moor	*c* TA 0088	1 urn	Conyingham (1849)
Anderson 16, Aislaby	? NZ 841086	Sherds	Anderson MSS, Liverpool Museum
Hawsker, Gnipe Howe	NZ 934085	2 collared urns, 1 accessory cup	Brewster (1973); Finney & Brewster (forthcoming)
Anderson 14, Hutton Mulgrave	NZ 814084	1 urn	Anderson MSS, Liverpool Museum
Danby	NZ 7008	Accessory cup	Dorman Museum, Middlesbrough
Castleton	NZ 682075	Urn and sherds of 2 urns	Manby (1972)
Folly Howe, Hutton Rudby	NZ 478072		Elgee (1930)
Danby Rigg	NZ 708066 NZ 709061 NZ 706058	2 urns in ring cairn Urn with accessory cup Sherds	Atkinson J C (1863) Hayes R H inf Lamplough & Baker; Hayes R inf
Fylingdales, Anderson 17	*c* NZ 936054	15 urns	Anderson MSS, Liverpool Museum

Place	OS Grid	Comment*	Reference
Ingleby Greenhow	NZ 573036	Urn with accessory cup	Pacitto (1970a)
Burton Howe	NZ 607033	Collared urn sherd	Hayes (1963)
Stoney Ridge	NZ 634032	Sherds of complete urn on ground surface	Hayes (1966c)
Stone Rook	NZ 683033	2 urns with accessory cups	Atkinson J C (1863)
Fylingdales, Kirkmoor Beck	NZ 925031	Sherds	Radley (1969b)
Western Howes	NZ 681022	2 urns with accessory cups	Atkinson J C (1863)
Peak	NZ 981015		Knox (1855)
Robin Hood VI	NZ 960012	2 urns and accessory cup	Greenwell (1890)
Robin Hood N	NZ 960012	Accessory cup	Scarborough Museum
Robin Hood S	NZ 960012		Scarborough Museum
Staintondale, Ravenhill	*c* NZ 981012	5 urns and accessory cup	Tissiman (1851)
Loose Howe	NZ 702008	Urn with accessory cup	Elgee & Elgee (1949)
Goathland Moor	Not plotted	Accessory cup	Yorkshire Museum
Staintondale, Rudda Howe	SE 977997	At least 1 urn, possibly 3	Tissiman (1852); Scarborough Museum
Lilla Howe	SE 889987		Longworth inf (unpublished)
Ousegill Head	SE 632983	2 urns	Hayes (1963); Yorkshire Museum
Harwood Dale	*c* SE 930970		Scarborough Museum
Hulleys	TA 005963		Knox (1855)
14.5km N of Pickering	?		Bateman (1861)
13km N of Pickering	?	Urn and accessory cup in 2 barrows	Bateman (1861)
13 km N of Pickering	?	2 urns in 2 barrows	Bateman (1861)
11km in of Pickering	?	Grooved ware (Manby)	Bateman (1861)
10km N of Pickering	?	1 urn, 2 accessory cups in 2 barrows	Bateman (1861)
6.5km N of Pickering	?	4 urns in two barrows	Bateman (1861)
5km N of Pickering	?	Urn with accessory cup	Bateman (1861)
3km N of Pickering	?		Bateman (1861)
1.6km N of Pickering	?	2 urns and sherds in 2 barrows	Bateman (1861)
1.6km N of Pickering	?	2 urns	Bateman (1861)
16km NE of Pickering	?	Accessory cup and beaker	Bateman (1861)
6.5km NE of Pickering	?	3 urns in 3 barrows	Bateman (1861)
6.5km NW of Pickering	?	2 urns and accessory cup in 3 Barrows	Bateman (1861)
17.5km E of Pickering	?	Accessory cup	Bateman (1861)
13km E of Pickering	?	2 urns barrows, sherds	Bateman (1861)

Place	OS Grid	Comment*	Reference
11km E of Pickering	?	1 accessory cup (with FV)	Bateman (1861)
10km E of Pickering	?		Bateman (1861)
Hackness, Reasty Top	SE 965943		Dimbleby (1962)
Silpho	*c* SE 9692	1 urn	Varley (1989)
Hackness, Springwood	SE 953939	2 urns and accessory cup	Dimbleby (1962)
Levisham Moor	SE 832936	2 urns	Pierpoint & Phillips (1978)
Hackness, Long Hill	SE 944934		Stickland (1950)
Broxa No 2	SE 942927		Stickland (1950)
Helmsley Moor	?	Accessory cup	Hayes (1963); Yorkshire Museum
Bickley	?	Accessory cup	Yorkshire Museum
Crosscliff	SE 895920	2 urns	Bateman (1861)
Coomboots	SE 995920	1 urn, 1 accessory cup	Scarborough Museum
Douthwaite Dale	SE 697907		Hayes (1963); Yorkshire Museum
Kepwick	*c* SE 488904	1 urn	Greenwell (1877)
Suffield Moor	*c* SE 975895		Scarborough Museum
Lastingham	?	Cylindrical	Elgee (1930)
Cawthorne	?	7 urns	Elgee (1930)
Saintoft	SE 92893	Accessory cup	Bateman (1861)
Brompton/Wykeham	SE 937891	Urn with accessory cup	Greenwell (1865)
Nawton Tower	SE 645889	4 urns	Hayes (1963); Yorkshire Museum
West Ayton, Way Hagg	SE 966884	Urn with accessory cup	Tissiman (1852)
Lockton	SE 840880	Accessory cup	Yorkshire Museum
Three Tremblers N	SE 935879	FV urn	Greenwell (1877)
Wykeham	SE 946879	9 urns and accessory cup	Greenwell (1865; 1877)
Wykeham	SE 946879	2 urns in 2 barrows	Greenwell (1865; 1877)
Wykeham Forest I	SE 957876	7 urns	Brewster (1973b)
Iron Moor V	TA00698755	Urn sherds	Coombs (forthcoming)
Givendale Head	SE 895875	2 urns (cylindrical)	Elgee (1930)
East Ayton, Osborne Lodge	SE 992874	4 urns, sherds of 3 urns, accessory cup	Gwatkin (1938); Scarborough museum
Hutton Buscel I	SE 95858720	2 urns, 1 accessory cup	Finney & Brewster (forthcoming)
Hutton Buscel II	SE 95958720	1 urn, 1 accessory cup	Finney & Brewster (forthcoming)
Hutton Buscel, Moor Close	SE 959872	Accessory cup	Scarborough Museum
Wykeham	*c* SE 951866		Greenwell (1877)
Blansby Park	SE 814866		Rutter (1973)
West Ayton Moor	*c* SE 970860		Scarborough Museum

Place	OS Grid	Comment*	Reference
Kingthorpe Kingthorpe	SE 835860	Accessory cup (with FV) Accessory cup	Bateman (1861) Yorkshire Museum
Sawdon Moor 1	SE 93508590	2 urns	Finney & Brewster (forthcoming)
Boltby	SE 506857		Willmot (1938)
Sawdon Moor II	SE 93658555	1 urn	Brewster (1966); Finney & Brewster (forthcoming)
Hambleton Grooms Stool	SE 511853	2 urns	Denny H (1865)
Allerston Warren	SE 874845	3 urns, 2 accessory cups	Bateman (1861)
Allerston Common	c SE 874835	1 urn (?) 1 accessory cup	Bateman (1861)
Cold Kirby	SE 517827	2 urns	Greenwell (1865)
Hambleton	SE 522818		Saunders (1910)
Ampleforth	SE 580800		Wainwright & Longworth (1969)
Ampleforth	SE 595798	2 urns, 2 accessory cups	Willmot (1937; 1938)
Ampleforth	SE 594798	2 urns	Willmot (1937)
Ampleforth	Not plotted	2 accessory cups	Yorkshire Museum prior to 1893
Sproxton	SE 590797	6 urns in 2 barrows	Proctor (1855)

**Blank - 1 collared urn, without accessory cups*

Table 22 Summary of data on barrows

Structure	Peripheral ditches	10
	External kerbs	26
	Internal Kerbs	26
	Graves	29
	Cists	39
	Timber graves	5
Ritual	Inhumations	31
	Suspected inhumations	10
	Cremations	134
	Barrows with beakers	19[2]
	Barrows with food vessels (types 1, 2 and 3)	35[2]
	Barrows with cinerary urns	108[2]
	Barrows with accessory cups	35[2]
	Bronze daggers	5[1]
	Other bronze objects	5
	Stone battle axes	6
	Cup-marked other carved stones	17
	Jet objects	18

1 *Plus two doubtful*

2 *These figures do not correspond exactly with those of Tables 16, 17, and 18, which also list pottery not found in barrows and vessels from unpublished excavations*

Table 23 Radiocarbon dates for round barrows

Barrow	Date bc and Lab No	Comment	Excavation reference
Street House NZ 73651962	Terminus post quem 1340 ± 35 BM 2007, 2009	Interface between long barrow and round barrow	Vyner (1984)
Gnipe Howe NZ 93400856	1290 ± 80 HAR 4933	From cist containing food vessel	Finney and Brewster (forthcoming)
Wykeham Moor I SE 957876	1535 ± 90 NPL 236	Charcoal from cremation pit which post-dates Stage I cairn, but pre-dates Stage II capping mound	Brewster (1973)
Sawdon Moor I SE 93508590	Cremation pit 2 1530 ± 90 NPL 196 pit 7 1380 ± 140 NPL 197	Pit 7 contained base/ wall sherd of collared urn	Finney and Brewster (forthcoming)
Sawdon Moor II SE 93658555	1560 ± 90 NPL 198	Cremation pit 2	Finney and Brewster (forthcoming)
Ampleforth Moor Barrow 3 Barrow 7 SE 580800	 582 ± 90 BM 369 537 ± 90 BM 368	Charcoal from old land surface where there were sherds from Early Neolithic to Late Bronze Age	Wainwright and Longworth (1969)
Wilton Moor Barrow NZ 57731829	1880 ± 80 HAR 9762; 2080 ± 90 HAR 9763	Early dates due to earlier activity than the collared urn cremation(?)	Cleveland County Archaeology Section (1989)

Table 24 Ring cairns

Place	OS Grid	Description	Reference
Street House	NZ 739189	A complex wood and stone circular monument, Neolithic beaker and collared urn sherds	Vyner (1988a)
Sleddale	NZ 612123	Circle diameter 11.5m. Excavation under small central cairn showed cremation but no pottery. In vicinity of cairnfield	Pearson (1974)
Great Ayton Moor	NZ 594115	2 circles, diameters 10m and 8.5m, containing 1 and 3 urn cremations respectively. Adjacent to chambered cairn, in vicinity of cairnfield	Hayes (1967a)
Robin Hood Butts, Danby Low Moor	NZ 712114	Diameter 25m x 23m, trenched by Elgee, no finds	Elgee (1930)
Kildale Moor	NZ 638084	Diameter 20m. Dug by Close 1960. Cremated bones in pit	Hayes (pers comm)
Crown End, Westerdale	NZ 663076	Small embanked oval 8.6m x 6m. A possible ring cairn. In vicinity of cairnfield	Hayes (1963)
Danby Rigg	NZ 707057	1 circle diameter 18.5m excavated, showing robbed grave. Another circle 16.5m diameter produced 2 urn cremations. Re-excavated by Baker and Lamplough in 1957. 4 others in cairnfield	Atkinson J C (1863); Hayes (pers comm); Harding A F (forthcoming)
Thorn Key Moor, Fylingdales	NZ 910035		

Cock Heads	NZ 728017	Circle 12m diameter, very slight feature	Hayes (pers comm); North Yorkshire Sites and Monuments Record 2663
Stony Marl Moor	NZ 957004 NZ 961007	2 rings in vicinity of cairnfield, diameters 19m, 18 m	Smith (pers comm)
High Snapes, Spaunton Moor	SE 706929	Oval bank 24m x 20m unexcavated	Hayes (pers comm)
Bumper Moor	SE 554926	Diameter 8m, possibly remains of a cairn, in vicinity of cairnfield. Excavated 1967	Fleming (unpublished)
Askew Ridge, Spaunton Moor	SE 742922	Diameter 20m, one cairn in the bank, another in the centre. Trial trenched 1968, showed oval with oak container (?)	Hayes (per comm)
Kepwick Moor	SE 488902	Diameter 19m. Unexcavated	Dunn & Spratt (1981)
Wykeham Moor		Several circles near barrows	Elgee (1930)
	SE 950878	Circle diameter 20m	Smith D (pers comm)
	SE 945879	Possible circle diameter 18m	Smith D (pers comm)
Irton Moor	SE 995872	Circular bank, 18m diameter, 0.6m height, 2 - 3m wide	Rutter (1970b)
Duncombe Park	SE 587822	Diameter 12m, excavated by Pacitto. No finds	Hayes (1963)

Diameters are external except where stated internal

Beaker period 2100-1400 bc and flourished in the food-vessel and collared urn period up to 1300 bc. Radiocarbon dating of the construction of round-barrows to the Late Bronze Age at Ampleforth Moor is so far unique in the area, but Manby's (1980) list of late Bronze Age globular, barrel, and bucket urns shows that the secondary use of round barrows continued into this period. In one barrow, at Suffield Moor (Lamplough, unpublished) the barrel and bucket urns may, however, have been primary. With regard to the later part of the Iron Age, round-barrows of this date are known in East Yorkshire, at the Scarborough La Tene cemetery for example (Stead, 1979), but to date no parallel is known in the study area. The ritual use of round barrows is known at Hawnby in the Saxon period (Denny, 1865), however, and at Gnipe Howe (Hawsker) (Finney and Brewster, forthcoming).

Monuments which seem similar to round barrows in date and function are the ring cairns, of which we have about a dozen examples on the moors (Table 24), one of which (Sleddale) is shown in Figure 41. These are circular banks of earth and stone a metre or so in width and about half a metre high, with diameters ranging from about 10m to 25m. The circles at Great Ayton Moor and Danby Higg produced collared urns on excavation, but others have been devoid of artefacts, though cremations are frequent. They are probably best explained as a stage in the construction of round barrows, rather than as a discrete class of monument. They are often associated with cairnfields in northern England

Table 25 Artefacts accompanying barrow burials

	Daggers	Battle Axes
Watershed barrows	Loose Howe (2)	Herd Howe Loose Howe Western Howes Brown Rigg, Glaisdale
Limestone Hills	11 miles east of Pickering* Cawthorn Brompton	11 miles east of Pickering* Lingmoor

* *Not the same barrow*
Table 27 shows a total of 33 battle axes, some others from barrows, but without excavation reports

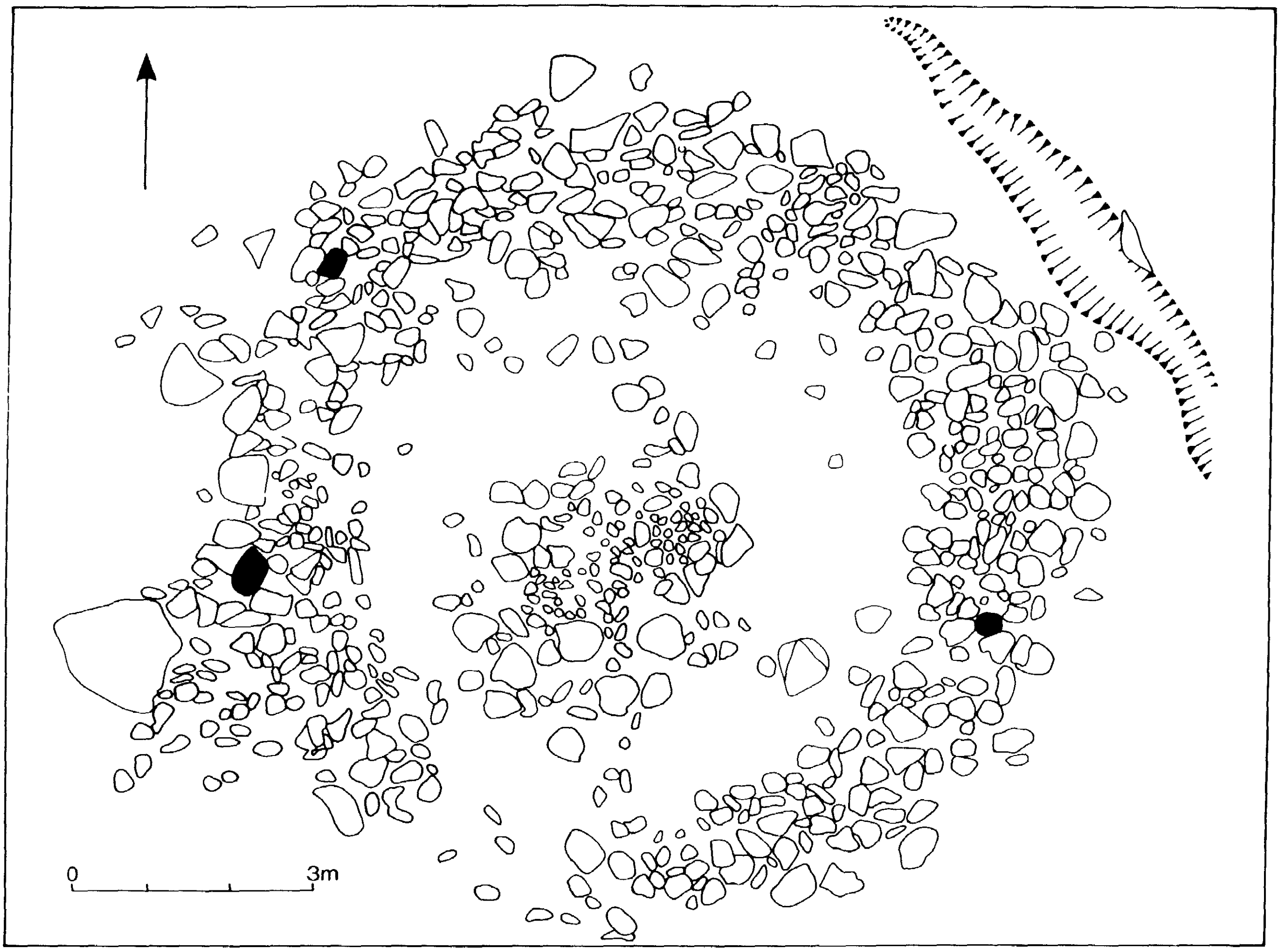


Figure 41 The ring cairn at Sleddale (after W Pearson)

(Fleming, 1971), as in the local context they are at Great Ayton, Codhill Slack, Stony Marl Moor, and Danby Rigg, where Harding has located several (Fig 48).

The distribution patterns of barrow artefacts are important. In Chapter 4.2 we have already commented on how the distributions of beaker barrows and cupstones are very similar to that of Neolithic axes, by which we infer that they are in the Neolithic settlement areas, which are all peripheral to the sandstone moorlands. Reference to Figure 39 shows that food vessels have a very similar geographical pattern. Collared urn cremations are also numerous in these settlement areas, but they occur also in the barrows on the moorland watersheds, almost to the exclusion of beakers and food vessels. Two exceptions are known, a Beaker burial on the watershed at Hambleton Moor (M J B Smith, 19781, in a limestone area which is in any case rich in Neolithic discoveries, and on the watershed on Guisborough Moor the prominent barrow named Hob-on-the-Hill which contained a class 3 food vessel (Atkinson, 1863). The watershed barrows are devoid also of cupstones and cup-and-ring stones, but this perhaps is not so significant since in the 175 barrows in the corpus (M J B Smith, pers comm) only five have both collared urns and cupstones. What does seem significant is that those who erected and used the barrows on the watersheds selected one only (ie collared urn cremation) of the several rituals normally practised at this time in the lowland settlement areas. It hardly seems likely that this exclusive use of collared urns in the watershed barrows is to be explained in terms of pottery chronology, for they did not outlast the span of food vessels.

Finally, we should consider whether the barrow burials throw any light on the social structure of the period. It is clear that not all members of society received an elaborate barrow funeral, for the numbers of barrows and funerary vessels form only a very small fraction of the total number of people who lived and died in the Bronze Age in this area. But within the range of barrow funerals there is little differentiation. Tb be sure, of the 210 excavated barrows, 34 had no identifiable grave goods surviving, but 175 had pottery of some description and these with a few exceptions are remarkably uniform, in the sense of being without other artefacts. We can reasonably suppose that the round barrows were the memorial tombs of local leaders of equal status. Very occasionally an artefact accompanied the burial, the most noticeable the bronze daggers and stone battle axes, which are either in the watershed barrows on the sandstone moorlands, or on the Tabular Hills (Table 25).

It would be difficult to sustain an argument for a chieftain aristocracy from this slight departure from equality of burial practice. However, two elaborate burials, at Swarth Howe a few miles inland from Whitby and Loose Howe on the central watershed, are in positions which command unusually spectacular panoramic views, and suggest the burial of a more important person. Loose Howe (Elgee and Elgee, 1949) contained an inhumation with a Merthyr Mawr dagger in an oak coffin with a cover, together with an oak 'canoe'. Above, and separate from, the inhumation was a collared urn cremation with a battle-axe and a Camerton-Snowshill dagger. It was a unique tumulus for this area. The burial at Swarth Howe is neither as elaborate nor as well documented as Loose Howe, but may have been a decayed version of it. On the west side was an interment accompanied by a beautifully ornamented urn, flint spears and jet ornaments, and on the east side an empty stone cist with a cupstone (Anderson MSS, Liverpool Museum).

Coffined burials in less prominent positions are recorded for Howe Hill, Brotton (Hornsby and Stanton, 1917), Pockley (Pacitto, 1970), Irton Moor I (Brewster, 1973a and 1973b) and possibly Hutton Buscel I (Finney and Brewster, forthcoming). There may have been other coffined burials in prominent

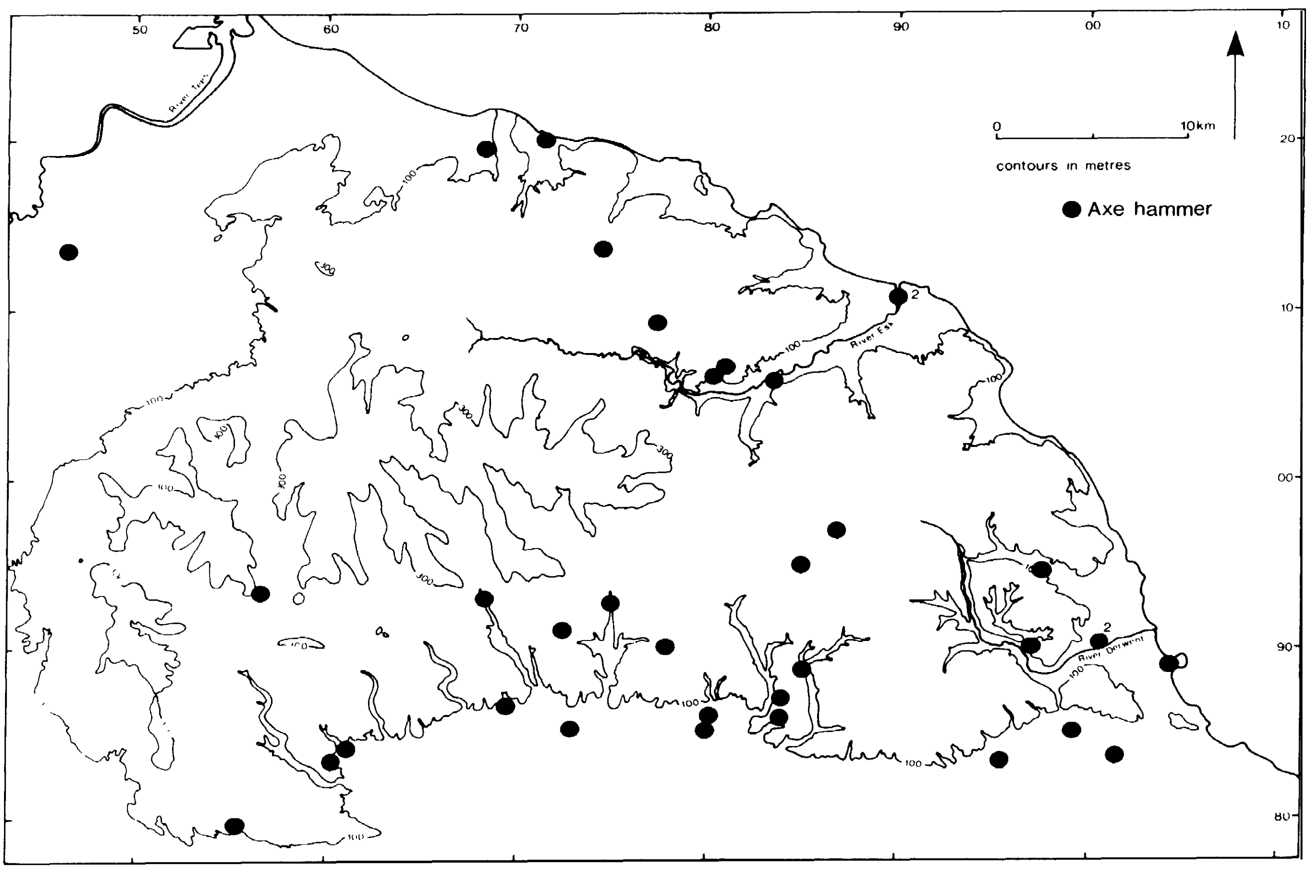


Figure 42 Distribution of stone axe hammers

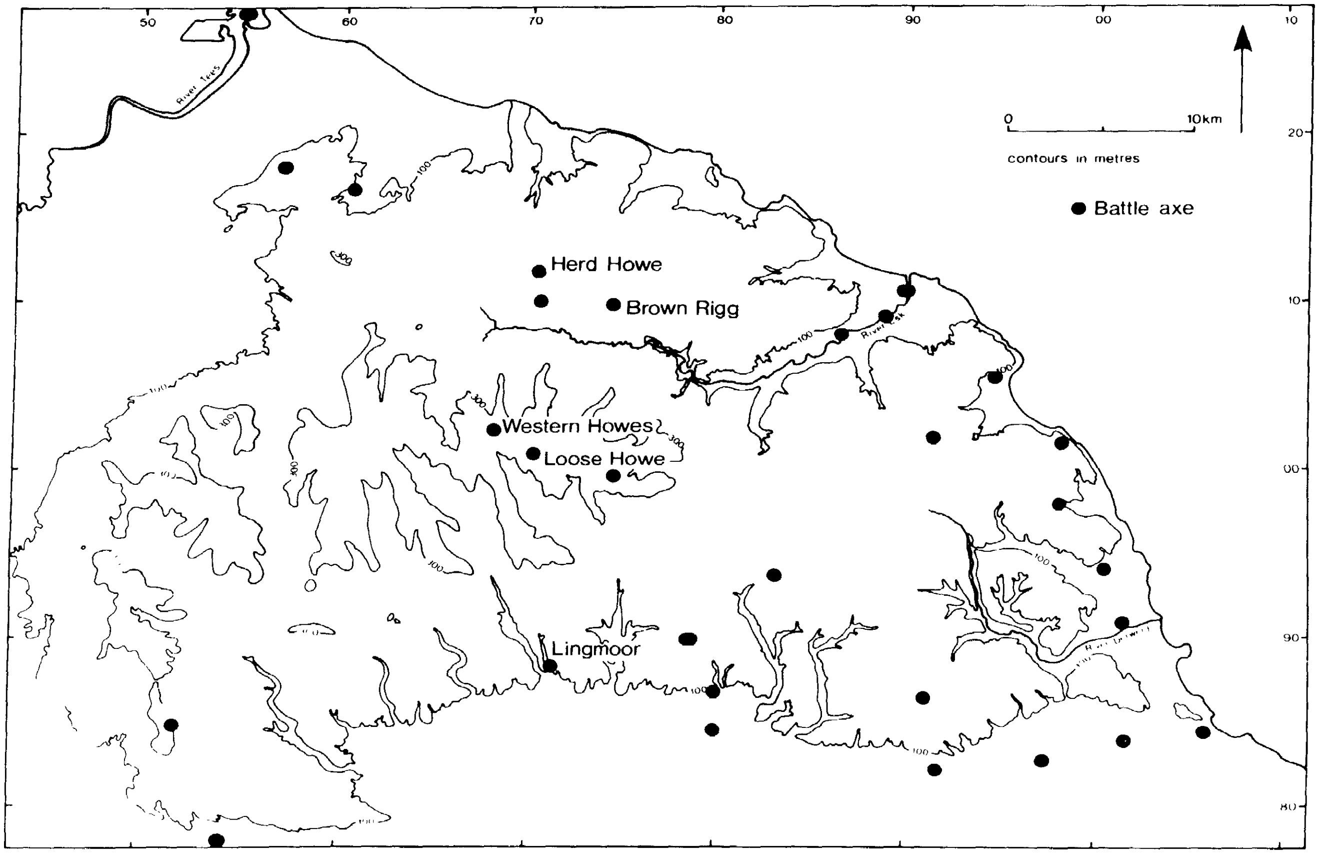


Figure 43 Distribution of stone battle axes

positions which have not been discovered because of the perishable nature of these remains, and the probability of their traces being undetected by the crude methods of the early diggers. We must take Loose Howe as an indication that a social level higher than the local headman possibly did exist in this society. This is broadly in agreement with Pierpoint's (1980) conclusions from his study of a wider range of Yorkshire Bronze Age tumuli. By making cluster analyses of the data on pottery attributes, grave goods, and skeletal remains, he deduced social relationships from both beaker and food vessel burials. This analysis was not possible with collared urns because very few of the cremations had been preserved and it was therefore not possible to relate grave goods to the sex and age at death of the skeletal material. Pierpoint did however define a group of rich burials of the urn period in prominent barrows, with oak coffins and exotic objects such as battle axes and daggers, of which he gave Loose Howe as the outstanding example. He also showed that, in general, the richest and best grave goods accompanied the male burials.

Artefact distributions

We have already discussed in Chapter 4.2 the distributions of flat bronze axes, bronze daggers and cupstones, whose dates span the Late Neolithic/earliest Bronze Age and the Early Bronze Age. The bronze metalwork, apart from the two Loose Howe daggers, is confined to the eastern and central Tabular Hills, and this includes the flanged axes which appeared at about 1450 bc. The cupstones, both those in barrows and those on earthfast boulders, have a distribution peripheral to the hills, similar in fact to that of the beaker graves. The artefact distribution taken overall argues for the continuity of the Neolithic settlement pattern, which was on the Tabular Hills and areas peripheral to the moors, into the later period. This is confirmed for the Early Bronze Age by the distribution of perforated stone axe hammers and battle axes, both dating about 1650-1250 bc (I F Smith, 1979). Figures 42 and 43 show the similarity of their distributions conforming to those of the other artefacts of the period, in a pattern first displayed by the Neolithic axe finds

Table 26 Axe hammers

Place	OS Grid	Comment	Reference
Brotton			Middlesbrough Museum
Maltby			Middlesbrough Museum
Skinningrove			Yorkshire Museum
Scaling			Whitby Museum
Lealholm, Stonegate			Whitby Museum
Crathorne			Middlesbrough Museum
Whitby		Group XVIII	Leeds Museum; Roe (1979)
Egton			York Museum
Grosmont			York Museum
Egton Bridge			Whitby Museum
Rigg Hall, Whitby		Group XVIII	Keen & Radley (1971); York Museum
Rosedale			York Museum
Farndale		1/2 axe	Roe (1979)
Bilsdale	SE 567932		Hayes (1963)
Lockton	*c* SE 870970	1/2 axe	Smith D (1976)
Saltersgate	*c* SE 850950	1/2 axe	Hayes (1968a)
Harwood Dale	SE 975946		Agar (1973)
Scalby		Type 11a Group XVIII	Roe (1979)
Scalby Beck		1/2 axe Group XVIII	Roe (1979)
Hackness			York Museum
High Dalby Warren			York Museum
Scarborough		Greywacke	Leeds City Museum
Kingthorpe			York Museum
Kingthorpe	*c* SE 8487	Stone	Malton Museum
Kirkbymoorside		(a) Greywacke; (b) Gabbro	Kenn & Radley (1971); Sheffield Museum
Spaunton	SE 725910	Under medieval building	Hayes (1964a)
Lingmoor, Hutton-le-Hole	SE 713883	Loose Howe type	Hayes (1978)
Sinnington Manor	SE 730851		Hayes (1969)
Pickering	*c* SE 800850		Scarborough Museum
Beadlam	*c* SE 6585	Part of axe	Scarborough Museum
Helmsley, Harome Road			Hayes (1963); Hull Museum
East Ayton		Type 1a Group XVIII	Roe (1979)
Pickering, Parks		Quartzite	Keen & Radley (1971); Yorkshire Museum
Seamer			Scarborough Museum
Helmsley, Duncombe Park			Hayes (1963)
Ruston Wass		Type 1b Group XVIII	Roe (1979) York Museum
Thorpe-le-Willows	SE 578770	Dolerite	Hayes (1965)

Notes: Group XVIII axe hammers are of whinstone, from igneous dykes in West Durham and Northumberland. Typology of axe hammers as given in Roe (1979).

Table 27 Battle axes

Place	OS Grid	Description	Reference
River Tees		1 mile from river mouth. Type V.	Middlesbrough Museum; Elgee (1930)
Street House	NZ 739182	Fragment in capping level of ritual monument	Vyner (1988a)
Eston Moor, near Guisborough		Type II	Whitby Museum
		Type I	Elgee (1930) (illustration)
Herd Howe	NZ 704117	Associated with cremation urn. Types III grey syenite. Barrow: Type II	Atkinson J C (1864; 1874; 1891); Smith R A (1924)
Danby North Moor, Whitby		1— Type IV Group XVIII 2— Group XVIII	1— Roe (1966); Whitby Museum 2— Roe (1979); Leeds Museum
Ruswarp			Elgee (1930) (annotation)
Sleights			Elgee (1930); Yorkshire Museum
Glaisdale	*c* NZ 746094	In a round barrow with cremation. Basalt. Type II	Atkinson J C (1864)
Western Howes	NZ 681022	Inside collared urn with accessory cup. Type IV. Grey syenite	Atkinson J C (1863); Roe (1966)
Robin Hood's Bay		From barrow. Type III. Group XVIII	Howarth (1899); Roe (1966)
Fylingdales			Elgee (1930) (annotation); Whitby Museum
Peak	NZ 981015	In barrow cist	Knox (1855); Elgee (1930)
Staintondale	SE 980980	Cist inhumation	Knox (1855), plate 18; Elgee (1930)
Loose Howe	NZ 702008	With collared urn, accessory cup and bronze dagger. Basalt. Type V	Elgee & Elgee (1949)
Levisham Moor	SE 832936	Type II	Elgee (1930); Kendall collection, Yorkshire Museum
Levisham Moor		Type II	Pierpoint & Phillips (1978); British Museum
Scalby		Type III	Roe (1979)
Scamridge			Howarth (1899)
Scarborough, Cloughton	TA 004940	Unfinished (no shafthole)	Leeds Museum
Moors, near Scarborough		Hornblende granite. Casual find (illustration in Elgee, 1930). Type III	Keen & Radley (1971); Sheffield Museum
Spaunton	SE 713883	In round barrow with cremation. Syenite. Type III	Hayes (1978)
Spaunton	SE 722899	Casual find. Dolerite? Type I	Buckley S pers comm
3 km N of Pickering		Type IV. Quartz-dolerite, possibly group XVIII (1 of 2 possible barrows in Bateman, 1861)	Keen & Radley (1971); Sheffield Museum
Hambleton Moor		Type IV. In barrow	
Pickering		Whinstone	Knox (1855) (illustrated)
Cawthorn		Type II	Roe (1966); Yorkshire Museum
Cawthorn Stackyard		Type III	Elgee (1930) (illustration)
17.5km E of Pickering		Ploughed out from barrow with clay vessel. Barrow contained urn cremation	Bateman (1861); Keen & Radley (1971); Sheffield Museum

Place	OS Grid	Description	Reference
Seamer		Type I	Roe (1966); Yorkshire Museum
Coxwold		Type I	Evans (1897); British Museum
Hutton Buscel		Type II	Roe (1966); Scarborough Museum
Snainton		Type V	Roe (1966); British Museum
Cayton		Type II	Roe (1979)

Notes: *Typology as given in Roe (1966). Stages I to V are in approximately chronological order. Group XVIII axes as for axe hammers.*

(see also Tables 26 and 27). The axe hammers are practical working tools, not found in burials, and are therefore likely to be more representative of the settlement areas. The battle axes, however, are found in the round barrows as well as casual finds, so that they are located both in the settlement areas and in four instances (Table 25) in the watershed barrows, where they accompany urn cremations. The artefact distribution pattern therefore confirms the preponderance of settlement on the Tabular Hills, and in areas peripheral to the sandstone moorlands. The conspicuous spread of barrows and cairnfields on the high moorlands is deceptive; the main settlement areas were elsewhere, on the lower terrain, as in the preceding and succeeding periods. The richest area, as in the Neolithic period, was the eastern part of the Tabular Hills.

Cairnfields

Cairnfields are groups of stony cairns, the cairn diameters being usually about 5m or less. They are nearly always integrated with lines of tumbled stone walls, sometimes with lynchets, and only rarely con-

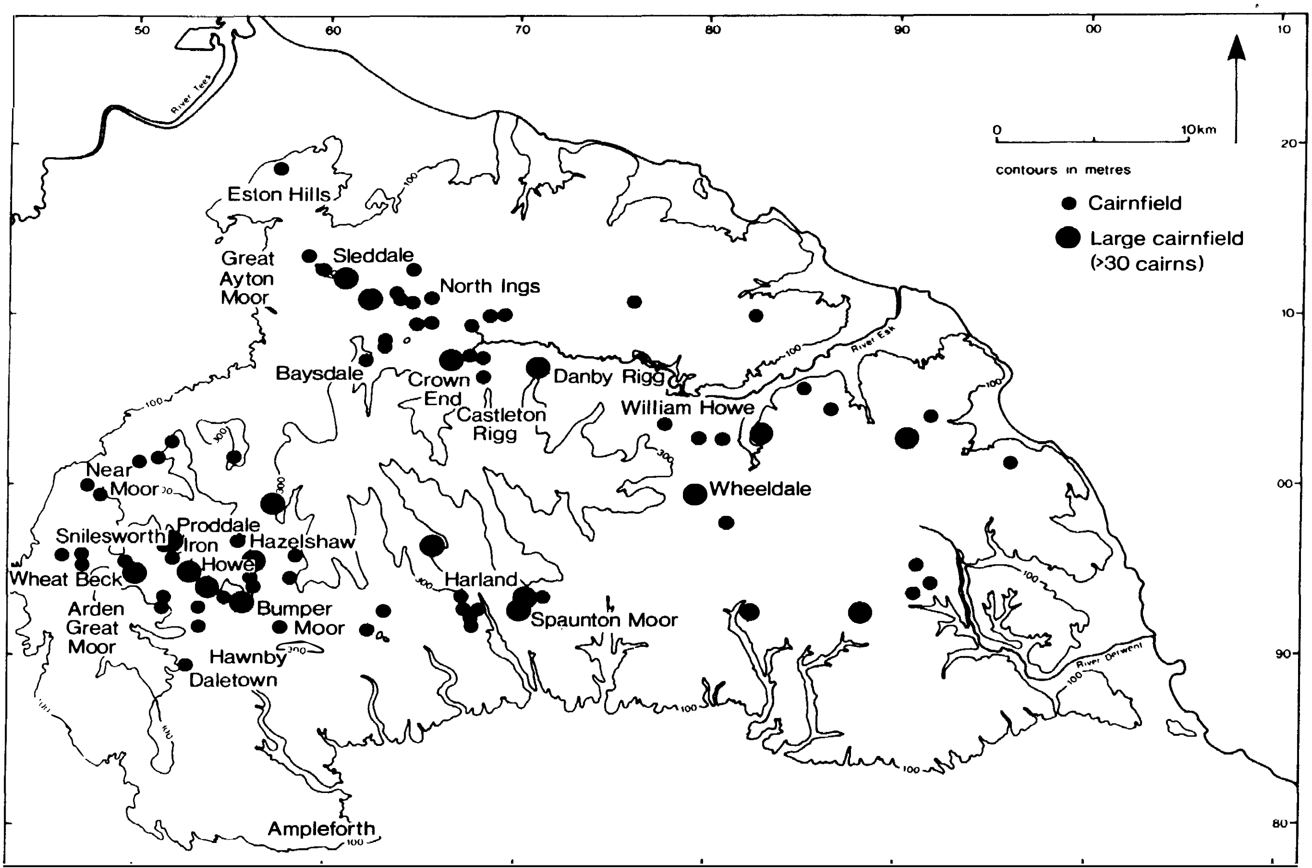


Figure 44 Distribution of cairnfields

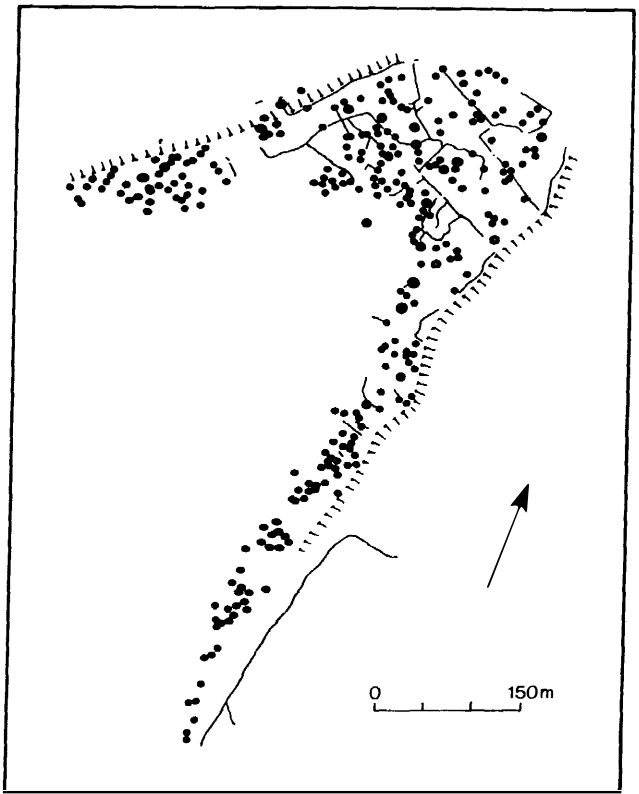


Figure 45 Cairnfield at Iron Howe (after R H Hayes and J B Rutter)

tain hut circles. They must be distinguished from 'barrow groups', which comprise numbers of burial barrows of various sizes standing in close proximity with no other direct associations: examples are on Eston Hills and Ampleforth Moors. Figure 44 shows the distribution of the 78 cairnfields in the area; see also Table 28. Of these, 76 are on the sandstone moorlands; two only are on the limestone, one on the eastern tip of Arden Great Moor, the other on the eastern spur above Daletown — which may, however, be a barrow group. The sandstone cairnfields are in three main groups: on the spurs overlooking Eskdale; on the spurs and scarp edges both east and west of Bilsdale; and to the north of the Tabular Hills, below the scarp edge. They are not found on the central watershed, but occasionally they are preserved in the dales and on the dale sides, and these will be discussed in the next section, on valley settlements.

Cairnfields vary considerably in size. Some contain only half a dozen cairns, as on Snilesworth Moor. Others, such as the famous sites at Crown End and Iron Howe, have hundreds, and the recent survey by Professor Anthony Harding shows over 1000 cairns on Danby Rigg (Harding, forthcoming). Few cairnfields have been surveyed, and only Danby Rigg has been investigated using a full range of modern archaeological and environmental techniques. Hayes and Rutter's (1963) survey of Iron Howe is given as Figure 45, and their survey of Bumper Moor as Figure 46. The interesting Near Moor field system is given as Figure 47 and Professor Harding's survey of Danby Rigg as Figure 48. Maps of Crown End and Sleddale cairnfields are provided by Elgee (1930: 144-5).

The cairnfields are not usually sites of permanent settlement, for hut circles are rarely found on them. There are two at Iron Howe, one at Thompson's Rigg, several possible hut platforms at Crown End and some possible circles at Danby Rigg recorded by Harding between the cross-rigg dykes, in an area apparently exclusively given to settlement. Absence of permanent settlement is corroborated by the paucity of finds; bronzes, stone axes, axe hammers, battle axes are all absent, there are few querns and rock carvings and not many flint artefacts. Hayes (1963) comments: 'The people who occupied these settlements at intervals probably lived in more sheltered places in the crags or dalesides.' Neither does there seem to be much funerary activity related to the cairnfields. Many people have excavated the small cairns and found nothing other than charcoal, though this does not disprove inhumation. Very

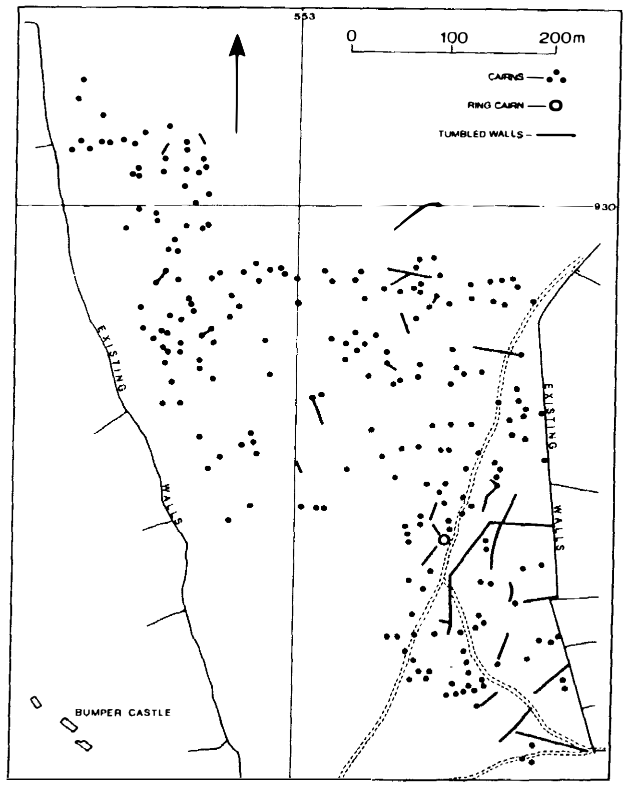


Figure 46 Cairnfield at Bumper Moor (after R H Hayes and J B Rutter)

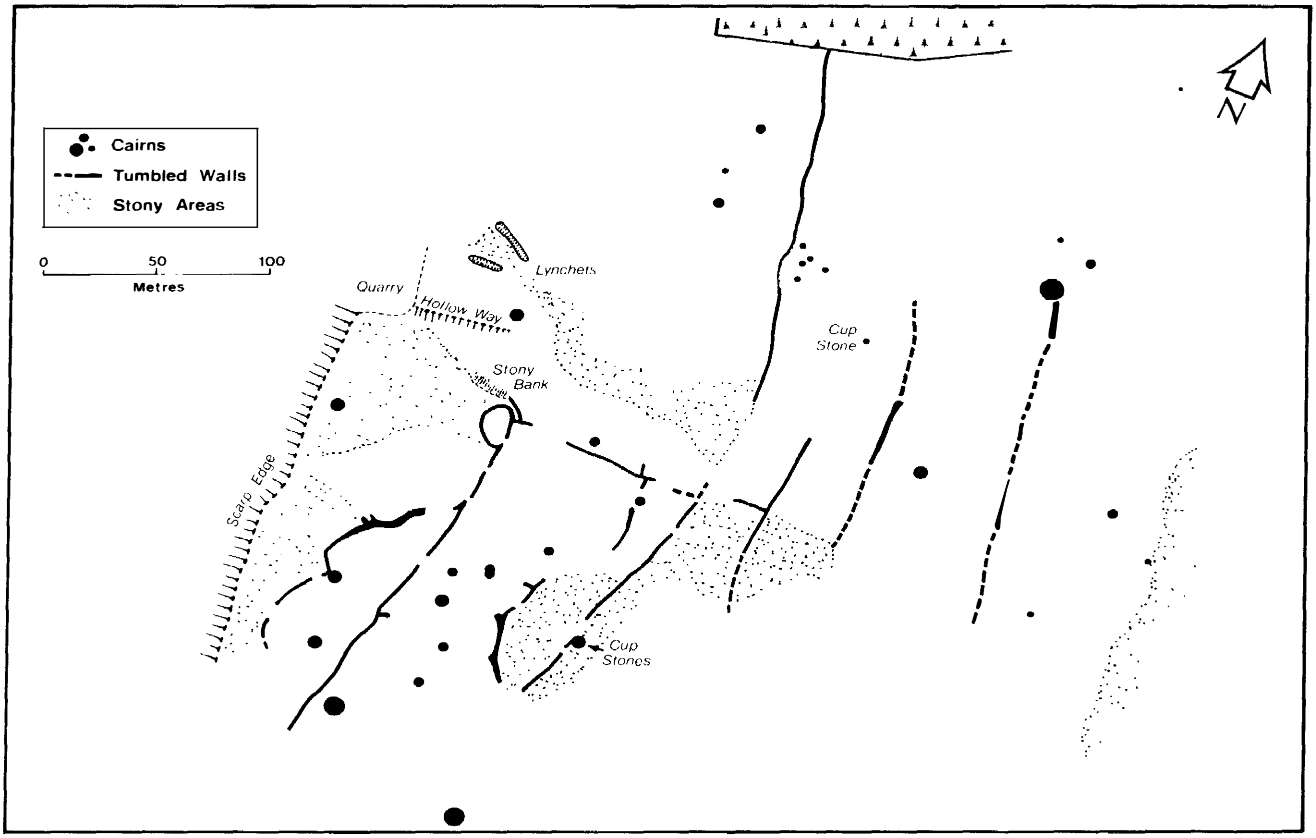


Figure 47 Cairnfield at Near Moor (after R Inman)

seldom has there been positive evidence, however; Ashbee (1957) found a cist beneath a small cairn on Kildale Moor, and there were cup-and-ring stones, presumably indicating some ritual activity, in a small cairn at Near Moor. Harding's recent work, following J C Atkinson's (1861) original observations, has shown several ring cairns on Danby Rigg (Figure 48); one of these produced urns, charcoal and calcined bones when excavated by Atkinson (1863). Cairnfields such as Danby Rigg, Near Moor and Wheat Beck also contain small numbers of round barrows; there are two on Danby Rigg excavated by Lamplough and Baker in the 1950s but unpublished. The ring cairns and barrows are of course not necessarily contemporary with the cairnfields.

Not infrequently the cairn stones are piled against an earthfast boulder, and in view of the association of the cairns with field walls and lynchets it seems most likely that their major purpose was for field clearance. Indeed, it is possible to see discrete areas cleared of stones, as shown at Near Moor (Figure 47), and observed by Harding at Danby Rigg. We must therefore interpret the cairnfields as field systems, not permanently occupied. Some of the cairnfields, particularly those on the interfluvial spurs, are delimited by linear earthworks; examples are Danby Rigg, Crown End and William Howe (Glaisdale). These cross-rigg dykes are territorial boundaries appropriate to spur terrain and will be discussed in the next chapter. They do not interact with the cairns so their relative dating is uncertain; the recent radiocarbon dates of about AD 1000 for charcoal from the ditch bottoms of the double dykes at Danby Rigg indicate that they must have been open until that period. The farming on the cairnfields seems to have been a mixture of arable and pastoral. The evidence for arable is of the lynchets, frequently observed in cairnfields on sloping ground, as at Near Moor, Rhumbard Snout, and Harland Moor, and the fairly regular layout of some of the field walls on the larger cairnfields. Pastoral activity is indicated by the deep hollow-ways which are found almost invariably linking the cairnfields to the neighbouring valleys, and occasionally by pastoral enclosures. The mixed nature of the farming on the moorland from the Early Bronze Age onward is shown by the pollen analyses (Chapter 2).

Cairnfields vary both in their sizes and in their proportions of walling to cairns; Wheeldale Moor

Table 28 Cairnfields

Place	OS Grid	Description	Reference
Eston Moor	NZ 576185	Probably a group of burial cairns	Elgee (1930)
Hutton Moor	NZ 590132		OS map
Hob on the Hill	NZ 643125		Elgee (1930)
Great Ayton Moor	NZ 595125	Extensive cairnfield with Celtic fields	Haves (1967a)
Sleddale	NZ 637110		Elgee (1930)
Sleddale	NZ 638108		Elgee (1930)
Wayworth	NZ 644106		Elgee (1930)
Percy Rigg	NZ 622106	Many cairns with extensive walling and circular enclosure. Cairns excavated	Ashbee (1957)
Black Dyke Moor	NZ 762106		OS maps
Eden House, Barnby Moor	NZ 826099		Hayes (pers comm)
Danby Low Moor	NZ 677097		OS maps
Danby Low Moor, Haw Rigg	NZ 694098		OS maps
Kempswithin 1	NZ 655095	Cairns with fields, lynchets	Elgee (1930)
NE of Box Hall	NZ 677093	Cairns with fields and huts	North Yorkshire Sites and Monuments Record 8180201
Kempswithin 2	NZ 647092		Elgee (1930)
Kildale Moor	NZ 631084	Surveyed. Cairns, banks and lynchets	Feachem (1973)
Kildale Moor	NZ 632080		Elgee (1930)
Rigg End	NZ 674075	Group of 7 cairns	Iles (pers comm)
Gallow Howe	NZ 681074	Group of 10 cairns	North Yorkshire Sites and Monuments Record 809.06
Danby Rigg	NZ 710065	Large cairnfield with cross-ridge dykes. Collared urns in burial circle, food vessel urn in tumulus	Elgee (1930); Whitby Museum, Harding A F (forthcoming)
Castleton Rigg	NZ 683061	8 mounds	North Yorkshire Sites and Monuments Record 820
Eskdaleside	NZ 853055		Elgee (1930)
Sleights Moor	NZ 867042		
Ramsdale	NZ 920038		
William Howe	NZ 778034	About 20 cairns with field walls between cross-ridge dykes	Elgee (1930)
Allan Tops	NZ 828028	Very extensive cairnfield with walling. Celtic fields	Elgee (1930)
Murk Mine Moor	NZ 797027		
John Cross Rigg	NZ 905027	Very large cairnfield, now destroyed. Cross-ridge dyke through southern end	Elgee (1930)
Struntry Carr	NZ 808026	Cairns and walls within large enclosure	Unpublished
Howe Moor, Charlton Bank	NZ 519025	Now destroyed, apart from 1 round barrow, 1 square barrow	Hayes (1963)
Cold Moor	NZ 552017		Elgee (1930)
Live Moor	NZ 512014	Long walls, fields, lynchets	Hayes (1963)
Live Moor	NZ 502011	Small group, with walling	Hayes (1963)
Peak Moors	NZ 960010		Elgee (1930)

Place	OS Grid	Description	Reference
Near Moor	SE 474999	Enclosure with fields and cairns	Elgee (1930); Goddard *et al* (1980)
Wheeldale Gill	SE 795994	60 cairns without walls. Surveyed 1978 - 1979	Smith D (pers comm)
Pamperdale	SE 481993	19 cairns, enclosure nearby	Browarska and Spratt (1980)
Nab End Moor, Bilsdale	SE 572989	40-50 cairns, with fields and walls	Hayes (1976)
Howl Moor	SE 813978		OS maps
Flat Howe	SE 555967	Small group	Spratt (unpublished)
Horn Nab, Farndale	Se 657963	30 cairns and walling	Hayes (1963)
Loosehowe Hill	Se 587959	5 small cairns	Hayes (1970)
Thimbleby Moor I	Se 462959	Small cairnfield	Brown & Spratt (1977)
Thimbleby Moor 2	SE 472958	Extensive field system, few cairns	Brown & Spratt (1977)
Snilesworth Moor	SE 520958	Small group with walling	Spratt (unpublished)
Limestone Ridge	SE 562952	Extensive cairnfield and Celtic fields	Hayes (1963)
Snilesworth Moor	SE 494954	2 small groups of cairns	Spratt (unpublished)
Maw Rigg 1	SE 910950	Extensive group, now forested	Elgee (1930)
Iron Howe	SE 527948	Large cairnfield with fields and walling. 2 hut circles	Hayes (1963)
Fangdale Beck	SE 561945	Group of cairns with orthostats and walls	Spratt (unpublished)
Low Crosset	SE 583944	10 cairns with walling	Spratt (unpublished)
Helm House Wood	SE 563940	10 cairns with extensive walling and orthostats	Hayes (1963)
Hawnby Moor	SE 537940	Large cairnfield, surveyed	Hayes (1963)
Maw Rigg 2	SE 920940	Extensive group, now forested	Elgee (1930)
Maw Rigg 3	SE 910935	Extensive group, now forested	Elgee (1930)
Harland Moor 1	SE 671933	Small cairn group	Hayes (1963)
Spaunton Moor	SE 705933	80 cairns with walling	Hayes (1963)
Spaunton Moor, Spindlethorn	SE 714932	12 small cairns, 1 excavated	Hayes (1975a)
Cow Wath	SE 514932	Small group	Spratt (unpublished)
Bumper Moor	SE 555930	Large cairnfield with ring cairn. Hut circle	Hayes (1963)
Arden Great Moor	SE 515928	Small group of cairns, orthostats	Spratt (unpublished)
Skiplam Moor, Cow Sike	SE 631926	10 cairns	Hayes (1963)
Spaunton Moor	SE 702925	30-40 cairns, now destroyed	Hayes (1963)
Harland Moor	SE 673925	12 cairns near megalith wall	Hayes (1963)
Harland Moor	SE 681925	Small group on valley slope	Hayes (1963)
Thompsons Rigg	SE 883923	Large cairnfield, hut circle	Hayes & Rutter (1975)
Harland Moor 4	SE 676920	20 cairns with walling and lynchets	
Harland Moor 5	SE 677917	20 with walling and circles. Probably more extensive originally	Hayes (1963)
Carr Cote	SE 578917	12 cairns	Hayes (1963)
Rhumbard Snout	SE 818915	Long-field walls, cairns, small field, hut circle	D & E King (pers comm)
Birk Nab	SE 623914	20 small cairns, originally more	Hayes (1963)
Daletown	SE 527892	Saxon burials (Denny)	Hayes (1963)

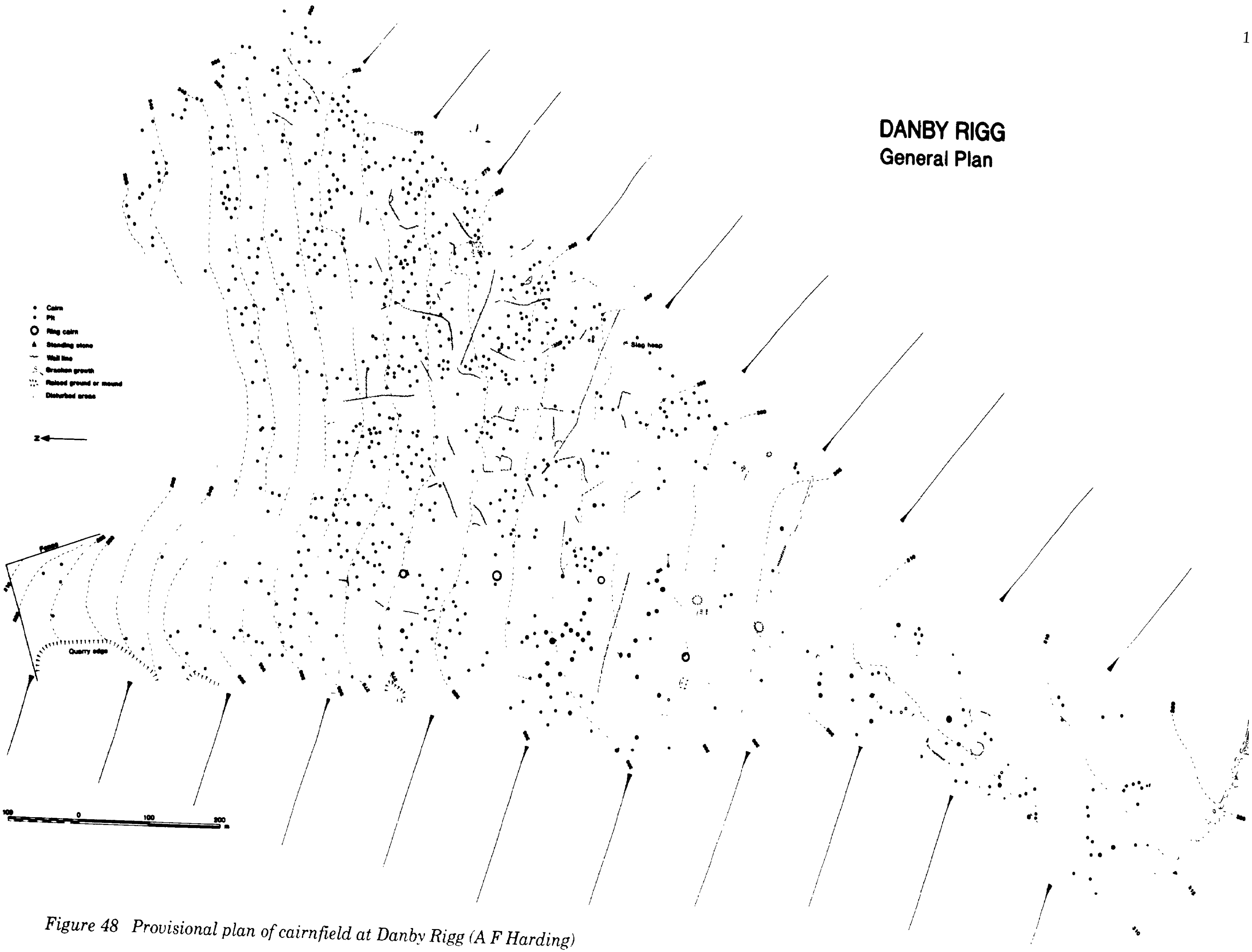


Figure 48 Provisional plan of cairnfield at Danby Rigg (A F Harding)

cairnfield consists entirely of cairns, but Near Moor, for example, has few cairns, but an elaborate and extensive wall system. Presumably the early activity during woodland clearance was free-range pastoralism, for pollen analyses show that woodland clearance was in progress long before the appearance of cereal pollen in detectable amounts. Field walls would be needed to protect the crops when arable farming started. Once the soil had started to erode, exposing the broken rocky subsoil, there would be a large amount of stone to clear and building of cairns would start. Harding carefully excavated a cairn attached to a length of wall on Danby Rigg and found the cairn to post-date the wall. As ploughing became increasingly impossible, fields went out of use and we find, as at Crown End and Iron Howe, large cairns in the middle of small fields, and at Near Moor, for example, one area has been kept clear by throwing stones haphazardly into a neighbouring small field. Harding has observed on Danby Rigg that stones of a wall and an adjacent cairn rested directly on the leached subsoil surface, and concluded that clearance of stone was a consequence of soil impoverishment, rather than a precursor of it. Of course, both are possible. We must await Harding's analysis of all the environmental information before drawing final conclusions.

Harding's plan of Danby Rigg (Fig 48) seems to indicate three activity areas on the cairnfield. The stone walls are concentrated in the north-east sector, and, although fragmented, are undoubtedly a field system. In the north-west, there are few walls, but a concentration of ring cairns and 25 cairns of diameter 4m. Between the cross-rigg dykes there are comparatively few cairns, but there are enclosures, walls and possibly hut circles. One may therefore propose a field area, a ceremonial area, and a possible settlement area. This reproduces the pattern shown in the valley cairnfield at Wheat Beck (Fig 50), where there is a field and cairn area shown on the western area of the plan, an area of enclosure and settlement in the north-east sector, and an area of barrows and cairns south of this. As would be expected, the cairnfield at Wheat Beck is much less eroded than that on Danby Rigg.

A major problem is the date-span of the cairnfields. We might be tempted to associate them with the earliest cereal pollen in the palaeobotanical record, but then we do not know unequivocally the origin of the cereal pollen. It might be argued, however, that they are not earlier than the first appearance of the cereal pollen, that is on the sandstone moorland during the Early Bronze Age. An Early Bronze Age date is also indicated by the cup-and-ring stones in the structure of the field wall at Near Moor, where a large round barrow is also integrated into the field wall. Most other dating evidence is by association with ring cairns (Table 24) and with round barrows which have produced Early Bronze Age pottery, as at Danby Rigg (Lamplough and Baker, 1955; J C Atkinson, 1863). Elgee's (1930) conclusion that the cairnfields have Early Bronze Age origins has been strengthened by the later evidence rather than weakened. But there is no doubt that activity continued into the Iron Age on two of the major cairnfields. The stone enclosure walls at Crown End have produced iron furnace slags of Iron Age type (Harbord and Spratt, 1975), while on Great Ayton Moor a similar enclosure near the cairnfield was built about 300 bc in grassland terrain, and showed mixed farming in the late Iron Age (Tinkler and Spratt, 1978).

The recent radiocarbon dates on charcoal from the ditch bottoms of the double dykes on Danby Rigg show that the ditches had been kept open until 1000 AD and that this may even be their date of construction. This opens the possibility that Danby Rigg was operated as a hill farm or sheiling long after the prehistoric period. Perhaps we can postulate classes of cairnfields - Danby Rigg and Bumper Moor, where the fields are disturbed, and fragmentary after long continued activity, and Near Moor and Wheat Beck, where the field evidence is much clearer and less disturbed, because they were abruptly abandoned at the ends of their working lives. Harding's work has clearly opened up possibilities for future work on the cairnfields.

The valley settlements

Prehistoric settlements have not often survived in the dales of the North Yorkshire Moors. One factor is that in many of them the rivers have eroded through the Jurassic sandstone into the lower shales, which has resulted in wide and fertile farmland in the dale bottoms, in which early settlements have been obliterated by centuries of ploughing. Another factor is the extent to which soil has been washed from the hills to settle in the valleys. There are sufficient casual finds in the dales of Neolithic axes, Bronze Age artefacts and Iron Age beehive querns to show that there certainly was prehistoric settlement in them, and that it could be quite considerable is shown by the large number of prehistoric artefacts found in the windypits (limestone fissures) in the Rye valley above Helmsley (Hayes, 1963, 1987).

The surviving prehistoric valley sites are often found in the extreme heads of the dales. Of those given in Table 29, Sleddale, North Ings, Baysdale, Proddale, Wheat Beck and Hazelshaw are all near the valleyheads. The most prolific area for valley settlements is in the Snilesworth-Hawnby area and the last 7 of the 12 listed in Table 29 are from this area. The reason for their survival is that, in this part of the moors, the river has not cut into the lower shales, so that the less fertile sandstone terrain extends to the riverside itself, and the valley settlements have on the whole been subject to less agricultural disturbance. The best preserved of these is at Wheat Beck, which seems to comprise a complete, though complex and multi-period, mixed farming settlement with a round hut, enclosures, long field walls, clearance cairns and tumuli. A preliminary survey is shown as Figure 50.

The dates of these valley settlements are not well established. Morphologically they closely resemble the cairnfields, and at Wheat Beck there are double -orthostatic enclosures of similar construction to the enclosure at Near Moor (Fig 491), and the round hut and small fields here also indicate a prehistoric date. A flat quern of Romano-British type has been found in the Wheat Beck site, so one must suppose that this site is contemporary with the cairnfields and persisted later than the Bronze Age. Settlement has of course continued in the dales until the present time and even in the remote valley heads until the 1950s.

A *model of the Early Bronze Age economy and settlement pattern*

Fortunately there exists in the north-west corner of the moors an area in which the Bronze Age remains are so completely preserved that it is possible to reconstruct with some degree of assurance the territorial pattern of settlements and boundaries. This area is the triangle bounded by the river Seph on the east, which runs through Bilsdale, the upper Rye valley on the south-west and the north-west scarp of the hills from Osmotherley to the head of Rilsdale. It is shown on Figure 51 which also gives the round barrows, the cairnfields and the valley settlements, all of them relatively numerous and well preserved in this area.

The evidence given in Chapter 2 for the Early Bronze Age economy is of mixed farming, with a large element of hill pastoralism, with consequent destruction of parts of the hill forest resulting in turn in podzolization and erosion of patches of hill soils, which undoubtedly took place in some parts before the construction of the round barrows (Dimbleby, 1962). In the face of the rise in population which may well have accompanied the initial expansion of activity on the hills and the subsequent decline in their fertility, some kind of territorial organization would seem to have been necessary. We have discussed in previous chapters the indications of the use of watersheds as meeting places and boundaries before the Bronze Age and these would be natural boundaries for any groups with a large pastoral element in their economy. These were now marked with round barrows in lines along the watershed, containing, as has been discussed, the collared urn cremations of the local leaders, apparently of similar status. Further, the streams and rivers not only form clear boundaries; it was absolutely necessary to share their waters if there was to be an efficient pastoralism. They would have been vital as boundary features, and are incorporated into other prehistoric boundary systems such as the Dartmoor reaves (Fleming, 1978) and the Cleave Dyke (Chapter 5.2). Figure 44 shows the watersheds and rivers as boundaries, and it is seen that they divide the terrain into separate territories, each, as it happens, with about 8 sq km of grazing land, each with access to the valleys and streams, and each with a cairnfield. An idealized model of this system is shown in Figure 53. We have already discussed how the permanent settlements of the Bronze Age were essentially on the lowland, and that the cairnfields were not permanently occupied farms, so that it seems reasonable to think of the cairnfields as

Table 29 Valley settlements

Place	OS Gird	Description	Reference
Sleddale	NZ 609122	Cairnfield in valley	OS maps
North Ings, Commondate	NZ 652112	Walls and cairns on valley side	
Long Green, Commondale	NZ 657096	Fields, walls, cairns, Lynchets	Elgee (1930)
Baysdale	NZ 622073	Walls, cairns, huts? on valley side	
Crossley Gate, Danby	NZ 717065	Small fields	Elgee (1930)
Proddale Beck, E	SE 518967	Large Valley side cairnfield, with Cairs, walls and field	Browarska *et al* (1979)
Proddale Beck, W	SE 515965	Cairns, walls and terracing above steep valley slope	Browarska *et al* (1979)
Snilesworth Lodge	SE 511960	Orthostats, cairns, terracing on gently sloping dale side. Saddle quern found	Browarska *et al* (1979)
Wheat Beck	SE 503947	Extensive settlement with hut, enclosures, fields, carins and tumuli	Spratt & Brown (1978)
Hazelshaw	SE 549934	10-12 cairns and walls on dale side	Hayes (1963)
Prywood	SE 533929	8 cairns and orthostats in flat valley bottom	Hayes (1963)
Hazel Heads	SE 534918	10-12 cairns with walling	Hayes (1963)

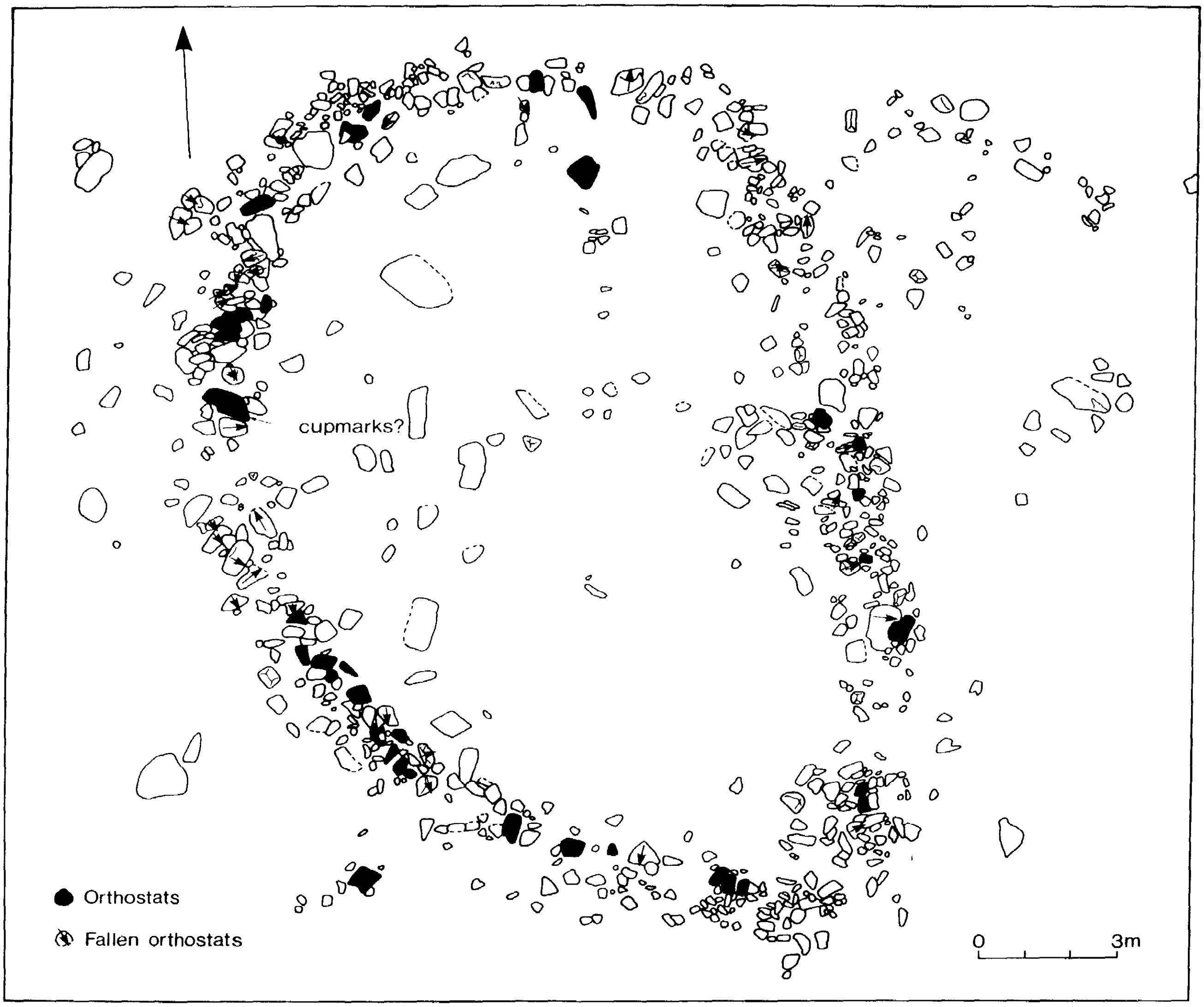


Figure 49   Orthostatic enclosure at Near Moor (after R E Goddard)

'shielings', that is, seasonal farms used for arable and pasture in the warmer months (Spratt, 1981). It is worth noticing in passing that these proposed Bronze Age boundaries are strikingly similar to the modern township boundaries which run along the watersheds and streams (Fig 54). In fact where the modern boundaries diverge from the earlier ones, it can be shown that changes took place in historic times (Spratt, 1981). Watersheds and stream boundaries are appropriate to any period in which there was substantial pastoral activity. It is significant that the Celtic names which survive in the area are almost all of rivers and hills. It seems to have been more important to early people to hand down the names of boundary features rather than those of the settlements which may have been less permanent.

This territorial pattern is readily identifiable on the north-west corner of the moors, but it can be seen to extend over the whole sandstone area, if in a more fragmentary way. The watershed barrows (Fig 55), are a feature of the central moorlands, and the cairnfields lie characteristically on the spurs or on the periphery of the hills. The same relation of the barrows and cairnfields is apparent near the other barrow lines shown on Figure 55, but it becomes less definite as we move from the high infertile moorlands of the north-west, where the watershed stands at 370-400m, to the south-east above

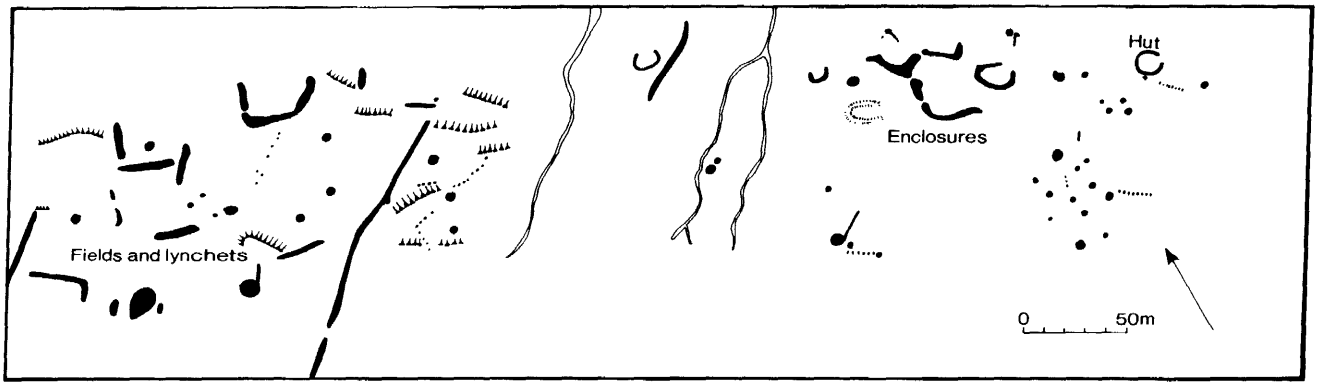


Figure 50 Settlement at Wheat Beck (Leeds University Extra-Mural class)

Harwood Dale, where it is at 230m. This may be due to the greater destruction of the prehistoric monuments at lower altitudes, or because, as shown by Atherden's (p41) work, the intensity of Bronze Age clearance and agriculture was not uniform across the sandstone moorlands.

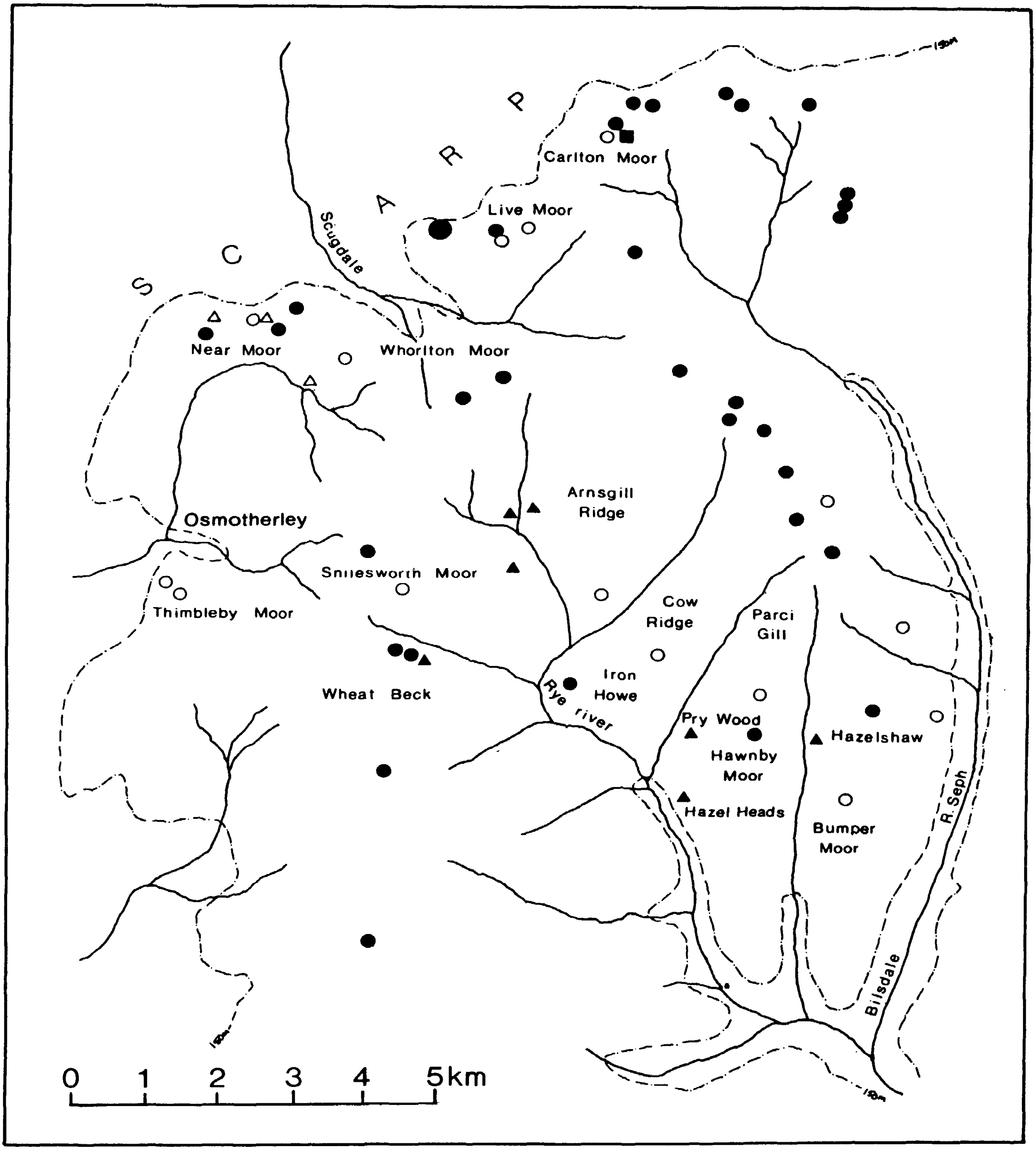
Conclusion

The economy of the Early Bronze Age therefore appears to be somewhat different from that of the preceding period. The Neolithic pattern was of lowland settlement and seasonal movement on the wooded hills for pastoralism, hunting, ritual and social gatherings. The Early Bronze Age farmers, retaining the lowland pattern of permanent settlement, used the sandstone hills for seasonal mixed farming shielings, intensified their pastoralism widely across the hill forests and, as the forest continued to decline, marked out their territories with cremation barrows on the watersheds, where ritual, and possibly social, activities still continued. Unfortunately this pressure on the fragile ecology of the hills set in train irreversible environmental, particularly pedological, changes which rendered their economy unstable. From this period we see in some pollen analyses an increase of heath vegetation to an extent from which it usually did not subsequently retreat- In some areas, then, the hill soils had become podzolized, and fertility had catastrophically declined beyond recall.

We have seen from the evidence of the round barrows that the social organization at this time is one in which the local leaders are the important figures. They are commemorated in cremations of equal status in the barrows, and evidence of higher status burials is quite exceptional. And the deduction from landscape analysis is of the division of the territory into 'estates' of equivalent type, by natural and ritual boundaries. The society seems to be not much developed from the anthropologist Marshall Sahlins' (1968) definition of a 'segmentary tribe'. Sahlins does not divide tribes rigidly into classes according to their social organization, but sees a continuous range from 'segmentary' to 'chiefdom' types. 'At the underdeveloped end of the spectrum, barely constituting an advance over hunters, stand tribes socially and politically fragmented and in their economies undiversified and modestly endowed.' Sahlins further describes the territorial organization of a 'segmentary' tribe which seems singularly pertinent to the Early Bronze Age situation on the North Yorkshire Moors:

> The economy of the segmentary tribe is as atomistic as the political system. Production is generally small-scale, with enough manpower available in the villages, not to say the family, for main tasks of livelihood. Besides, as each community produces the same things, none is substantially dependent on another for specialised products. The tribal economy is not integrated by a localised division of labour and the exchange of complementary goods. The relation of the primary segment to the tribal landscape proclaims its independence. The community's domain lies across the g-rain of natural resources, incorporating the range of environments to which the tribal technology is customarily adapted. The minimum political group holds farming land of different types, pasturage, hunting territory - whatever is deemed necessary for a human (tribal) existence. The local economy is the tribal economy in miniature. Each group, exploiting like environmental opportunities, underwrites, by its ecological completeness, its political autonomy.

We could scarcely have a more apt description of the local Early Bronze Age organization, revealed both by study of the burial remains and of the territorial organization, and confirmed by the absence of identifiable central places within this area, and the



0 cairnfield ▲valley Site 0 round barrow A stone enclosure ■ square barrow 0 hilllfort

Figure 51 Prehistoric sites in the Snilesworth area

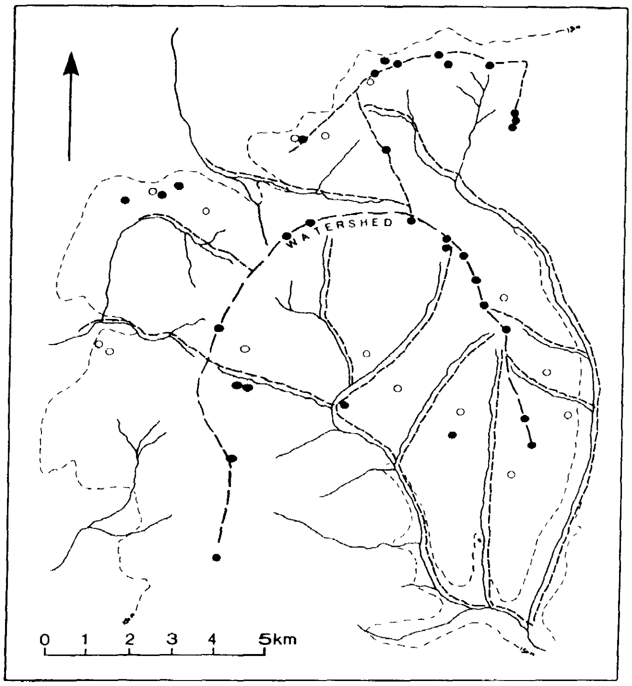


Figure 52 Proposed Bronze Age boundaries in the Snilesworth area

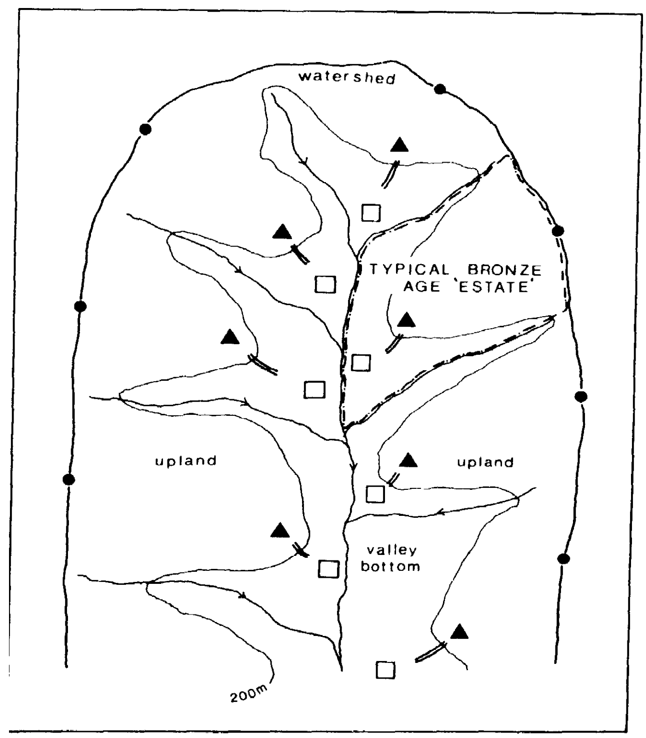
paucity of central ceremonial sites. The evidence for segmentary tribal organization therefore seems reasonably convincing. If so, the society was ill-organized to cope with the difficulties engendered by over-exploitation of the hill forests. The irretrievable disaster of partial, and finally total, desertification of the hills was as much a social and political failure as a natural phenomenon, a failure of local groups to align their immediate self-interests with the long-term stability of the ecology, and of the economy of the whole society which depended upon it.

Finally, we should consider the fact that the evidences for a segmentary tribal organization come from the sandstone moorland, inhospitable terrain of relatively poor fertility and rather remote from external influences. It is in marked contrast, for example, with the contemporary Wessex society, situated in a fertile country and softer climate, with good communications, in which had arisen a rich hierarchical society. Many writers (eg Gilman, 1981) have commented on the emergence of stratified European Bronze Age societies on the richer farming areas. We should not think of the North Yorkshire Moors situation, therefore, as typical of Early Bronze Age organization generally, though it may be representative of much of the less fertile parts of the country. At all events, we should not seek uniformity of organization over wide, agriculturally heterogeneous areas, say between the Yorkshire Wolds and the North Yorkshire Moors.

Even in the small area of this study we see repeated evidences of a wealthier society on the limestone hills than on the sandstone and boulder clay areas of the north. There is witness of this in the Early Bronze Age, where the daggers and flat bronze axes of the earliest part are concentrated on the limestone areas. This dichotomy tends to become even more pronounced in the Late Bronze Age.

2 The Late Bronze Age, 1300-600 bc

The Late Bronze Age is in several important respects a formative time of the later prehistoric periods, not only in this area, but in Britain, indeed in northern Europe as a whole. Locally and nationally we see the virtual cessation of round barrow construction, and of the food vessel and urn rituals. In many areas of England these rites were replaced by cremation in flat cemeteries, but these have not been identified in North East Yorkshire. (There is a possible candidate at Ellerby, near the coast (NZ 802150), but this might be a ploughed-out barrow group.) All we know of the burial rites is the occasional deposition of cremations in the round barrows with the distinctive globular, bucket- and barrel-shaped urns of the Late Bronze Age. As with the preceding Neolithic and Bronze Age periods, we



0 round barrow ▲ cairnfield □ valley site // hollow way

Figure 53 Model of territorial organization in North-East Yorkshire

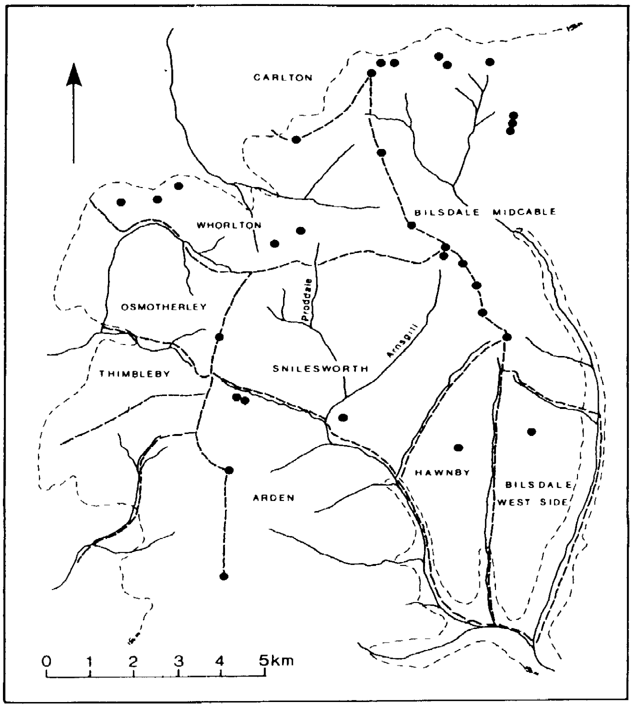


Figure 54 Modern township boundaries in the Snilesworth area

have very little habitation identified to this period, and the settlement pattern must be deduced from the bronze artefacts which have been discovered as sporadic finds. With regard to landscape archaeology, the constructions both of massive linear earthworks as territorial boundary markers, and of forts and enclosures, appear to start in this period, and are perhaps as revealing of the state of society as studies of the smaller artefacts. Data on all the archaeological aspects of this period have been assembled for eastern Yorkshire by Manby (1980). 'Iwo possible Late Bronze Age settlements have been excavated, Castle Hill, Scarborough (R A Smith, 1927); and at Crossgates, Seamer (Finney, 1989), both of which survived into the Iron Age.

Metal artefact distribution

The distributions of the late Bronze Age metalwork is given in Tables 30-35 and plotted on Figure 56. The chronology of these artefacts, taken from Burgess (1979), is given in the tables, and in diagrammatic form in Figure 1. Dates of these bronzes are given in the specialist papers in calendar years, for being almost invariably unassociated with other materials, they have been dated mainly by methods other than radiocarbon determinations. In a general review, however, it is necessary that the dating of bronzes be consistent with the other artefact data and the calendar vears have been converted to radiocarbon (1/2-life 5568 years) years simply to keep a uniform timescale.

The flat bronze axes and daggers fade from the archaeological record at about 1450 bc, at which time the earliest of the flanged axes (Table 30) make their appearance, to continue into the Late Bronze Age as wing-flanged axes until about 1050 bc. Palstaves, of which we have remarkably few examples, are first made about 1300 bc and continuing until about 650bc (Table 30). The socketed axe (Table 32) appears about 750 bc in Yorkshire for a rather short span of about 200 years. The latter form part of all the bronze hoards of the district, which are thus dated to the last part of the Late Bronze Age. Possibly they were deposited following the conversion of the metallurgical industry from bronze to mainly iron, but hoards vary widely in composition and different interpretations are possible. The hoards in North East Yorkshire (Table 34) comprise articles used for many purposes; decorative bronzes such as pins, armlets and bracelets, military uses represented by swords and spearheads, and utilitarian such as axes, chisels, hammers, knives, and gouges as well as the bronzesmith's working materials - sheet metal, ingots of bronze and casting moulds. They provide a picture of the bronze industry serving the society at various levels - ornaments for a prosperous and probably elite group, equipment for the military, tools for the working craftsmen. Spearheads of various types in the date range 1450-550 bc are found fairly widely as casual finds (Table 31). There is a rather smaller number of swords, which are all of the Ewart Park phase, that is, the very end of the Late Bronze Age, 800-550 bc. Figure 56 shows the distribution of finds of all these artefacts. Their absence from the high sandstone moors is a characteristic of many of the prehistoric artefact distributions discussed in this report, but in the case of bronzes we should consider whether this is caused by corrosion in the moorland soils.

Tylecote (1979) has shown that bronzes remain uncorroded in acid peat soils, because of a protective action of the peat, though they do corrode in acid soils of low organic content. Bronzes should therefore survive well on the peaty moorlands, but in some areas where the peat has been eroded, they might have been dissolved. That very few bronzes have been found in the Cleveland boulder clay area may not, however, be attributed to corrosion, for Radley (1974) has recorded many from the boulder clay areas of the Vale of York. We can therefore regard corrosion of bronze as a minor influence and make reasonably well-founded deductions about the Late Bronze Age settlement from the metal artefact distribution. The most obvious one is the relatively prosperous state of the inhabitants of the Tabular Hills, especially in the central and eastern sectors. If bronzes must be bought or exchanged with agricultural products, then, as we have observed for the Neolithic and Early Bronze Age periods, the low, south-facing, well-drained, lime-

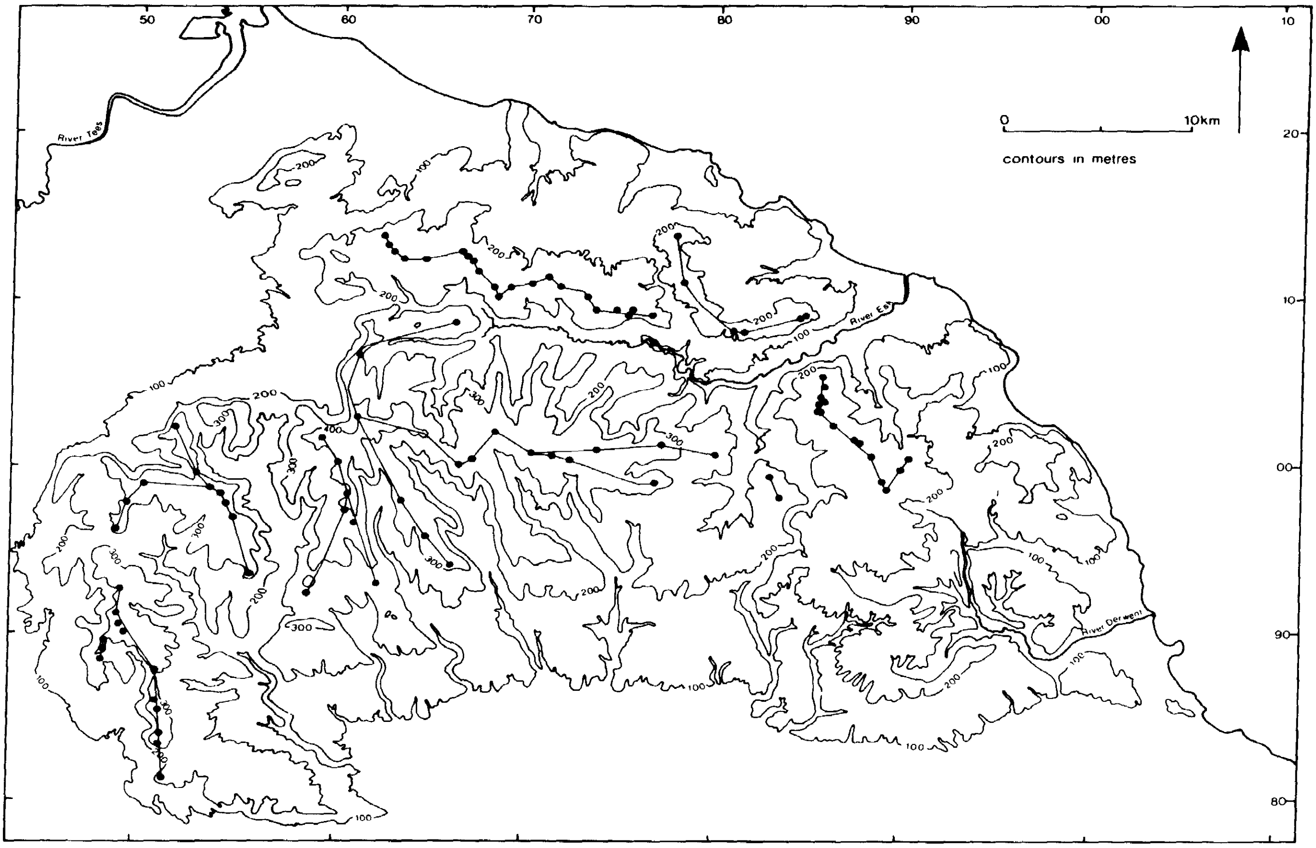


Figure 55 Lines of round barrows along watersheds in North-East Yorkshire

stone hills are likely to be seen as the most prosperous in this area. They reflect their wealth in the acquisition of bronzes which further enhance prestige and military ability and, with better tools, enable a more sophisticated and diversified economy. It was a situation of 'positive feed-back' between a prosperous agriculture and a metallurgical industry which led to a marked advance in these areas over the material, and probably political, situation elsewhere in the region. The imported gold torc (1150-850 bc) found at Coomboots near Scarborough tends to confirm this impression. Only at Whitby and in its Eskdale hinterland is there any comparable concentration of bronze finds.

The bronze artefacts emphasize, once again, the essentially lowland nature of the settlement pattern, which, as Radley (1974) showed, extends widely on to the dry ridges and river banks of the Vale of York. The concentration of axes in the lowland farming areas leads one to think that their uses were mainly in construction work for fences, barns and houses on the farms, rather than a principal agent in forest clearance on the hills. And perhaps their distribution, sometimes showing the places where they were discarded as obsolete, reflects the early part of the Iron Age as much as the last part of the Bronze Age.

In some areas it is possible to make a more accurate analysis of bronze finds on various grades of agricultural land and draw some conclusions about trends in settlement movement and social organization, for example in Lincolnshire (Gardiner, 1980). This approach is scarcely feasible in North-East Yorkshire, because as discussed in the introductory chapter, the bronze finds cannot usually be located to the necessary degree of accuracy. The bronzes represented in Figure 56 scarcely allow any geographical separation of the military and utilitarian items, but the riverine and coastal distribution of some late spearheads and swords (all Ewart Park) is a discernible feature at the Tees and Esk, and at the Scarborough coast. This might indicate the presence of a military elite group on the communication routes, as seems to have been the situation in southern England (Rowlands, 1976).

Pottery and burial sites

Manby (1980) has listed the late Bronze Age bucket-, barrel-, and globe-shaped urns recovered from

Table 30 Flanged bronze axes and palstaves

Place	Description	Approx date span bc	Reference
1 Flanged axes			
Boosbeck NZ 660170	Two axes, 1 wing flanged, the other missing	1150-1050	Elgee (1930); Middlesbrough Museum
Roseberry Topping NZ 580126			Elgee (1930); Hull Museum
Whitby	Arreton type	1450-1350	Manby (1965)
Bilsdale	Haft/wing-flanged axe	1150-1050	Hayes (1963); Hull Museum
Farndale	Haft flanged axe	1350-1150	Hayes (1963); Hull Museum
Scalby TA 007899	Flat (Migdale) axe with flanges	1450-1350	Manby (1965): Scarborough Museum
Near Scarborough	Arreton type	1450-1350	Manby (1965); Hull Museum
Dalby SE 860880	Haft-flanged axe, Briggington type	1350-1150	Yorkshire Museum files
Pickering	Arreton type	1450-1350	Manby (1965)
Pickering	Flanged axe	1350-1150	Herts County Museum
Thornton dale	Arreton Axe	1450-1350	Malton Museum; Manby T (inf)
Cayton	Proto haft-flanged	1450-1350	Private collection, Abbott G W, Peterborough
2 Palstaves			
Moors near Scarborough			Elgee (1930); Sheffield Museum
Kirkbymoorside SE K700870	Looped palstave, Irish type	A wide date span, 1350-600	Elgee (1930); Yorkshire Museum
Spaunton, Grange Farm	Palstave, now lost		Hayes (pers comm)

round barrows in the area, and these are given in Table 36. Unfortunately none of them come from well-published excavations, and it is difficult to be sure whether they were primary or secondary depositions. Undoubtedly, at Stanghow, Herd Howe, Hutton Buscel, and the barrow 2 miles north of Pickering, the later urns were found in the same barrows with collared urns and were therefore presumably secondary, and the bucket urn at Ebberston was also a secondary feature. In the Suffield Moor barrow, however, the bucket and barrel urns stood centrally side by side, and appear to be primary. Thus there may be another instance of Late Bronze Age barrow construction, in addition to those on Ampleforth Moor dated by radiocarbon by Wainwright and Longworth (1959).

Our information at present, then, shows us that the urn cremation rite continued into the Late Bronze Age, with urns of different style, and, usually, of inferior fabric. None of these later deposits are in the watershed barrows which form the territorial boundaries, though Herd Howe and Court Green tumuli which contained Late Bronze Age pottery, were in prominent positions. The religious and burial rites fade from the archaeological record during the Late Bronze Age, reappearing with the square barrows in the Iron Age.

Hill forts

There are four, possibly five, earthworks in the area which can be called hillforts in the conventional sense, and they are shown in Figure 65. They are all reviewed in Vyner (1988b). Eston Nab Fort, in a position commanding the Tees estuary, is a univallate fort of 1.3ha, first described as an incomplete double circle of rough loose stones (Graves, 1808). It has been excavated three times, in 1927-29 by Elgee (1930), in 1966-68 by Aberg (1968; 1969) and in 1985-87 by Vyner (1988a), who analysed the total information from the three campaigns (Figure 57). All three excavations included sections of the rampart and exposures of areas within it. The present D-shaped rampart is a dumped clay bank 5m wide and some 400m long, currently 2m in height above ground level, backed by a stone wall 4.3m wide. The stone wall may originally have been higher than the clay bank, to judge from wall stones tumbled into the ditch, or there may have been a stone palisade. The V-shaped ditch, 6.6m wide and 3.3m deep, has a

Table 31 Bronze spearheads

Place	OS Grid	Description	Approx date span bc	Reference
Yarm	NZ 430127	Side-looped	1150-800	Middlesbrough Museum
Great Ayton, Roseberry Topping	NZ 580126	Fragment	Ord (1846)	
Whitby		1 leaf-shaped, plain, pegged; 2 small, leaf-shaped, plain, pegged; 3 blade only, leaf-shaped with blade	1 750-550, 2 800 -550	Whitby Museum
Cawthorn		Thin, flat with tang	1450-1250	Howarth (1899)
Scalby		Leaf-shaped, socketed		Sheppard (1917); Yorkshire Museum
Scarborough		1 barbed; 2 blade of small leaft-shaped, plain spearhead	750-550	1 Yorkshire Museum; 2 Scarborough Museum
High Dalby		Arreton Down type	1450-1250	Rushton (1976)
Kirkbymoorside		Lunate		Radley (1976)
Scamridge		Leaf-shaped, bulbous blade, pegged	750-550	Elgee (1930)
Blansby Park		1 bronze spearhead	?	Hayes (1988) Kept at Werts arm, Blansby
Pickering		Point of stepped blade, spearhead	850-750	Yorkshire Museum
Sawdon		Side-looped	1200-800	Scarborough Museum
Helmsley		Side-looped	1200-800	Yorkshire Museum
Allerston		1 small side-looped; 2 looped	1200-800	1 Yorkshire Museum; 2 Castle Museum, York (Grove 1939)
Brompton				Yorkshire Museum
Sutton-under-Whitestonecliffe				Yorkshire Museum 1891 catalogue
Cayton		socketed spearhead with loops	1200-800	Elgee (1930), British Museum

Note: *Descriptions of spearheads by Ian Colquhoun, with nomenclature as in Burgess (1974)*

rock-cut drainage channel, rectangular in cross-section 0.3m deep and 0.6m wide (Aberg, 1968). There is one original entrance on the south-east of the defences. Radiocarbon dates on burnt timbers in the rampart are 460 and 360 bc. About 50m within the rampart are two interesting palisade trenches, built in succession, and these can be dated by pottery finds to the Late Bronze Age. Since the timbers of the second palisade had never been replaced and because its entrance had been deliberately blocked, Vyner (1988b) concluded that the stone wall of the rampart was probably built within 50 years of the palisade construction. Thus Vyner (1988b) was able to propose a chronology for the defences: the successive palisades are of the Late Bronze Age, possibly about 8th-5th century bc, the rampart boulder wall of the early part of the Iron Age, and the bank and ditch of the rampart a little later - about 450 bc. Vyner also discussed for the first time evidence of settlement within the fort. There were post settings and shallow pits within the palisaded area, which could include at least one round house. The fingertip-decorated pottery in these postholes indicates that it had been used for settlement and ceremonial purposes from these earlier periods.

The Boltby hillfort, on the western scarp of the Hambleton Hills, overlooking the Vale of York, is a univallate fort, or rather was, for it was almost

Table 32 Socketed bronze axes

Place	OS Grid	Description	Approx date span bc*	Reference
Marske		From the beach		Middlesbrough Museum
Roseberry Topping	NZ 580127	3 from hoard Yorkshire type	750-550	Elgee (1930); Sheffield Museum
Postgate Hill, Glaisdale	NZ 760046	Faceted axe	750-550	Yorkshire Museum
Quarry Hill, Glaisdale	NZ 776061	Multiple mouth moulding	750-550	Hayes (1968a)
Egton			750-550	Elgee (1930)
Lease Rigg	NZ 825050	Yorkshire type	750-550	Elgee (1930); Whitby Museum
Boonhill, Gillamoor	SE 667908	Hoard; 6 axes Yorkshire type	750-550	Hayes (1968a); Pacitto (1980)
Harwood Dale		Otto-faceted with oval mouth	750-550	Yorkshire Museum
Hartoft		Yorkshire type	750-550	Yorkshire Museum
Hambleton Hills		Not plotted on map. Drawing by Saunders. Faceted axe	750-550	Yorkshire Museum
Scalby		Hoard; 17 axes	750-550	Sheppard (1917); Hull Museum; Yorkshire Museum
Troutsdale		Large ribbed axe		Yorkshire Museum
Falsgrave			750-550	Yorkshire Museum
Scarborough Castle		3 axes, Yorkshire type	750-550	Smith R A (1927); Scarborough Museum
Keldholme		Hoard: 3 Yorkshire type, 1 plain	750-550	Hayes (1963); British Museum Kirkstall Museum
Scamridge		Bag-shaped axe	750-550	Yorkshire Museum
Cold Kirby		Looped and faceted axe	750-550	Settle Museum
Thornton Dale		2 axes, Yorkshire type	750-550	Elgee (1930); Hull Museum
Welburn		Hoard? 5 axes, 3 Yorkshire type, 1 bag shaped, 1 plain	750-550	Crowther-Beynon collection, Driffield; Grantham collection. Driffield
Helmsley		Multiple mouth mouldings	750-550	Burgess (1968)
Pickering		Hoard? Probably Yorkshire type	750-550	Herts County Museum
Seamer Carr		1 Sompting type plain, 1 Sompting type ribbed and pelleted	650-550	Burgess (1968)
Pickering Carr		Yorkshire type	750-550	Yorkshire Museum
Ebberston Carr			750-550	Burgess (1968); Doncaster Museum
Wykeham Carr		Yorkshire type	750-550	Doncaster Museum
Ruston			750-550	Elgee (1930); Kirk collection, Castle Museum York
Great Barugh		Yorkshire type	750-550	Hayes (1963); Yorkshire Museum
Cayton Carr		Sompting form, ribbed and pelleted	650-550	Burgess (1968)

**As applied to Yorkshire*

Table 33 Bronze swords

Place	OS Grid	Description	Reference
River Tees		Early Ewart Park phase	Elgee (1930); British Museum
Whitby		Blade fragment, Ewart Park phase, unclassified	Whitby Museum
Boonhill Gillamoor	SE 667908	Part of hilt, Ewart Park	Pacitto (1980)
Scalby		Hilt fragment in hoard. Ewart Park phase unclassified	Elgee (1930); Hull Museum
Sawdon		2 swords, early Ewart Park phase	Yorkshire Museum
Brompton		Early Ewart Park phase	Edinburgh, National Museum of Antiquities
Ebberston		1 sword, 1 blade and shoulders of sword, 1 chape, Hallstatt, Gundlingen Variant B	Howarth (1899); Cowen (1967); Sheffield Museum; Scarborough Museum
Harome	SE 660832	Sword blade. Ewart Park unclassified	Elgee (1930); Hull Museum

Notes: *Classification has been published by Coquhoun & Burgess (1988). Swords classified on a combination of blade and hilt features; incomplete swords are therefore unclassified. Ewart Park swords date approximately 850-650 bc, the Gundlingen-type sword after 650 bc.*

entirely destroyed by ploughing in 1958. It had a D-shaped rampart which stood 1m high, and enclosed 1.2 ha. Vyner (1988a) comments on the survival of a small length of the rampart at the scarp edge, and of a small rectangular enclosure of unknown date within the fort. Two round barrows in the interior, gold earrings of the beaker period from beneath the rampart found in Willmot's(1938) excavation, and Neolithic pottery (Peterborough ware) found in this vicinity show that the site of this fort also was used in earlier prehistoric periods. Challis and Harding (1975) date the rampart itself to the Late Bronze Age, from a single rim sherd of a bucket urn from Willmot's excavation, which is similar to pottery from the Mam Tor hillfort in Derbyshire.

The three other forts in the area have little dating evidence. The small promontory fort at Live Moor (0.8 ha) stands on the north-west corner of the moors. It has two visible ramparts, an earlier one just inside the outer, later one at its south-western end. There is a central entrance, whence a hollow-way runs up the hill slope to the Live Moor cairnfield. This is the highest of any of these early field systems (315m) and as such is arguably Bronze

Table 34 Bronze hoards

Place	Description and date	Reference
Roseberry Topping	Found 1826. 3 socketed axes, spearhead, gouges, hammer, chisel, knife and axe moulds	Ord (1846); Elgee (1930) Sheffield Museum
Scalby	Found 1927. 17 socketed axes, 2 spearheads, sword handle, chisel, bronze cakes, 2 gouges	Sheppard (1917); Hull Museum; Yorkshire Museum
Boon Hill, Gillamoor	Found 1979. 6 socketed axes, sword hilt, spear tip, 3 ingots, sheet of bronze	Pacitto (1980)
Keldholme	Found 1824. 8 axes, 3 surviving, looped and socketed	Hayes (1963); British Museum; Kirkstall Museum
Scarborough Castle	2 socketed axes, one of them Yorkshire, fragments of dress pins, armlets, rings, gouge. ?workship debris	Smith R A (1927)
Pickering	A possible hoard? 2 socketed axes, 1 flanged, 1 winged axe found on scrapheap	St Albans Museum
Welburn	A possible hoard? 5 socketed axes, 3 Yorkshire type, 1 bag-shaped, 1 plain	Crowther/Beynon and Grantham collections

Note: *All hoards are in the approximate date-span 750-550 bc. Detailed analyses of these hoards are given in Manby (1980).*

Table 35 Miscellaneous Bronze Age objects

Place	Description	Approx date span bc	Reference
Whitby	double-blade bronze axe		Elgee (1930)
Peak	Bronze awl		Elgee (1930)
Coomboots, Scalby	Gold torc	1150-850	Knox (1855)
Moors near Scarborough	Tanged razor		Sheffield Museum
High Dalby	Bronze knives		Elgee (1930); Yorkshire Museum
Boltby	Gold basket earrings below fort rampart	Middle of the Beaker period, 1800-1600	Willmot (1938)
Scamridge	Bronze 'lance head'		Elgee (1930)
Sawdon	Bronze sickle	Heathery Burn, 750-550	Scarborough Museum
Wykeham Moor	Bronze awl		Elgee (1930)

Age, unlikely to persist into the Iron Age, which might suggest an early date for the fort. The fort, only recently discovered (Smith, 1979), has not been excavated, but shows no signs of hut structures. The promontory fort at Roulston Scar (20 ha) was discovered in 1969 when Pacitto (1970) excavated what appeared on the surface to be a cross-ridge dyke running across the neck of the spur which forms the landing field of the Yorkshire Gliding Club. It proved to be a timber-framed box rampart, consistent with a date of about 400 bc (Challis and Harding, 1975). Grange (1859) reported it as 3m high and 12m wide, with a ditch of corresponding depth and width. There is no evidence of hut structures, but as at Boltby, there were round barrows within the fort. The promontory fort at Horn Nab is in an unusual position, on the west scarp of Farndale overlooking the dale, and beyond to the south,

Table 36 Late Bronze Age pottery in round barrows*

Place	OS Grid	Description	Reference
Court Green, Eston Hills	NZ 588185	Bucket urns (?) now lost	Elgee (1930)
Stanghow	NZ 665124	Barrel-shaped bowl	Atkinson (1863); British Museum
Newton Mulgrave	?	2 bucket urns, 1 with fingertip impressions on rim	Elgee (1930); Anderson MSS Liverpool Museum
Herd Howe	NZ 704117	Globular bowl, with collared urn	Atkinson (1863); British Museum
Lastingham	SE 720907	Bucket urn	Elgee (1930)
Suffield Moor	c SE 9789	One barrel urn, one bucket urn	Lamplough (unpublished)
Cawthorn Stackyard	SE 778890	Bucket urn	Elgee (1930); Yorkshire Museum
Givendale Head	SE 896875	1 bucket urn, 1 barrel urn	Yorkshire Museum
Hutton Buscel	*c* SE 9587	Globular jar	Greenwell (1877); British Museum
3km N of Pickering	*c* SE 7888	Bucket urn	Bateman (1861); sheffield Museum
6.5km NE of Pickering	*c* SE 8586	Bucket urn	Bateman (1861); Sheffield Museum
Pickering	*c* SE 7983	Bowl with moulded foot	Sheffield Museum
Ebberston	SE 895877	Bucket urn	Scarborough Museum

** Data from Manby (1980)*

the Vale of Pickering. The rampart, some 300m long, 2m high and 6m wide, has a ditch on the northern side about 3m wide. It cuts off the southern tip of a spur, forming a fort 9ha in area, protected on the other sides by steep cliffs, with an approach track entering from the south. It was sectioned by Hayes and Whittaker (Hayes, 1963), who found, however, no dating evidence. A kerbed cairn 17m in diameter stands within the fort, which contains no other visible features. There is some debate whether the rampart may be a cross-ridge dyke, similar to others on the North Yorkshire Moors.

Summarizing the evidence of the five hillforts, we see, in the Late Bronze Age, at least the start of fortification of well-placed hilltop sites, which had been the scene of earlier prehistoric activity. They now became forts of various sizes, but with few indications of prolonged settlement. Some other highly defensible positions are occupied by (undated) prehistoric enclosures, but are lacking formal defensive earthworks. Thus there are enclosures at the summit of Penhill, Kepwick (Aberg et al, 1977; Fig 68), and a double-ditched enclosure on a hilltop above Stonegrave Lodge (Riley - Air Photographs 981/l and 2, 1974), both undated. The Thieves Dyke on the limestone scarp at Silpho Brow forms with the scarp an enclosed area of 30 ha, overlooking the coastal region north of Scarborough, and the Late Bronze Age/Iron Age settlement at Scarborough itself is on a defensible position at Castle Hill (R A Smith, 1927), though this was the scene of permanent settlement. It is difficult to distinguish between the function of hill forts and those of other hill-top enclosures without defensive works. We may have a situation analogous to Wessex and the South Downs (Bradley, 1971b), where early hillforts seem to have developed from pastoral enclosures. In the southern chalklands, where population pressure was presumably higher, many forts developed on the hills; in North East Yorkshire, only five forts were built, leaving other ostensibly suitable sites unoccupied or filled by enclosures not fortified by large ramparts.

The linear earthworks

Two kinds of linear earthwork can be seen in the area (Fig 58; Table 37): long dykes up to 9 km which are generally found in plateau situations in the limestone areas and, less commonly, running along scarp edges of the sandstone moors; and the cross-ridge dykes found in spur terrain, cutting across the

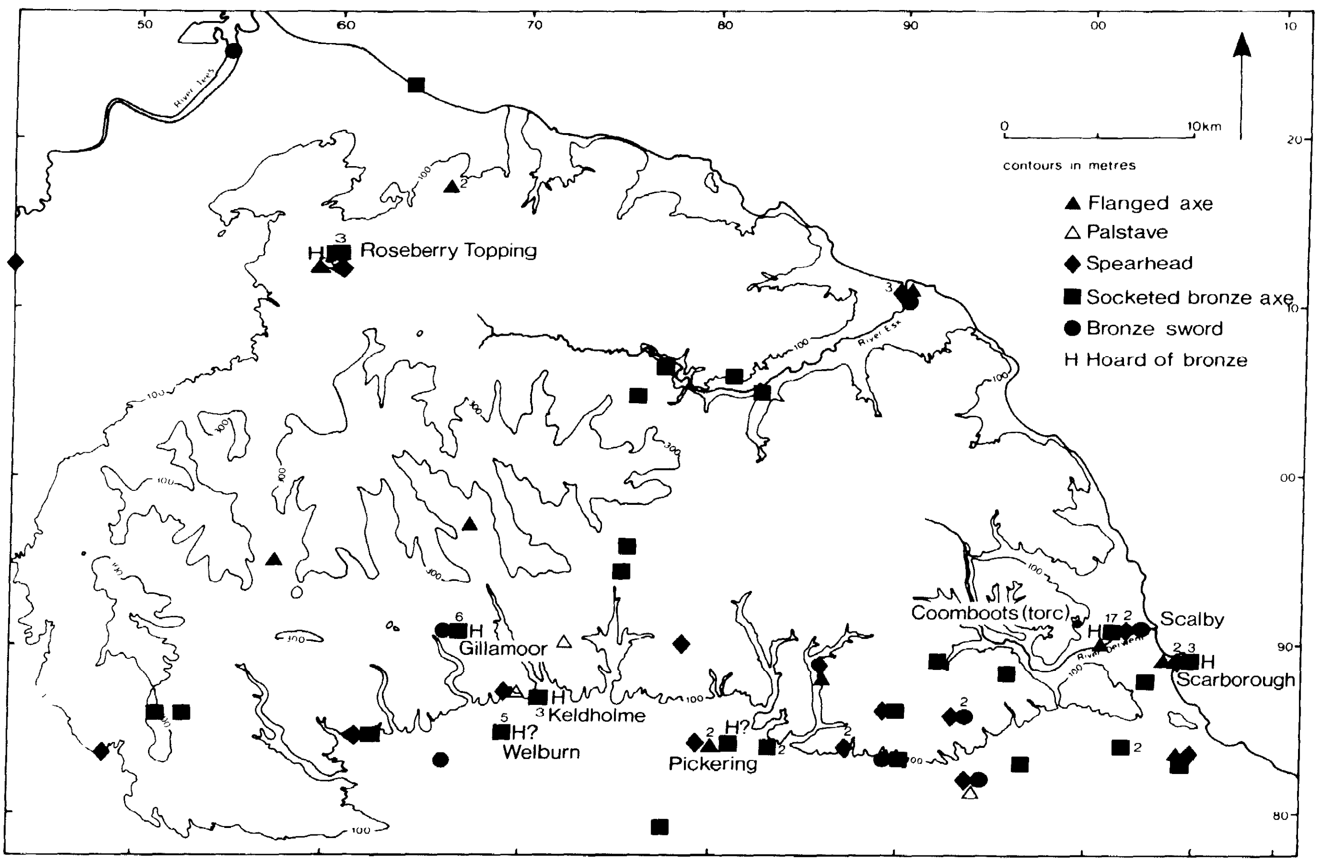


Figure 56 Distribution of bromzes of the Late Bronze age

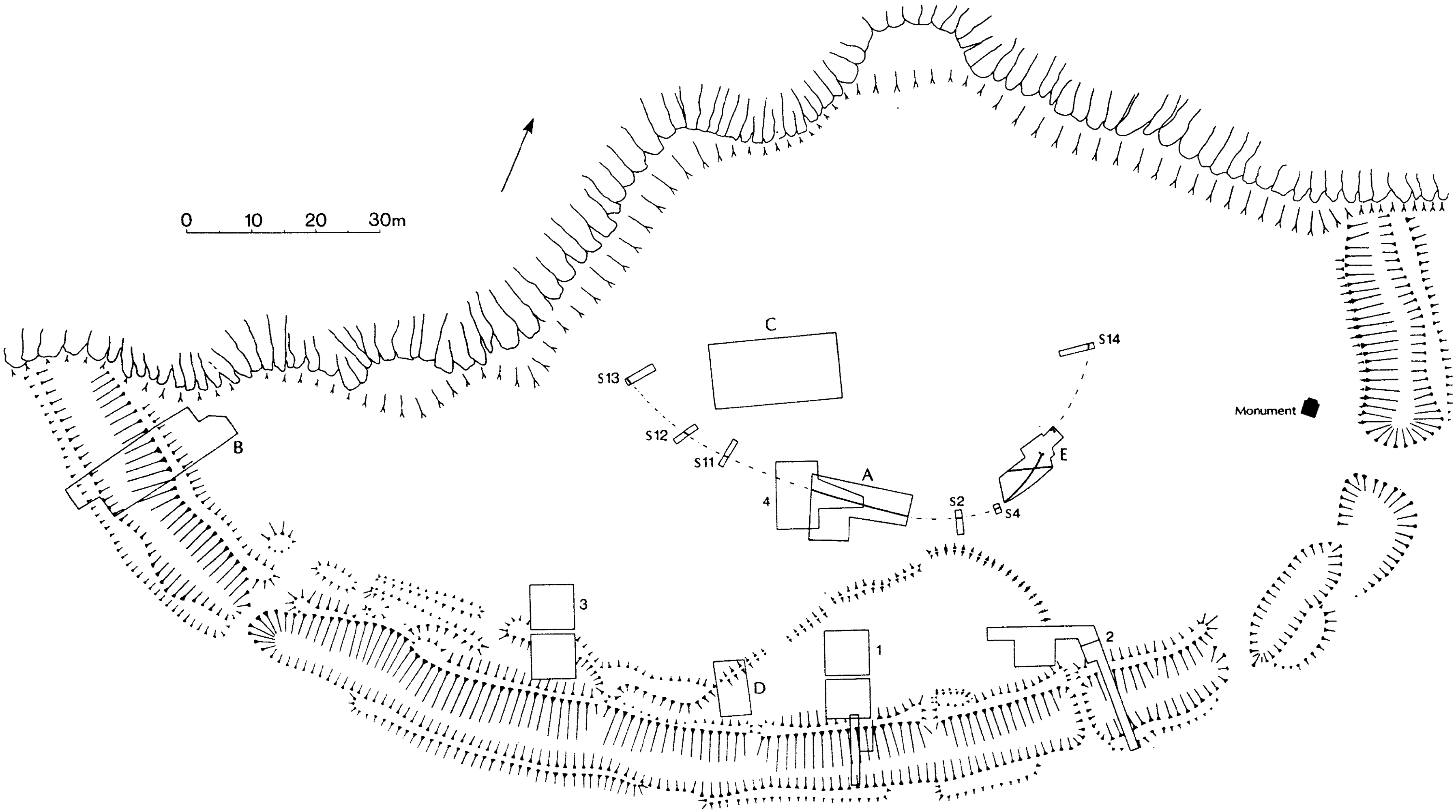


Figure 57 Eston Nab hillfort (trenches 1–3 after Aberg 1968, 1969; trenches A–E, Vyner 1988b)

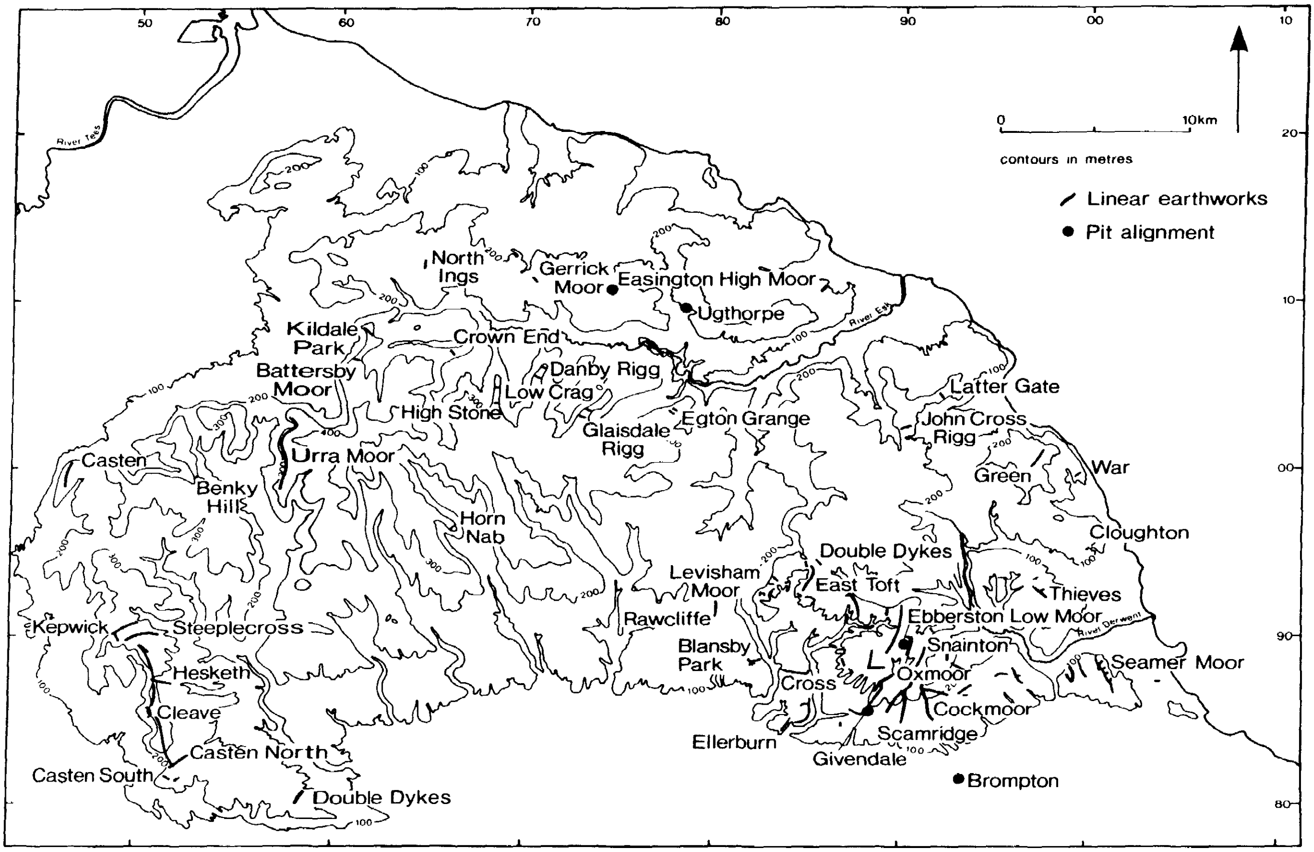


Figure 58 Linear earthworks and pit alignments in North-East Yorkshire

narrow necks of hill spurs, or interconnecting valley heads. Both the long earthworks and the cross-ridge dykes are best interpreted as territorial boundaries, but that does not exclude the possibility of their having other functions. Indeed, the two earthworks at Roulston Scar and Horn Nab, which might well have been classed as cross-ridge dykes, have proved on excavation to be defensive earthworks (Pacitto, 1970; Hayes, 1963). Although usually found in different types of terrain, the long linear earthworks and cross-ridge dykes are occasionally found together, the outstanding example being at Levisham Moor, where wide moorlands and long spurs lie close at hand. The dyke builders laid out earthworks according to the needs of the economy and the nature of the landholdings and to the topography which deeply influenced both.

The problem of dating is a difficult one. As will be seen, the long earthworks can be dated as later than the round barrows, and there are reasons, given below for individual dykes, for believing that construction started in the Late Bronze Age and continued into the Iron Age. Manby (1980) gives evidence of a similar date range for the linear earthworks on the Yorkshire Wolds. We have little dating evidence for the cross-ridge dykes, and we can only suppose them to be roughly contemporary with the long earthworks, being analogous boundary systems suitable for spur terrain. Harding's radiocarbon date of AD 1000 for charcoal from the ditch bottom of the cross-ridge dyke on Danby Rigg has been discussed on p111.

The cross-ridge dykes

Cross-ridge dykes are associated with only a few of the cairnfields on the sandstone area (Fig 58). Save for a dyke on Gerrick Moor interconnecting two boggy valley heads, there are none to the north of the Esk valley. There is one at Benky Hill on the high moors west of Bilsdale, but none on the hills flanking the eastern side of this dale. Nearly all the spurs running northward into the Esk valley from the high moors have them: Crown End (Westerdale), Castleton Rigg (2), Danby Rigg (one single dyke, one double dyke), Glaisdale Rigg (2), and Egton Moor (2). Here they divide the cairnfield area from the empty moorland, and as they do not intersect the

Table 37 Early linear earthworks (excludes deer parks etc)

Place	OS Grid	Length (km)	Description	Reference
North Ings	NZ 6412	0.5	From boundary barrow into valley head	Elgee (1930)
Gerrick Moor	NZ 7011	0.25	Cross-ridge dykes between valley heads	Elgee (1930)
Kildale Park	NZ 6108	0.6	Built into medieval deer park wall	
Crown End, Westerdale	NZ 6607	0.4	Cross-ridge dyke	Elgee (1930)
Battersby Moor	NZ 6006	0.2	Cross-ridge dyke	
Danby Rigg N	NZ 7006	0.3	Cross-ridge dyke	Elgee (1930)
Danby Rigg S	NZ 7005	0.4	Cross-ridge dyke	
Latter Gate	NZ 9204	0.25		
Low Crag Dyke	NZ 6804	0.5	Cross-ridge dyke	Elgee (1930)
High Stone Dyke	NZ 6804	0.1	Cross-ridge dyke	Elgee (1930)
Glaisdale Rigg N	NZ 7303	0.3	Cross-ridge double dyke	
Glaisdale Rigg S	NZ 7303	0.3	Low broad bank	Iles (pers comm)
Egton Grange	NZ 7703 NZ 7703	0.25 0.15	Cross-ridge dyke, double orthostat Cross-ridge and enclosing field svstem	
John Cross Rigg	NZ 9002	0.65 (0.15)	Separates 2 cairnfields	
Benky Hill	SE 5399	0.1	Cross-ridge dyke	AP (SF 1704, 151-7 RCHM air photograph)
Urra Moor	NZ 570	4.8	Large scarp-edge earthwork	Hayes (1963)
Green Dyke	NZ 9700	1.3		
War Dyke	SE 9999	0.3		
Casten Dyke, Osmotherley	NZ 4600	1.5	Scarp-edge earthwork, east end doubtful	
Cable Stone	NZ 5800	0.8		Hayes (1963)
Hulleys North	SE 9996	0.5 (0.15)		
Iron Howe	SE 5395	0.2	At northern limit of cairnfield	
Cloughton, Stone Dale Plantation	TA 0095	0.1		
Gallows Dyke	SE 8494	0.15		
Double Dyke	SE 8594	0.4	Cross-ridge dyke with pits	
Levisham Moor	SE 8393	0.3	Cross-ridge dyke	
Levisham Moor	SE 8393	0.3	Cross-ridge dyke	
Levisham Moor	SE 8392	0.8	Iron Age/Roman enclosure attached	
Levisham Moor	SE 8292	0.1	From enclosure to valley road	
Horness Rigg	SE 8392	0.1	Cross-ridge dyke	
Levisham Moor	SE 8292	0.5	Iron Age/Roman (?) enclosures attached	
Far Black Rigg	SE 8492	0.15	Cross-ridge dyke	

Place	OS Grid	Length (km)	Description	Reference
East Toft Dyke	SE 8592	0.15 (0.5)	Cross-ridge dyke	
Newgate Moor	SE 8792	0.1 (0.2)		
Springwood	SE 9592	0.15		
Thieves Dyke	SE 9792		Very large enclosure with pits in dykes	
High Bride Stones	SE 8791	1.8		
Dargate Dykes	SE 8991	0.4	Large double dyke	
Rawcliff	SE 7991	(1.5)	Only fragment survives	
Blackpark	SE 7591	0.05		
Blackleys	SE 9190	0.25	Cross-ridge dyke	
Cropton, Fall Rigg	SE 7690	0.15		
Kepwick	SE 4990	2.0	2 dykes at right angles	Spratt (1982)
Steeple-cross	SE 4990	2.0		Spratt (1982)
Daletown	SE 5089	0.8	Not an ancient dyke	Spratt (1982)
Snainton Dykes	SE 9089	1.2	Massive multiple dyke	
Ebberston Common E	SE 9089	0.4	Dyke with pits, damaged by ploughing	
Ebberston Common W	SE 9089	1.0	Dyke with pits, much damaged	
Red Dyke	SE 8989	1.0		
Cropton, Moor Dyke	SE 7689	(0.25)		
Sand Dale	SE 8888	1.3		
Allerston Low Moor	SE 8988			
Stone Close Rigg	SE 8688	(0.3)		
Brompton Moor	SE 9388	0.8 (0.8)		
Blansby Park	SE 8288		Ploughed-out complex earthworks	
Rowbrow	TA 0087	0.4 (1.6)	Fragmented dyke with branches	
Seamer Beacon	TA 0087	0.6 (0.4)		
Hesketh	SE 5187	1.5		Spratt (1982)
Givendale Head	SE 8987	0.4 (0.6)		
Givendale Head	SE 8887	0.65		
Oxmoor Dykes	SE 8987	0.7	Massive multiple dykes	
Moor Dyke N	SE 9587	0.7		
Craddlegrip	SE 9687	0.9		
Craddlegrip Wood S	SE 9687	0.1		
Craddlegrip Wood N	SE 9687	0.15		
Skell Dykes	SE 9987	0.65 (0.4)	Massive double dyke	
Irton Dyke	SE 9987	0.1 (1.5)	Double dyke, fragment only survives	
Wetmoor Dyke	SE 8987	1.1		
Cross Dyke	SE 8487	1.2 (0.15)	Cross-ridge dyke	
Low wood	SE 8587	(0.25)		
Mall Dawson's Slack	SE 5787	0.65	Medieval?	

Place	OS Grid	Length (km)	Description	Reference
Cleave dyke	SE 5087	9.0	Long earthworks in various states of preservation	Spratt (1982)
Givendale Lower Dyke	SE 8986	0.5		
Givendale Dyke	SE 8986	2.25		
Scamridge Dykes	SE 9086	2.8	Massive multiple dykes	
Moorsome Dyke	SE 9086	(0.)		
Cockmor Hall Plantation	SE 9186	0.8 (0.3)		
Cockmoor Dykes	SE 9186	2.1 (0.5)	Multiple dykes	
Grain End	SE 9386	0.15 (2.0)	Reached Cockmoor	
Rise dykes	SE 9486	0.6 (0.5)		
East Moor N	SE 9486	0.15		
East Moor S	SE 9486	(0.15)		
Bowesmoor	SE 9486	0.3 (0.3)		
Moor Dyke S	SE 9586	0.5 (0.4)	Damaged	
Seamer Moor Hill	TA 0186	0.15 (0.25)	Double dyke	
Weaponness	TA 0386	(0.15)	Cross-ridge dyke	Knox (1849)
Appleton Common	SE 7286	(0.5)		
Malton Cote Dyke	SE 8985	(1.0)		
Givendale Rigg	SE 8785	0.15 (0.3)		
Oxdale Upper Dyke	SE 8885	(0.1)		
Netherby Dale	SE 9084	1.9	Massive dyke. but much damaged	
Wykeham Grange	SE 9485	0.3		
Thornton Moor	SE 8585	0.8		
Ellerburn Banks	SE 8585	1.9 (0.15)		
Ellerburn Wood	SE 8384	1.1		
Stonygate	SE 8684	0.15		
Oxdale Lower Dyke	SE 8884	(0.3)		
Gristhorpe	TA 0982	0.15		
Casten Dyke N	SE 5182	0.2		Spratt (1982)
Casten Dyke S	SE 5181	0.5		Spratt (1982)
Double Dykes, Sproxton Moor	SE 5760	2.0 (0.8)	Massive double dyke	

Notes: *Much of the data in this table was collected by Mr J G Rutter, and is kept in Scarborough Museum. Lengths given in parentheses are destroyed earthworks, additional to those unbracketed. See also Spratt (1989).*

cairns or ancient field walls, it is not possible to assess their dates in relation to the cairnfields. At most of these sites the cairnfield does not extend beyond the dyke on to the moor, so it might seem that the cairnfields had expanded to their maximum extent before the cross-ridge dykes were built (though this is, of course, arguable). At Egton Moor the cairnfield does in fact lie partly outside the southern cross-ridge dyke, and at Fylingdales Moor a cross-ridge dyke ran through the middle of a very large cairnfield, largely destroyed in 1940-5.

It is often possible to discern a relationship between the cairnfields, the cross-ridge dykes and the local roads and trackways. If we suppose that the cross-ridge dyke marked off an area at the tip of the spur for the use of those living in the main valley, and that on the moor beyond the cross-ridge dyke lay the territory of the farms in the side valleys, then we should expect to find trackways between the tip of the spur and the main valley and from the vicinity of the cross-ridge dyke into the side valleys. This effect is in fact particularly well seen at Danby Rigg, Castleton Rigg, Glaisdale Rigg, and Crown End. It is also well displayed at Caulkley's Bank, where a cross-ridge dyke exists across the spur near the Nunnington-Hovingham road (Riley, air photograph 743-11, 1975), and a trackway runs down the point of the spur to West Ness. In view of the integrated upland/lowland economy of the Bronze Age, indeed of all the prehistoric periods, we should expect these tracks interconnecting valleys and hilltops to be among the most ancient, and their relation with the cairnfields and cross-ridge dykes seems to be a demonstration of this.

The long linear earthworks

In discussing the territorial arrangements of the Early Bronze Age period, we have seen how the boundaries appear to be based on the natural features of watersheds and valleys, and how integrated upland/lowland estate boundaries were marked on the watersheds by round barrows. Thus the divisions seemed to rely on religious sanctions for their effectiveness, in early societies often synonymous with legal constraints. With the growth of population, wealth, and competition in the 1st millennium bc and an apparent decline in that form of religious observance associated with the round barrow interments, these boundaries were augmented by linear earthworks, especially in the most prosperous areas. This reinforced the moral sanction with a physical barrier, in some cases a very considerable one. Thus we find the linear earthworks in two characteristic positions, either on the watersheds or scarp edges or running from them down into the valley heads, and not infrequently associated with the round barrows of the earlier system. There are a few scarp edge earthworks on the north side of the sandstone moorlands, as at Urra Moor and Kildale Park, where the early earthwork has been incorporated into the 13th century deer park, but these have no associations and are at present undatable.

The Cleave Dyke system on the Hambleton Hills is shown in Figure 59. At the present time, it gives, of all the earthworks, most clues to dating, which still remains rather insecure. The dyke system is related to the barrows in two ways, one a direct association, the other indirect. First, the dykes sometimes incorporate barrows, as at Casten Dyke North, and at Hesketh Dyke, where the dyke changes structure at a large round barrow incorporated in it. Second, the dykes are sometimes aligned on barrows, as at Kepwick Dyke, or they change direction at barrows, as the Cleave Dyke itself on Hambleton Moor, or the barrows stand close alongside the dyke, as again with the Cleave Dyke in the same area. There seems little doubt therefore that the dykes are later than the round barrows, and augment the territorial system which was based on them, described in Chapter 5.1. A further clue to the date of the dykes is the relation of the Cleave Dyke with the Boltby hillfort. All air photographs and all early maps show that there is a gap in the dyke in the section immediately to the east of the fort, presumably to allow access to it. The same can be observed with the configuration of the dykes to the east of Roulston Scar promontory fort. Since the date of the rampart at Boltby is thought to be about 1000 bc, as discussed above, one might believe that the dyke system, being in use during the life of the fort, dates to the first half of the first millennium. A third, and even less definitive clue, is the relation of the system to the roads and tracks. It is clear that the Hambleton Street ridgeway cuts the dyke on Kepwick Moor in a way which shows the dyke to be the earlier of the two. As we do not know the date of the Hambleton Street, the observation is not very helpful; it simply reveals that the ridgeway is not a Neolithic/Early Bronze Age feature. On the other hand, the relation of the dykes with the road running up the scarp at Sneck Yat shows this road to be earlier than the dyke. It is another illustration of the early date of tracks leading between the lowlands and the hills. This landscape analysis of the Cleave Dyke area has been published in detail elsewhere (Spratt, 1982).

The function of the dykes, like that of the earlier territorial system, is to define the outer limits of farming units, whose settlements and no doubt much of whose agricultural activity were on the lower ground. Although arable farming is conducted at the high altitude of the Cleave Dyke at the present day, there is no evidence that large tracts were other than pastoral in the Late Bronze Age, and the function of these dykes was other than linear pastoral boundary definition. The fact that pit alignments are incorporated in parts of the dyke system, as can be clearly seen at present on air photographs and has also been demonstrated by excavation at the Sutton Bank section (Cleveland County Archaeology Section, 1989), is confirmation of the essential boundary function of these earthworks, several of which continue in use as township boundaries at the present time (Spratt and White, 1986).

About 8 km east of the Cleave Dyke, on the eastern end of the Hambleton Hills, a very large double dyke interconnects the valley heads in the north and south sides of Sproxton Moor. It does not seem to be associated with the Cleave Dyke system, and is possibly to be interpreted as part of the tribal boundary between the Parisi and the Brigantes, which may continue through Ryedale to the north scarp of the Tabular Hills (Ramm, 1978). If so, it belongs to an era when the organization of the Iron Age tribes was fairly advanced, as discussed in Chapter 6.

The dykes on the Tabular Hills to the east of the river Rye are both prehistoric and medieval in date. (We have little evidence of Roman or Dark Age

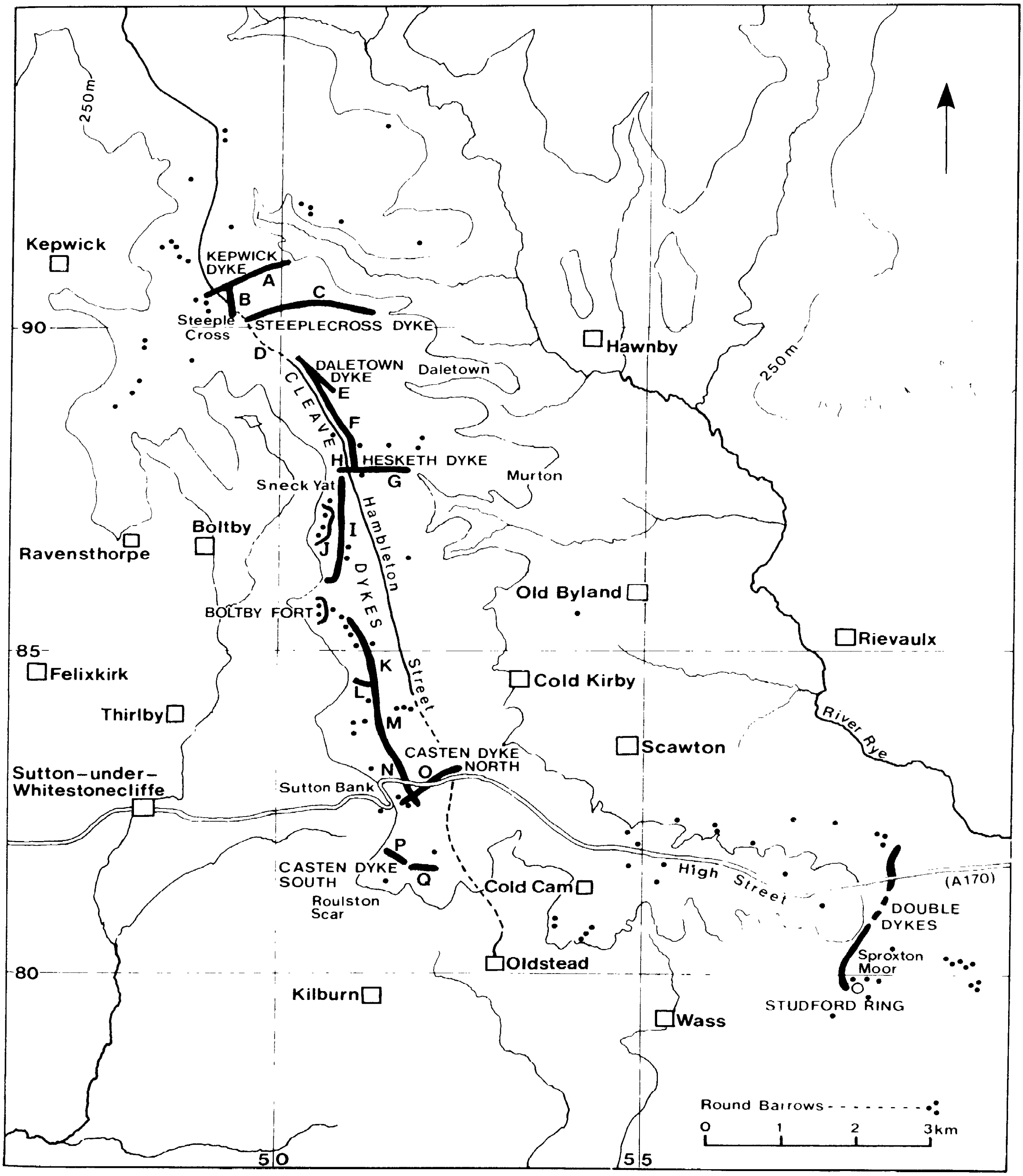


Figure 59 The Cleave Dyke system

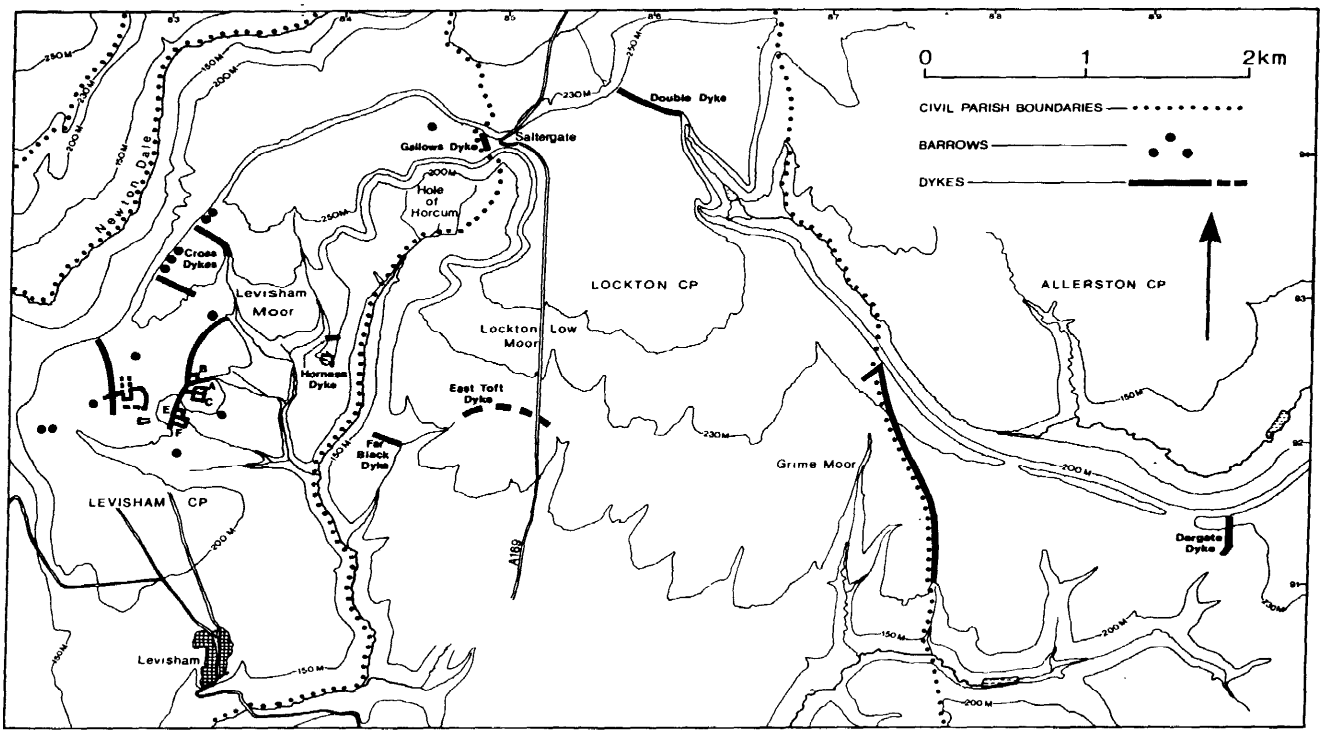


Figure 60 The dykes on Lewisham, Lockton Low and Grime Moors (see p 148 for a discussion of the lettered enclosures)

dykes). They can usually be distinguished because the former are related to the natural features of the terrain (scarps, valleys, rivers) and the latter to areas of medieval land use (arable/pastoral boundaries, woodland, deerparks, etc), which are sometimes given in documents and maps. They can conveniently be studied in six areas (Spratt, 1989):

(1) From the River Rye to Newtondale there are few prehistoric dykes.

(2) From Newtondale to Dalby Beck there are four major dykes (Cross, Howle, Middle, and Ellerburn Wood dykes). They seem to form a coherent prehistoric boundary system which survived in use into the medieval period and in part to the present day.

(3) From Newtondale to Wydale is the largest dyke system on the Tabular Hills. The major prehistoric dykes run from the scarp edge into the valleys, dividing the terrain into ‘estates’ having areas of high and low ground suitable for a mixed economy, similar to those of the Cleave Dyke system. At the western end the dyke system on Levisham and Lockton Moors, although not yielding much dating evidence, or interacting much with other features in the landscape, seems to present a fairly complete survival, or at least, a recognizably coherent system. The higher parts of the moor comprise calcareous grits, more suitable for early pastoral than arable use (though much is currently under the plough), while the lower parts, in the vicinity of the more fertile enclosed medieval fields of Lockton and Levisham, comprise oolitic limestone. These Corallian grits and limestones lie on the soft Oxford clay, so that where this gently southward-sloping plateau has been eroded, there are very steep valleys and, surrounding the plateau on the west, north, and east, a very steep scarp. The disposition of the dykes is shown in Figure 60, which shows three kinds of earthwork. First, a series which interconnects the crest of the peripheral scarp with the heads of the valleys: referring to Figure 60, from west to east, these comprise three dykes on Levisham Moor, the Gallows Dyke, the Double Dyke at Hazelhead, two dykes on Newgate Moor, and the Dargate Dykes. Second, on the spurs in the centre of the area are three cross-ridge dykes which subdivide the spurs; the Horness Dyke, Far Black Dyke, and East Toft Dyke. These two kinds of dyke do not, unfortunately, in this area interact with datable features on the landscape, so that we cannot estimate their construction dates. They perform the same functions as the Cleave Dyke system in dividing the terrain into large farm units

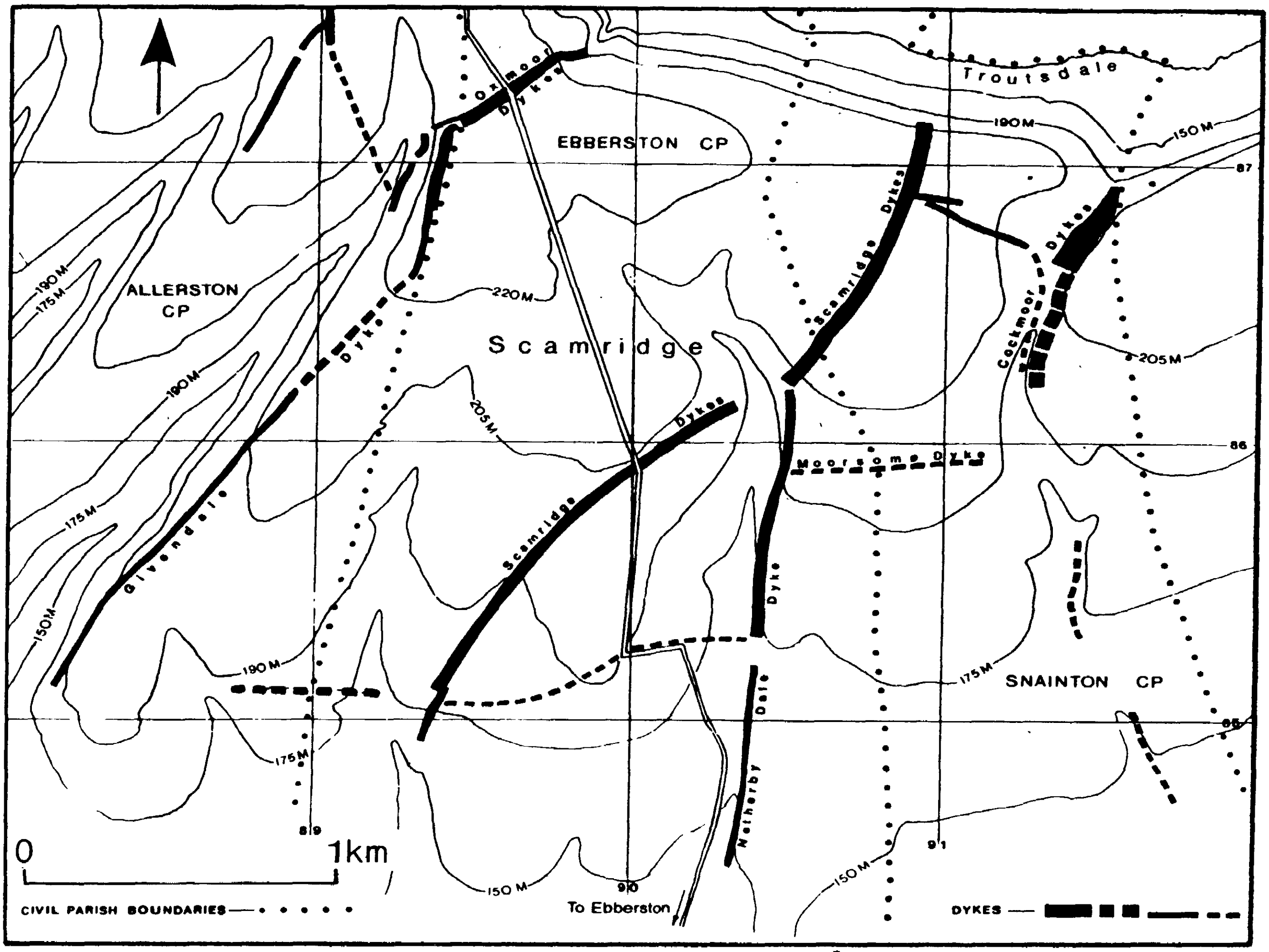


Figure 61 The dykes in the Scamridge area

with appropriate access to upland and valley terrain, and are therefore assumed to date from about the same period, that is, Late Bronze Age to Iron Age. Their disposition in interconnecting the line of the watershed with the valley heads is exactly the same as that of the Cleave Dyke system; the differences lie in the topographical situations. The third series is, however, approximately datable. These are the linear earthworks interconnecting the Iron Age/ Romano-British enclosures on the lower part of Levisham Moor to the north of the village fields (Hayes, 1983). This terrain, on the calcareous grit, is marginal land, ploughed sporadically at least in medieval times as shown by the rigg-and-furrow strips on the moorland. Evidently it was in use in the Iron Age/Roman periods, when dykes were dug connecting the enclosures with the valley heads, thus making a further subdivision of the moor. The situation is parallel to that recently observed at Wetwang Slack on the Yorkshire Wolds (Dent, 1982), where the terrain had been marked by an extensive linear earthwork on the high ground, while lower in the valley a later earthwork was constructed to mark the limits of a scattered Iron Age settlement and its burial ground. While the Levisham Moor situation therefore shows the use of dykes in subdividing the terrain into major estates, it also reveals dykes, probably later in date, with a different conception, more intimately connected with the settlements themselves; and, as they interconnect enclosures, they might have served as droveways.

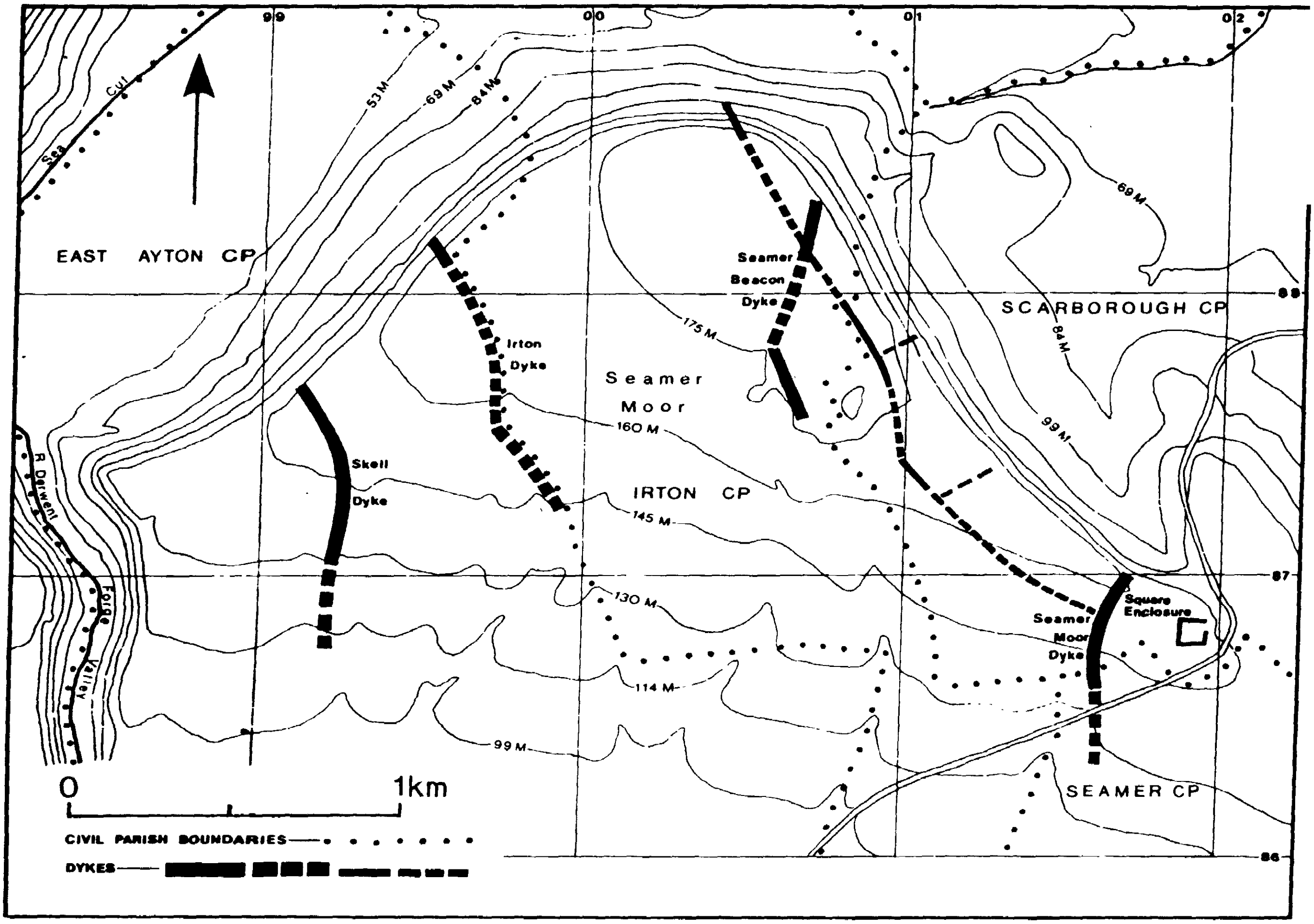


Figure 62 The dykes on East Ayton, Irton and Seamer Moors

At the eastern end we may also read the massive dykes of the Scamridge area (Fig 61) as having the same configuration on the landscape as the Cleave and Levisham/ Lockton systems, namely that they run down from the steep scarp edge across the gently sloping plateau into the valley heads. They have been studied by Mortimer (1905) and Wheeler(1931), and in more detail by Rutter in a series of papers to the Scarborough Archaeological Society (1965; 1967a; 1967b; 1969). Mortimer saw the dykes of the Yorkshire Wolds as boundary features, 'admirably adapted for keeping cattle', but thought of the dykes of the Scamridge area as 'less than for enclosure, more for making hollow-ways of great dimensions'. He showed that a round barrow in the line of the Cockmoor Dykes was in place before the dykes were built, by demonstrating by excavation that the dykes did not run beneath the barrow. Wheeler saw these dykes, however, unequivocally as boundary systems appropriate to the topography, commenting that 'the frontiers omitted by nature have been supplied by the handiwork of man.' It is true that the positions of the dykes on the terrain are perfectly explicable in the terms appropriate to the other dyke systems we have discussed, namely that they augment the natural boundaries of watershed and valley heads. It has recently been shown by air photography that the system extends for about a mile southward from the surviving upland dykes, to the vicinity of the present villages (Powlesland, pers comm). What is not so readily explicable is the massive construction of these earthworks. At Cockmoor, there are six major dykes and up to fourteen smaller ones running parallel. The smaller dykes clearly postdate the large

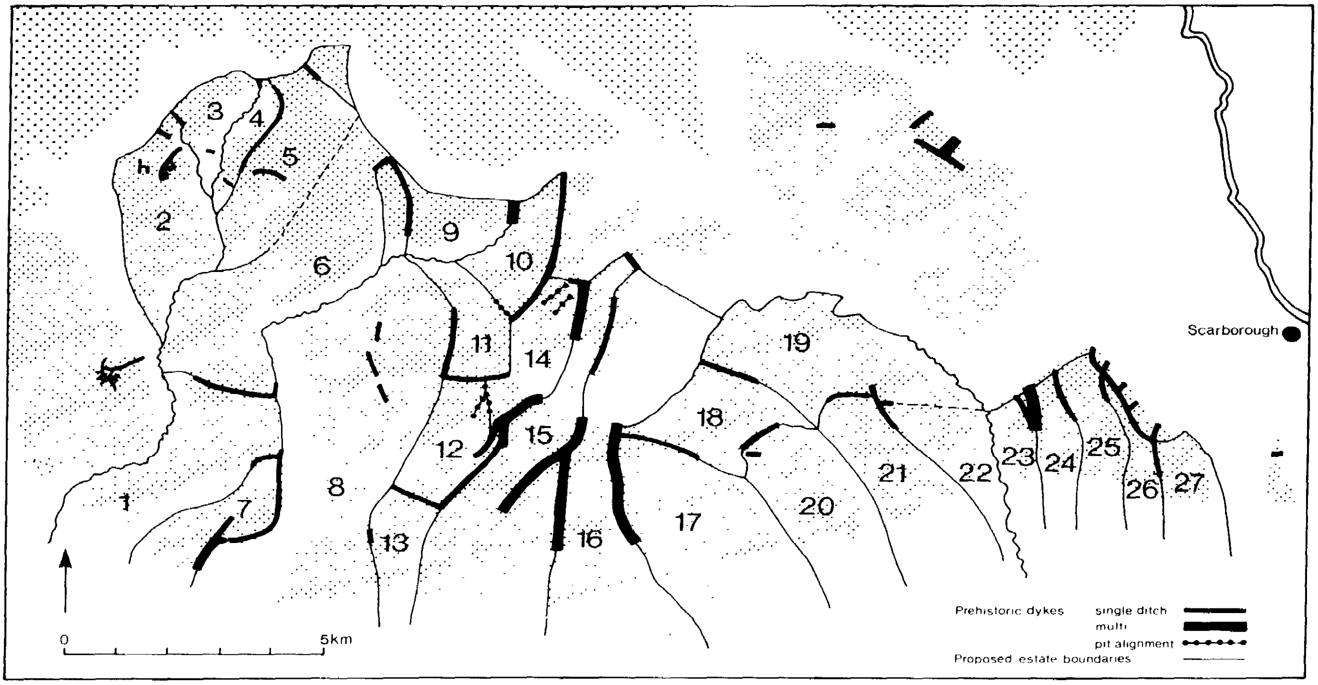


Figure 63 Proposed prehistoric estate boundaries on the east Tabular Hills

ones and are not mentioned before Young's (1817) description. The small dykes may well have been associated with the important warrens operated here in the 18-19th centuries (Spratt and Drummond, 1984). The Scamridge and Oxmoor dykes are multiple major dykes, each individual ditch and bank being a formidable earthwork in its own right. At present we can only guess their purposes. The eastern areas of the Tabular Hills where they lie was at all times the most wealthy, and that presumably means that here the cattle would be thick on the g-round, a target for the less fortunate. These earthworks would certainly inhibit the movement of animals and men across them and if thickly planted with hawthorn, for example, would be impenetrable to tanks, even more so to cows. Such an explanation is not entirely satisfactory, however. The hostility of neighbouring farmers must have been bitter indeed to warrant the erection of such barriers, and in any case why are there so many of these massive dykes in the eastern Tabular Hills, but so few in the centre, also a fairly prosperous prehistoric area? In the Roman and medieval periods, large dykes were often built to mark the territories of the more prestigious groups and the element of high status probably has some bearing on our massive prehistoric dykes. No simple explanation is possible, however. Boundaries were probably regarded in a holistic way. They were symbols, often with religious associations, of the societies who built them, both of the living and the dead, they were the means of minimizing friction between neighbours, and barriers against straying and raiding of cattle. They could develop into tracks for herding animals, and later into roads. And infrequently they might become defensive structures. They were multi-period and multi-functional. The massive Scamridge dykes seem originally to have been a major tribal boundary, similar to Sproxton Moor Dykes, and were only later converted to a more typical farm boundary by the insertion of Netherby Dale dykes.

(4) From Wydale eastward to Forge Valley is an entirely different system. The dykes run east-west,, interconnecting the valley heads. They define an area south of the scarp, which is conspicuous for its many surviving round barrows and at least eight square barrows (Table 40). Specific areas devoted to ceremonial use are found elsewhere, for instance in Wessex in the Bronze Age. The Moor Dyke, which forms part of this system, has an enclosure attached containing roundhouse foundations, an indication of a prehistoric date. South of the dykes the land

is more fertile, given to agriculture, contrasting with the early moor and present forest to the north.

(5) To the east of Forge Valley, in the immediate hinterland of Scarborough, the block of the Tabular Hills comprising East Ayton, Irton and Seamer Moors has a series of dykes running from the scarp southward toward the valley heads, as shown in Figure 62. All the dykes are ploughed out in their southern reaches, some only surviving on the scarp edge, so that it is not easy to see where they terminated in the south. Four of the dykes can reasonably be interpreted as the early land boundary system, dividing the terrain into large blocks - the Skell Dyke, the Irton Dyke, Seamer Beacon and Seamer Moor Dykes. The Seamer Beacon Dyke is complicated by being crossed by a later dyke system, which seems to define a stretch of the moor along its eastern flank, possibly a later enclosure of Seamer Moor land for the settlements below the eastern scarp edges.

The four seemingly early dykes are of similar character to one another, and the antiquity of the Seamer Moor Dyke is shown by the presence of enclosures attached to it, in the manner of the Levisham Moor enclosures (Hinderwell, unpublished edition, History of Scarborough, 1824, Scarborough Museum).

(6) There are a number of dykes in the coastal region, which have different dates of construction from prehistoric to Dark Age and medieval. They do not form a coherent system. The most important are the Thieves Dykes on Silpho Moor, probably prehistoric in origin, and mentioned in the Whitby Cartulary from 1077 onward. They might have been designed for defence, having multiple earthworks and placed in a dominating position.

From all the evidence, it is possible to exclude the medieval dykes and make a tentative map (Fig 63) of the prehistoric estates bounded by the natural

Table 38 Pit alignments

Place	OS Grid	Description	Reference
Easington High Moor	NZ 7410	Double pit alignment	Young G (1817)
Ugthorpe	NZ 7809	Groups of double pits at intervals 230m, 100m and 35m. Groups lie parallel to barrow alignment	Smith D (pers comm); 25" OS map (1894)
Danby Rigg	NZ 7006	Double pit alignment, 3 pits in each line. Near cross-ridge dyke	Smith D (pers comm); 25" OS map (1894)
Double Dykes	SE 8694	Pits in line of dyke	RCHME (York)
Arden Little Moor	SE 5091	Pits at east end of linear dyke	Spratt (1982)
Ebberston Low Moor	SE 9089	2 linear dykes with pits. Badly damaged	6” OS map (1854)
Jingleby House	SE 8989	Dyke with pits well preserved	6” OS map (1854)
Cropton	SE 7688	Short pit alignment (N-S)	Pacitto, AP 129/6
Fadmoor	SE 6788	Pits in field boundary (N-S)	Pacitto, AP 54/8
High Scamridge	SE 8987	2 linear dykes with pits	6” OS map (1854); Mytum (1984; 1986)
Aislaby	SE 7787	Short pit alignment (E-W)	Pacitto, AP 99/7, 8
East Ayton Moor	SE 9987	Enclosure dyke with pits adjoining Skell Dyke	6” OS map (1854)
Lockton	SE 8388	Short pit alignment (N-S)	,Pacitto, AP 130/8
Scamridge	SE 9085	Dyke with pits	6” OS map (1854)
Givendale	SE 8885	Dyke with pits	Young (1817)
Cleave Dyke	SE 5184	Air photographic and field evidence of pits in the Cleave Dyke at many points	Spratt (1982); Spratt & White (1986)
Brompton	SE 9381	Long pit alignment on carr land, ploughed out	Riley, AP 535/35, 36 (1974); 981/25 (1976)
Nunnington	SE 6875		Riley (1975); Riley, AP 538/31

features of scarps and valleys and bythe dykes. Many uncertainties remain in this story, however.

Pit alignments

Pit alignments are often associated with linear earthworks, and seem to have been constructed within about the same timespan. Frequently in this area the pits are within the ditches of the earthworks, for example in the Cleave Dyke and in the Ebberston and Scamridge areas (Table 38). Occasionally on the Yorkshire Wolds, for instance, but not in the present study area, there are examples of a pit alignment continuing on the same line beyond the termination of a linear dyke, evidently fulfilling the same function. They can therefore be treated as boundary markers analogous to the dykes.

There are in general three kinds of pit alignment in this area. First, those which are in the lines of the linear dykes, particularly in the Jingleby/Snainton/Ebberston system where there are some fine surviving pit alignments. Mytum (1984; 1986) has recorded the two associated alignments at High Scamridge: the pits, set in a shallow trench 1.5m wide, are generally oval in shape and variable in size, some being more than 1m deep. In the Cleave Dyke system they have not survived so well. Second there is the double pit alignment on Easington High Moor, the famous 'British village' of the Victorian antiquaries. It is not entirely explicable in terms of a boundary system, for it is not continuous, a small part of it lying separate from the main alignment, on Black Dike Moor 200m to the east. It is certainly in a suitable position for a boundary marker, near a line of three round barrows, and almost on the Easington/Lealholm township boundary. It appears in fact to be an incomplete boundary mark. Two other fragmentary double pit alignments listed in Table 38 would seem to confirm this impression. On Ugthorpe Moor, 4km east of the Easington alignment, there are four fragments of double pit alignment, placed in a line with gaps of 230m, 100m and 35m between them. They lie parallel to a neighbouring barrow alignment. And on the cairnfield at Danby Rigg, there is a small fragment of pit alignment immediately to the north of and parallel to the northernmost cross-ridge dyke, and close to an alignment of cairns. The Ugthorpe and the Danby fragmentary alignments seem to be, like the Easington lines, unfinished boundary features. These three double pit alignments appear, superficially, to be similar to that at Milfield Plain in Northumberland (A F Harding, 1981) but there are some important differences. The pits at Milfield are 1m diameter and contained posts 0.2m in diameter. Cremated bone was found in them and they were thought to be associated with the nearby henge monument with which they are contemporary, as shown by radiocarbon dates. The pits at Easington High Moor are 2.5-3.0m in diameter and there are no reports of bones or posts.

Finally, there is one example of a cropmark of a pit alignment on the flat carr land of the Vale of Pickering, just to the south-west of Brompton Village. Recent work has shown that pit alignments are prolific on the south side of the Vale (Powlesland, pers comm), dividing the carr lands into quite small areas. Aerial photography has not yet been intensive along the northern part of the Vale, but it is reasonable to hope that further work will reveal more alignments here also. It is an indication of farming pressure on the carr lands in the 1st millennium bc, a point which will be further discussed in Chapter 7. A few fragmentary pit alignments (Cropton, Fadmoor, Aislaby, Lockton) show that these alignments were quite extensively used on the Tabular Hills in addition to the linear dykes, but little evidence of them seems to have survived. In the Scamridge area the pit alignments recorded on the 1854 Ordnance Survey maps have all been destroyed completely.

Conclusion

While the evidence for the Early Bronze Age on the sandstone moorlands seems to indicate a decentralized 'segmentary' organization of society, there were some signs in a few richer burials, and in the concentration of bronze finds in the Tabular Hills, that a level of society above the local leadership was beginning to emerge. The Late Bronze Age sees a more pronounced movement towards a ranked society, particularly marked on the fertile and prosperous limestone hills. It is here that we see a concentration of bronze artefacts, many of them of an aristocratic or military character, and here there was authority enough to assemble the necessary labour at least to start work on massive territorial earthworks. The gold torc found in this area is a quite spectacular indication of a wealthy elite. The emergence of a chieftain class is much less obvious in the less fertile sandstone and boulder clay terrain, though there was indeed work on hillforts, and the almost complete disuse of the round barrow burial sites indicates that, here too, the old order was changing. Possibly the forest regenerations that are indicated at this time in the pollen analyses on the moorlands (Chapter 2) indicate a more rational land use, less of a free-for-all exploitation; but if so, it was a temporary slackening of the pace of destruction of the woodland. In the Late Bronze Age, therefore, there was a continuation of the settlement pattern, Neolithic in origin, on the limestone hills and the valleys and peripheries of the sandstone moors. Social trends were established which were to culminate in the tribal organization of the Iron Age. The most advanced were those living on the fertile Tabular Hills, where wealth and social organization left their marks in the archaeological record, both as bronze and even gold finds, and as the massive earthworks which still dominate parts of the landscape.

6 The Iron Age, 600 bc-70 AD

For many years the nature of the Iron Age settlement in the area remained obscure, and it was proposed by Elgee (1930) that the Bronze Age culture simply persisted until the Roman period. A considerable advance was made by Wheeler (1954), who investigated the 52ha enclosed site at Stanwick, some 25km west of the north-west corner of the present study area. He believed it to comprise three progressively larger phases, a small hillfort dated from AD 47-48, a larger work from AD 50-60 and the final massively built fortified enclosure, unfinished at the time of the Roman incursion. Recent investigations agree the timespan of occupation but tend to see the site more as a civil centre, its construction less connected with the military events of AD 44-71 (Ramm and Turnbull, pers comm). From the absence of ancient field systems and storage pits, paucity of querns (one only), the relative crudeness of the native pottery and the vast acreage of the fort, Wheeler proposed a 'crude, semi-nomadic economy . . . in which agriculture played a subordinate part.' Wheeler's analysis was also partly based on the misconception that pre-Roman beehive querns are rare in Yorkshire. To be sure, the Hunsbury (pierced) type is not often found in North Yorkshire, but there are many hundreds of the Yorkshire (unpierced) type which date broadly 300 bc-AD 200. This fact alone cast early doubts on the nomadic-pastoralist view of Iron Age Yorkshire, though it persisted in some less well-researched literature. What sealed its fate was both the palaeobotanical research showing intensive forest clearing and mixed agriculture at this period, and the discovery of mixed farming settlements in several parts of Yorkshire.

Within the study area, evidence for the early part of the Iron Age remains very sparse indeed. The only settlement dated to this part of the Iron Age is on the Castle Hill at Scarborough, a conspicuously defensive site. Unfortunately the excavation records (R A Smith, 1927) have left its interpretation in a state of confusion. The material from the 42 excavated pits is unprovenanced and there is uncertainty whether the bronzes from the occupation level were associated with the pottery or entirely unconnected with it. The best discussion of this problem is to be found in Challis and Harding (1975) The main bronze finds were socketed axes, a gouge and a chisel, a bracelet, and possibly a sword handle; and there was some indication of bronze casting on the site. All were from the occupation level, but an iron rod is said to have originated from the pits. Challis and Harding were able to differentiate two kinds of pottery. First, the material from the pits comprising tall, rounded, flare-rim vessels with internally bevelled rim, and those with finger-tipping, all of which have continental counterparts and can be dated to the 6th century bc. On the occupation level the pottery style with angular profiles, imitating metal vessels of continental type, is thought to date to about mid-5th century bc. Although, as on some other sites, the datings of the bronze and the pottery do not coincide, the socketed axes being dated somewhat earlier than the pottery, the site can surely be placed at the very beginning of iron metallurgy in the 6th century bc as a median, with a broad date-span as suggested by Manby (1980). Other evidence is the Gündlingen (Hallstatt) sword and chape from Ebberston, and the bronze bracelets of Hallstatt type from Scarborough (Manby, 1980) and Yearby (Zealand, 1973). Only one house of the early part of the Iron Age has so far been discovered, at Crossgates Farm, Seamer, dating 700 bc onward (Finney, 1989). The construction of ditches and enclosures around houses of the later centuries of the Iron Age has led to their discovery by field and aerial surveys in the past twenty years, often on marginal land. Possibly the forest regeneration on the hills in the Late Bronze Age and the lack of settlement finds in the early part of the Iron Age imply abandonment of the marginal lands at this time, to be reoccupied in the later Iron Age.

In spite of the hiatus in the early part of the Iron Age, there can be very little doubt that throughout the 1st millennium bc there was a very considerable, and increasing, population living in the traditional settlement areas, on the periphery and in the valleys of the hills, and on the Tabular Hills. The lowlands of Cleveland in the north and the Vale of Pickering in the south were also well occupied. The evidence for large numbers of people comes both from the palaeobotanical evidence of massive clearances and from the great earthworks of the 1st millennium, both the linear boundary dykes and the hillforts. The location of the settlement in the later part of the Iron Age is shown by the distribution of beehive querns, most of which are casual finds (Fig 64). For this period, however, we have corroborative evidence that the settlement pattern indicated by the sporadic finds bears a reasonably good relationship to the distribution of settlements as they have been discovered in the field. Figures 65 and 70 show the settlements of the Iron Age and Roman periods respectively. By comparing these with Figure 64, which shows the distribution of beehive querns which occur in both periods, it can be seen that the quern finds give a representative picture of the settlement pattern. All three show the absence of settlement on the central moorlands, as for the preceding periods, though they differ from one another in detail. The large number of beehive querns in the Esk Valley, for example, indicates a fair amount of settlement, but few sites have been located. In addition to settlement evidence, we have a number of Iron Age barrows, particularly on the Tabular Hills. The development of linear dykes and hillforts, initiated in the Late Bronze Age, continued into the Iron Age, but the dating within the 1st millennium is still very uncertain. We shall review the evidence from these subjects in order.

1 Querns

Less than 40 saddle querns (Table 35) have been found in the area, compared to nearly 200 of the beehive type, A main reason for the lesser numbers is that the saddle querns are easily overlooked. They have been found in or near Bronze Age monuments, and Iron Age and Roman sites, but as we have no Neolithic dwelling sites, there are no examples from this period. They are found, like the beehive querns, in the areas peripheral to the moors. This again tends to confirm that settlement in the post-Mesolithic periods was always on the margins, seldom in the heart of the moors.

North-East Yorkshire is a particularly favourable area for the study of beehive querns. There are many of them, most of them made of local sandstone, some of which can be identified and even on occasion assigned to one of the local quern factories at Goathland, Spaunton Moor, and Bransdale. About one-eighth of the querns are of millstone grit from the Pennines, but as this rock is not fossiliferous, the source of the querns can only be estimated in rather broad terms. The investigation of the distribution and lithology of the querns is described by Hayes *et al* (1980), whose work provides the basis for this discussion. Beehive querns have been found in twelve excavations in this area, so that there is some basis for deducing their date-span, though not with any accuracy The date of their introduction is late in the Iron Age, but since this rests solely on pottery associations, a true date can only be an approximation; 300 bc seems to be a reasonable guess, as in Lincolnshire to the south (May, 1976). Flat querns were introduced in the early part of the Roman occupation, but many beehive querns are found in later contexts, often reused as walls and

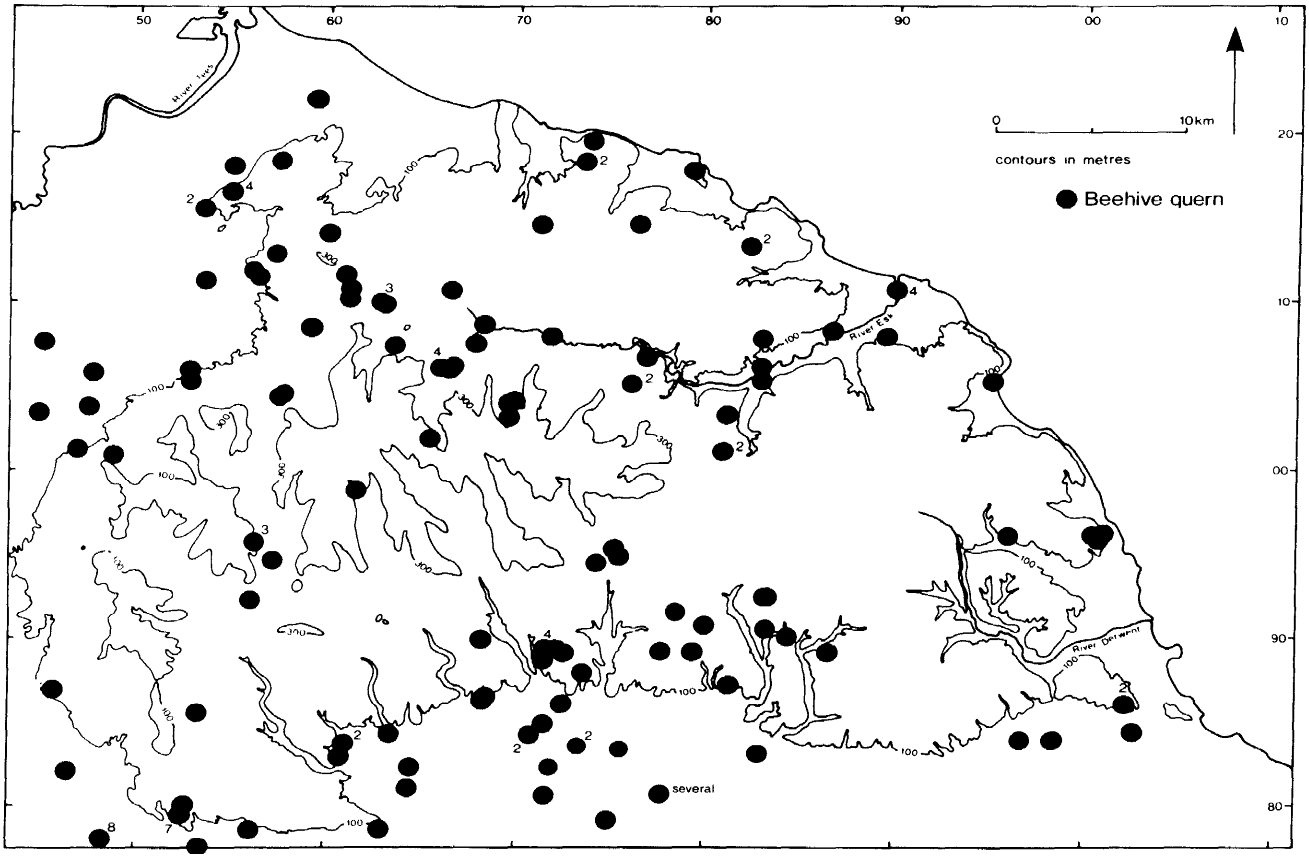


Figure 64 Distribution of beehive querns plotted on arable land shown on the 1945 Land Utilisation Survey (after Hayes et al, 1980)

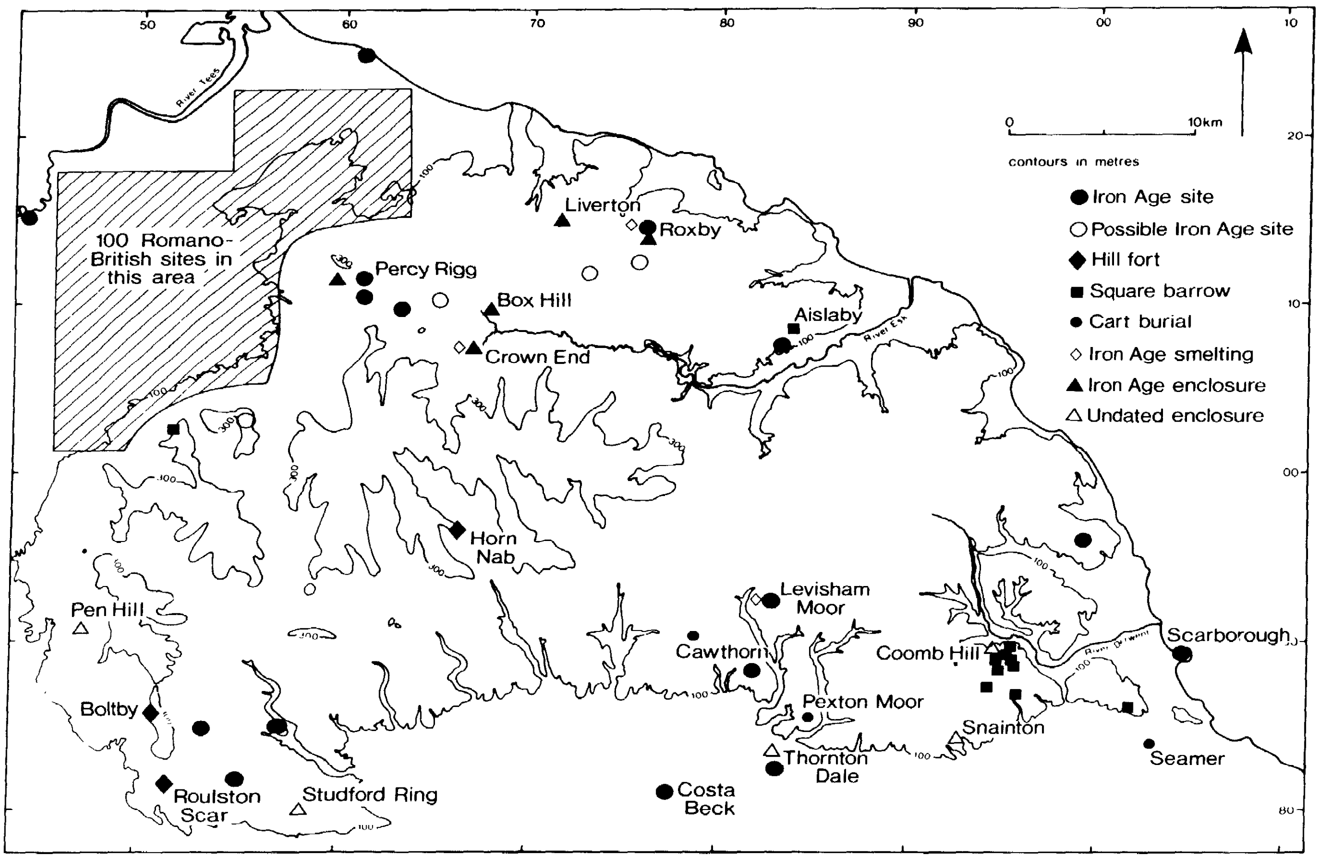


Figure 65 Distribution of Iron Age sites, enclosure, barrows and forts

paving. Thus the distribution map represents settlement in the pre- and post-invasion periods. It is plotted in Fig 64 together with the arable land as shown in the 1945 Land Utilisation Survey, showing a close coincidence. It seems reasonable to think that the geographical pattern of arable farming in the Late Iron Age and early Roman period was not very different from that of modern times, especially as there is supporting evidence for this from other studies. First, the pattern of settlement as shown by air photography and fieldwork confirms the pattern shown by the querns. Second, as discussed in Chapter 2, the Iron Age/Romano-British period was one of intinsive forest clearance; much of this must have been on the low ground. Third, the paucity of woodland clearance place-names in this area indicates that much of the low ground had been cleared before the Saxons named their settlements. The evidence is strong, therefore, for a Late Iron Age/Romano-British agricultural pattern on the Tabular Hills, the peripheral and valley lowlands, as at the present day. Indeed, one may well wonder whether there was any viable alternative for the early farmers; we have seen that this pattern is persistent from the Neolithic period onward.

The pattern of distribution of querns from various sources is interesting, as giving some insight into trade and exchange. There seem to be three separate patterns:

1 The millstone grit querns from the Pennines, a very good rock for milling, are distributed mainly to the west of the area, with progressively lower density toward the coast.
2 The querns produced from the local quern factories at Bransdale and Spaunton (both of the crinoid grit, a fossiliferous sandstone) and from Goathland (a Middle Jurassic unfossiliferous sandstone) are found on the arable land within 15 to 20km of the factories. These have medium-quality milling properties. The crinoid grit querns also find their way well into south-east Yorkshire.
3 The poor-quality querns from the Corallian rocks of the Tabular Hills, these, however, seldom move away from the area of the rock outcrop.

Table 39 Pre-Roman Iron Age sites

Place	OS Grid	Description	Reference
Redcar		Pottery scatter with Roman sherds	Inman (unpublished)
Eston Nab	NZ 568183	Hillfort	Aberg (1968)
Park House, Skelton	NZ 643182	Very clear cropmark (1985)	Vyner (pers comm)
Normanby	NZ 557172	Refuse heaps	Atkinson J C (1864)
Guisborough Park*	NZ 597171	Enclosure crop- and soil- marks	Spratt (1971)
Barnaby*	NZ 573168	Enclosure cropmark	Spratt (1975)
Upsall*	NZ 557164	Hut soilm arks	Spratt (1971)
Ingleby Barwick	NZ 437151	Excavated site with IA and Roman pottery	Heslop (1984)
Liverton*	NZ 714150	Enclosure	Hayes (1964a; 1988)
Roxby Low Morr	NZ 762144	4 excavated 1Ahuts	Inmam *et al* (1985)
Roxby Low Moor	NZ 761139	Enclosure with huts	Inman *et al* (1985)
Roxby High Moor*	NZ 758126	Ditched circular hut	Inman *et al* (1985)
Girrick Moor	NZ 704118	Enclosure 32 x 37m. Second enclosure adjoining	Young (1817); Elgee & Elgee (1933); Hayes (1988)
Easington High Moor*	NZ 731118	Ditched circular hut	Spratt (unpublished)
Percy Rigg	NZ 610115	5 circular huts excavated	Close (1972)
Nunthorpe		Pottery scatter with Roman sherds	Unpublished
Great Ayton Moor	NZ 598114	Enclosure with hut	Tinkler & Spratt (1978)
Tanton*	NZ 526112	Enclosure cropmarks	Still & Vyner (1986)
Pale End, Kildale	NZ 610103	IA and Romano-British settlement, excavated	Hayes (196633)
Wayworth*	NZ 651101	Celtic fields, stone-paved huts, unexcavated	Elgee (1930)
Crag Bank	NZ 631098	Huts, fields, lynchets, excavated	Close *et al* (1975)
Box Hall, Castleton	NZ 678095	Enclosure with IA sherds, fields to the north	Elgee (1930); Hayes (1988); North Yorksire Sites and Monuments Record 818.01001
Stokesley	NZ 5308	Subrectangular enclosure	Still & Vyner (1986)
Kirby*	NZ 5108	Subrectangular enclosure	Still & Vyner (1986)
Topstone Folly	NZ 832075	Possible hut site with IA sherds, continuing to 4th century	Hayes & Rutter (1964)
Crown End, Westerdale	NZ 668076	Enclosure with iron slag	Harbord & Spratt (1975); Hayes (1988)
Crathorne	NZ 450075	Cropmark with pottery and quern	Still & Vyner (1986)
Ingleby Arncliffe	NZ 460000	Subrectangular enclosure	Still & Vyner (1986)
Bilsdale Midcable*	NZ 555030	Circular stone hut with stone walling	Browarska & Spratt (1980)
Hulleys*	SE 997960	Celtic fields, beehive querns	Elgee (1930)
Levisham Moor	SE 830922	Enclosures with IA and Roman pottery	Hayes (1989)
Kepwick*	SE 468905	Quadrilateral enclosure	Aberg *et al* (1977)

Place	OS Grid	Description	Reference
Coomb Hill	SE 954894	Well-preserved enclosure	Mytum (1987)
Scarborough Castle	TA 050890	Late Bronze Age/Early Iron Age settlement	Smith (1927)
Blansby Park*	SE 820880	Extensive linear features	OS maps
Boltby	SE 507857	Hillfort	Willmot (1938)
Ashberry	SE 570848	IA sherds from windypit entrance	Hayes (1963; 1987)
Cold Kirby*	SE 535845	Celtic fields with pottery spindle wheels etc	Sanders (1910)
Snainton	SE 928840	Kite-shaped enclosure	Riley, AP 538/33 (1974)
Roulston Scar*	SE 515815	Promontory fort with timber-lace rampart. No pottery	Pacitto (1970b)
Thornton Dale	SE 831832	IA type enclosure	NY County Archaeologist
Thornton Dale	SE 834823	Iron Age and Roman sherds	Clark M K (1931)
Costa Beck	SE 776809	Extensive riverside settlement	Clark M K (1931); Hayes (1978)
Cold Cam	SE 534816	Celtic fields, IA and R-B pottery	Hayes (1963)
Studford Ring*	SE 582798	Enclosure of Iron Age type	Unpublished

** Indicates probable Iron Age site, but not proven by definitive finds*

Note: The many sites (100) in Cleveland discovered by Inman containing unstratified Iron Age and Romano-British pottery are not included here. The best information is to be found in Inman (1988). For beehive querns see Hayes et al (1980).

There seem to be, therefore, three kinds of distribution; an organized trade from the Pennines; a local trade in the quern factories of the region; and a home industry for the Corallian querns. It is not possible to assign date-spans to these trade patterns, nor for that matter to the sculptural quality of the querns. which range from a very crude to a beautifully shaped quern. There also seems to be a wide variety of use of the querns, for querns of various rocks and different forms are found on the same settlement site.

The advantage of a beehive quern compared with a saddle quern is not its greater output per hour, but that it is much less tiring to operate, and can therefore be used for longer to process greater quantities of grain. The study of beehive querns indicates an intensification of agriculture in the last part of the Iron Age and the Roman period, to the extent that special quern factories were established and querns were brought from the Pennines up to 90km. It is hardly possible to reconcile these facts with the idea of a nomadic pastoral economy for the area.

2 Settlements

The overall distribution of Iron Age settlements is shown on Figure 65 and listed in Table 39. The map gives a correct overall impression of the predominantly lowland nature of Iron Age settlement, but is misleading in the sense that it shows the largest concentration of sites in the Cleveland area. This is the recent result of systematic air photography revealing cropmarks of subrectangular enclosures (Still and Vyner, 1986) and intensive fieldwalking to discover sites revealed by pottery scatters (Inman, 1988); other lowland areas have not yet been so intensively searched. Nine subrectangular enclosures were reported by Still and Vyner in lowland Cleveland, in addition to three already known on the higher ground of the county, and an equal number of lowland sites are currently under study. These must represent only a fraction of the late prehistoric sites, for the enclosures are difficult to detect from the air on boulder clay terrain. This view is confirmed by the discovery to date of about 100 Late Iron Age/Romano-British sites by Inman's fieldwalking. Here we encounter a major problem in distinguishing Iron Age sites from Romano-British; we do not know the extent to which the Late Iron Age pottery forms continued to be made after AD 70, but evidence from Lease Rigg (p162) indicates that they continued until at least AD 100 and possibly later. Thus it is uncertain, when sites contain unstratified mixtures of native Brigantian and Roman pottery, whether they predate the Roman arrival. Therefore we have a general idea of the distribution of Iron Age settlement in the total study area, but unreliable information on local concentrations, and some uncertainty in the date spans of local Iron Age pottery and quern forms.

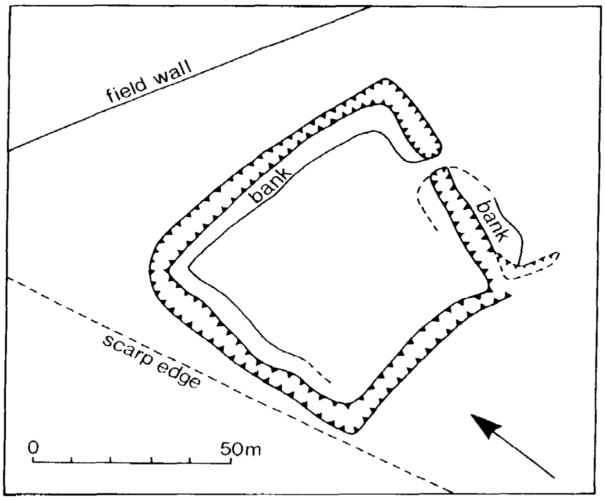


Figure 66 The undated enclosure at Penhill, Kepwick

Two of the lowland Iron Age enclosures have been excavated, at Ingleby Barwick (Heslop, 1984) and Potto (Inman, 1988), and a major enclosure at Thorpe Thewles north of the Tees (Heslop, 1987). The Ingleby Barwick site was interpreted as Iron Age enclosures and fields, sustaining mixed farming, on which rectangular Romano-British fields were later laid out. The Potto enclosure, very late Iron Age/Romano-British continuing to about AD 200, was cut by a field boundary ditch, when this site also was apparently converted to part of a field system. The same phenomenon was observed at Thorpe Thewles, where the field system supplanted the Iron Age enclosure at about AD 200. These are further discussed in Chapter 7.

The settlements preserved on the higher ground fall into two main types: first, the unenclosed roundhouses; and second, roundhouses surrounded by an enclosed area delimited by a ditch and bank. The unenclosed roundhouses are usually found in clusters of two or three but, as will be discussed later, single houses also occur on the moorlands. The first example of this type to be investigated was the group on the crest of Percy Rigg near Kildale (Close, 1972). Here there were probably three phases of construction of houses on the same site, deduced from their horizontal relationships. The pottery could be dated to the late part of the Iron Age, by reference to the work of Challis and Harding (1975). This extensive classification work, which forms the basis of all the dating in this chapter, was in progress concurrently with the Percy Rigg excavation. Challis and Harding make the point that Percy Rigg pottery, with that of Stanwick, Pale End, Catcote (near Hartlepool: Long, 1988), Normanby, and to some extent Levisham Moor, form a distinctive group (to which we can now add Roxby, described later), for which the association with imported wares at Stanwick provides rough dating evidence. At Percy Rigg, the presence of one beehive quern base together with nine saddle querns and rubbing stones supports the continuation of the settlement into the last phase of the Iron Age. The querns, together with honestones, also provide evidence of the agricultural nature of the subsistence. There was no direct evidence of pastoral activity, partly because uncalcined bone does not survive in the moorland soils. Some of the huts did not contain hearths, however, and might be interpreted as byres. This is the highest of all the Iron Age settlements currently known in the area (270m), and it would be surprising if there were not pastoral activity at this height. The huts are associated with a field whose boundaries comprise small linear ditches, but its purpose, whether agricultural or pastoral, is unclear. The other finds from these well-constructed stone huts are surprisingly sparse; a fragment of a jet bangle is the only hint of a lifestyle other than that of bare subsistence; evidence of weaving or metallurgy is absent and there is no imported pottery or glass. Indeed, the pottery itself, containing fragments of the local Cleveland Dyke igneous rock, appears to have been crudely fired on the site, A poor farm on marginal land, one would conclude, perhaps even a seasonal one. The fact that several hearths and a cooking pit were found external to the huts might suggest use of the site in the fair weather months, though not necessarily exclusively so.

About 1.2km west of the Percy Rigg site lies one of the best examples of an Iron Age enclosure, on Great Ayton Moor, separated from Percy Rigg by Lounsdale valley. It is approximately square in plan, with side length 60m, with two corners sharply defined right-angles and the other two gently curved through the right-angle. The characteristic of sharp and rounded corners often occurs with the Late Iron Age enclosures which are included in Table 39. They seem to be distinct from the small square enclosures listed in Table 42, which appear to be connected with the farming activities in the Roman period, as will be discussed in Chapter 7. The enclosures with the pronounced rounded corners, for which we have any information, appear to be constructed in the last phase of the Iron Age. They are at Great Ayton Moor, Crown End (Westerdale), Roxby Low Moor, Crathorne, Boxhill (Castleton), and Levisham Moor. Coomb Hill (Wykeham Forest) and Studford Rigg (Hambleton Hills) have this morphology but are undated. Further afield, Thorpe Thewles (a few kilometres north of the Tees), excavated by the Cleveland County Archaeology Unit (Heslop, 1987), West Brandon in County Durham (Jobey, 1962), and Meltham near Huddersfield (Toomey, 1976) are all Iron Age enclosures with this type of ground plan. It is, however, very unlikely that there is a definitive chronology of enclosures which can be framed from their shape. Lacking any better information, the large enclosures with rounded corners have been included in the Iron Age lists, and those with regular square plans, most of which are now ploughed out, in the Roman lists. But there is no certainty in this matter, and some may even date to post-Roman and later medieval periods. Some enclosures do not correspond with either of these descriptions, for example, the kite-shaped enclosures at Barnaby and Snainton, and the irregular rectangular enclosure at Penhill, Kepwick (Fig 66).

The economy of the Great Ayton enclosure appears to have a pastoral emphasis. Palaeobotanical study of the soil below the rampart showed that the enclosure was built in open grassland, at about the middle period of the Iron Age from the pottery evidence. There were no querns or honestones found in the excavation of an oval paved hut in the interior, and the internal ditch and wall footings on the inside of the bank suggest that the enclosure was designed to hold stock. However, the palaeobotanical work indicated cereal growing prior to the construction of the enclosure, and a field system formed later around the periphery indicates agriculture at a later date. Many pollen diagrams from the peat bogs in Cleveland show continuous cereal culture in the Iron Age (Chapter 2). The enclosure at Great Ayton Moor, therefore, although primarily pastoral in purpose, has evidence of arable activity; in other words, it is a mixed farm, not entirely dissimilar from the unenclosed homesteads. It is probably wrong to think of the settlements, either enclosed or unenclosed, as completely independent farming units. They probably formed part of integrated mixed farming complexes; the unenclosed huts were possibly agricultural in emphasis, the enclosures having a more pastoral emphasis. The enclosures are not concentrated either on the higher or on the lower ground, for they are found across the Cleveland plain, and on the lower foothills.

Several prominent enclosures of Iron Age types lie on Levisham Moor, some 500m north of the present cultivated fields, and are interconnected by a series of dykes, as described in Chapter 5.2. They were investigated by Scarborough Archaeological Society (Rutter, 1964b; 1965; 1966); a diagram of the site is given in Figure 60. Enclosures A, B, C, D and F were partially excavated. All produced pottery of Late Iron Age type, drawn by Challis and Harding, and in addition there were a few Roman sherds. Enclosure A produced a mortarium rim of Gillam Type 240, dated from the late 1st to the early 2nd century; and a glass bangle came from enclosure B, also dating to about this period (Hayes, 1983).

Enclosure A proved to have a very deep external ditch and, lying on a small hilltop, gives an impression of a defensive purpose. Enclosure C, not visible as an upstanding earthwork, seemed to be a later extension of A. Enclosure B contained two large circular huts of wood or turf construction, and a considerable quantity of Iron Age pottery, so that it appears, with A, to be a main dwelling area. Site D proved to be a bloomery, surrounded by a ditch, and evidently roofed. It contained a hemispherical bowl furnace with a clay dome still in place, and was the only unenclosed building in the area. The enclosures lie on the relatively infertile calcareous grit of the Corallian series, whereas the present village and its fields are mainly on the fertile oolitic limestones, and it would seem likely that the moorland enclosures are the peripheral sites of a farming community which occupied the more productive land near the present village. For the size of the complex, quern finds were sparse (two beehive querns and several saddle quern fragments), perhaps indicating, as at Great Ayton and Roxby (see later), a mainly pastoral function for the enclosures.

The situations of the Iron Age settlements at Roxby (see Fig 67), which are on the marginal land on the moorland side of a medieval village, are similar to those of Levisham Moor. A study of the medieval layout of the village from the 1728 and 1813 maps shows clearly that all the surviving Iron Age sites are on the marginal land which was not cultivated in the Middle Ages, a conclusion confirmed by field observations. There appear to be three settlement types, disposed either side of the road leading southward from the village across the moor to the Esk valley near Danby Beacon. First, there was a ditched enclosure, on which a rescue excavation was possible after ploughing in 1973. The ditch proved to be quite shallow, and there was no sign of a palisade, so that its structure provided a contrast with the deep external ditch of the Levisham Moor enclosures, and with the well-constructed ditch, wall, and bank for stock enclosure at Great Ayton Moor. The Roxby enclosure ditch seemed simply to demarcate an area for herding animals, and perhaps was planted with a hedge. It contained two ditched houses, one of which was excavated and yielded mainly thick coarse pottery similar to Stanwick coarse wares; they seemed to comprise storage jars, possibly for meat or other animal products. The house also produced a small barrel jar, which, as discussed by Challis and Harding, is a later Bronze Age form which survived into the Late Iron Age in this part of Yorkshire. Only one quern fragment and no honestones were either produced in the excavations or ploughed up from the enclosure or its vicinity. As with Great Ayton Moor enclosure, one may therefore think of a mainly pastoral emphasis for this site (Inman *et al*, 1985).

There were also groups of houses in the area, and one linear group of four houses was excavated from 1973 to 1981 (Inman *et al*, 1985). The first three houses produced pottery whose shape and fabric left no doubt of its identity with that of the other Late Iron Age sites of the region. One of them contained a saddle and a well-worn beehive quern and had a circular annexe, which, having no entrance at floor level, seemed to be a raised storage room. Possibly the main activity here was storage and processing of cereal products. A second house contained an iron-smelting bowl furnace and a number of furnace bottoms (slag solidified to the shape of the bottom of the furnace), There were a honestone, saddle querns, and pot boilers indicative of more general

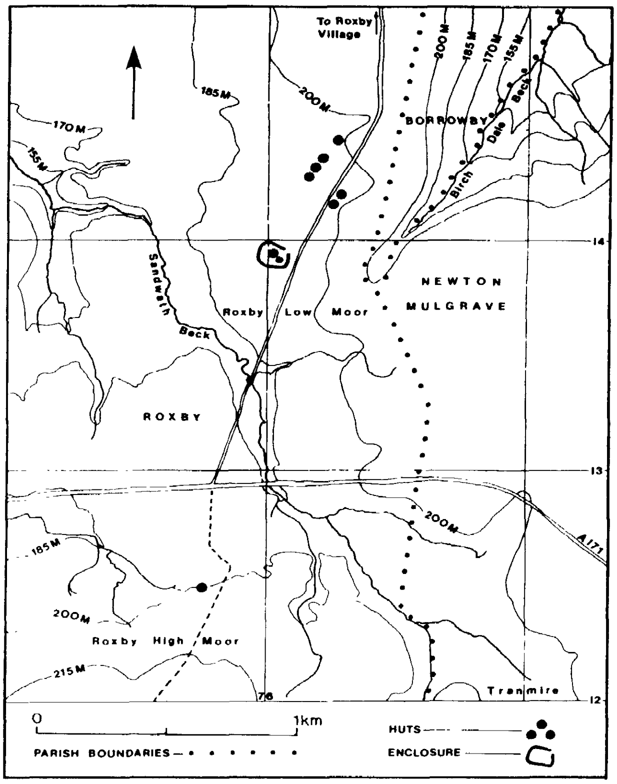


Figure 67 The Iron Age sites at Roxby

activities. The third house, contemporary with the second, as shown by a furnace bottom found in the ditch, had working hollows with metallurgical debris, and might have been used for smithing operations, in addition to more general utility. The fourth house, a little removed from the other three, produced pottery of rather later fabric, of a sandy, gritty texture usually associated with Romano-British wares, and, from the very last phase of silting of the ditch near the entrance doorway, sherds of Anglo-Saxon stamped ware of the 6th century AD. It was situated in an area of cross-ploughing of prehistoric type, and was clearly to be dated later than the first three houses; it is uncertain whether there was an overlap. The economy of these houses seems predominantly agricultural, though the discovery of the horns of *Bos longifrons* in the house ditches indicates pastoral activity as well. A mixed farming economy for the area is in fact borne out by palaeobotanical work at Tranmire Slack, a peat bog about 3km south-east of the site (Jones, 1978). The cereal and pastoral farming pattern seems to have originated in the Bronze Age, and there is evidence in the Iron Age of quite intensive mixed farming, accompanied by a rapid spread of heathland. Tree pollen was at this time about 10% of the total, and pollen from shrubs was almost negligible. In other words, the appearance of the terrain was probably not very different from that of the present day, though pastoralism currently dominates the scene. The palaeobotanical and archaeological evidences for mixed Iron Age farming are therefore in good agreement. Lastly, a third settlement type is comprised by the single ditched roundhouse on a small hillock in the moorland area near the prehistoric track, about 1500m south of the enclosure. It has not been excavated, but is probably best interpreted as a herdsman's house.

If, as has been discussed in Chapter 5, we conceive of the late prehistoric farmers operating in discrete territories defined chiefly by natural boundaries, then it is easy to specify the territory of the Roxby Iron Age group, for the terrain is almost completely surrounded on all sides by moorland streams in quite deep valleys, in fact the combined present-day townships of Roxby and Borrowby (Fig 67). (From the nature of the township boundaries, Borrowby can be seen as a later intrusive township into Roxby terrain, since the boundary between the two follows the irregular line of the early fields.) On the west the territory is bounded by Roxby Beck, on the east by Birchdale Beck, on the south and south-east by Hardale and Tranmire Slacks (see Figs 66; 67). There are two gaps in the natural boundaries provided by these streams, one on the west, the other on the east; the boundaries here are marked by stones, some of them of very ancient weathered appearance, some obviously more modern. The ter-

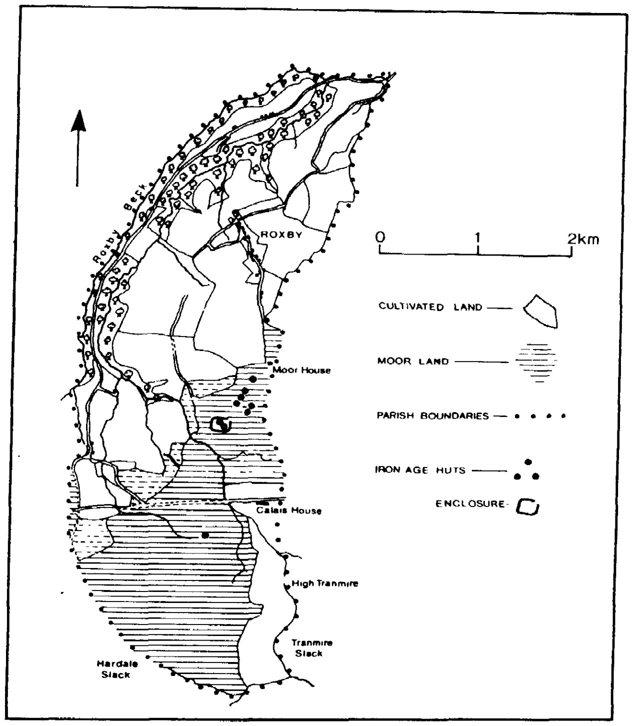


Figure 68 The 1728 map of Roxby parish, also showing Iron Age huts

rain defined by the boundaries would give, in the Iron Age, as at later periods, scope for both arable and pastoral activities. And, as in the medieval period, the prehistoric arable activity would tend to be concentrated on the more workable boulder clay to the north of the area. The present village is a survival of the medieval street village, surrounded by the old open fields where a good deal of rigg-and-furrow strip is still to be seen, with outlying farms in the southern part of the area - Moor House (near the excavated huts), Calais House, and High Tranmire Farm, all predominantly pastoral farms. There is not much arable farming at the present day, but in the medieval period there was obviously much ploughland near the village, extending southward almost to the Iron Age sites, and pastoralism on the rough grazing and moorland in the south of the area. This situation is reproduced in the Iron Age pattern. The mixed farming settlement and prehistoric ploughland is in the north of the area left untouched by the medieval ploughing; the pastoral activities seem to have been further south at the enclosure site and presumably the isolated herdsman's house on the heather moorland. Unfortunately, no prehistoric material or site has survived in the area near the village, which is the usual situation in the medieval farmlands, so that we cannot know for certain the nature of the Iron Age activity there. We can, however, propose with a certain assurance an integrated mixed Iron Age economy for the area, with groups of houses having different functions in the economy, with an arable emphasis to the north, and pastoralism to the south on the moorlands. It is not a situation of the fully integrated economy of a medieval village, but perhaps an early example of a 'polyfocal' settlement as discussed by C C Taylor (1977) - though of course we cannot be certain, our evidence from the main part of the present village having disappeared. This pattern is, however, also found at Levisham, as already discussed, and can also be seen in the medieval village of Liverton a few kilometres to the west of Roxby. Here on the moorland side of the medieval village was an enclosure of Iron Age or Roman type which produced beehive querns, and on the higher moorland to the south is an isolated roundhouse, reproducing the Roxby pattern. Indications of incipient nucleation have been observed in recent Iron Age studies in Yorkshire, particularly at Wetwang Slack (Dent, 1982). Nucleated Iron Age settlements have been investigated in the North and North Midlands in recent decades; Dragonby in Lincolnshire (May, 1976) and Ledston in West Yorkshire (Keighley *et al*, 1977) are both nucleated settlements dating to the later part of the Iron Age.

Finally, we must discuss the nature of the Iron Age settlement in the carr lands of the Vale of Pickering. In Chapter 5.2, the recent work on pit alignments was discussed, as indicating intensive farming use of the carr lands in the first millennium bc, sufficient to warrant boundary systems. For the later part of the Iron Age and the Roman period, beehive querns are fairly plentiful, usually being found on the small hillocks which are scattered on the flat lands of the Vale, particularly the Kimmeridge clay outcrops in the western part, Thus there seems to have been an intensification in this period of a settlement pattern going back to the Neolithic period, as shown by the stone axe distribution. There is also an example of a large nucleated settlement here, at Costa Beck, about 3.5 km south-west of the centre of Pickering, It is at the riverside, apparently built on wooden piles, investigated at the end of the last century (Duncombe, 1899) and again in the 1920s, but without adequate pumping equipment to ensure good excavation conditions (M K Clark, 1931). In recent years pottery, together with querns, bones, loomweights, and iron slag has been recovered from a 100m stretch of the river banks (Hayes, 1979; 1988) and aerial photographs show an intensive early field and enclosure system to the north of the stream, on the carr land 2 km north of the site (Riley, air photograph 991/25, 1976). The pottery from the early investigations seems to date from the last centuries of the Iron Age (Challis and Harding) and Hayes' recent discoveries confirm this view. The animal bones collected in the 1920s excavation provide an interesting insight into the Iron Age economy; they were chiefly of *Bos longifrons*, but dog, red deer, goat or sheep, pig and horse were also present, many bones being of immature animals. Quernstones found in the recent searching indicate use of cereals, so that there seems to have been a mixed economy, as found on the other Iron Age sites described in this chapter. The air photographs of the Costa Beck area, showing both enclosures and fields, seem to provide some confirmation of this. The recent discovery of a La Tène sword at Seamer Carr (Schadla-Hall, pers comm) is another sign of Late Iron Age activity on the carr lands.

Iron Age metallurgy

In view of the readily available iron ores in the area, it is not surprising to find some examples of prehistoric ironworking. Three sites are currently known. At Levisham Moor there was preserved, with the clay dome intact, a bowl furnace which was evidently within some kind of simple building. Sherds of Late Iron Age pottery were found, and slags of typically heterogeneous composition, indicating a rather unsophisticated standard of technology (Hayes, 1983). In one of the Roxby houses there was a similar furnace, diameter about 0.3m, filled with fragments of the clay dome and metallurgical debris. The house had undergone structural alteration during its lifetime, possibly to allow the ventilation needed for furnace operation, which produces copious amounts of poisonous carbon monoxide. A number of typical furnace bottoms were found in the house and at the entrance, and in the ditch of the adjacent house. The second house had depressions in the floor filled with metallurgical debris, which might indicate that the secondary smithing operations had been done there. Finally, the typical

Table 40 Square barrows

Place	OS Grid	Description	Reference
Aislaby	*c* NZ 840085	Square and oblong barrows	Young (1817)
Carlton Bank	NZ 518025	Single square barrow	Spratt (unpublished)
Cawthorn	SE 788901	Cart burial	Stead (1979)
Wykeham Forest	SE 954894	4 square barrows	Pacitto (pers comm)
Wykeham Forest	SE 951891	Square barrow	Pacitto (pers comm)
Wykeham Forest	SE 949889	4 square barrows	Smith D (pers comm)
Wykeham Forest	SE 956888	Square barrow	Smith D (pers comm)
Wykeham Forest	SE 959885	Square barrow	Pacitto (pers comm)
Wykeham Forest	SE 950883	Square barrow	Smith D (pers comm)
Wykeham Forest	SE 950880	Square barrow	Smith D (pers comm)
Wykeham Forest	SE 944871	Square barrow (Loft Howe)	Smith D (pers comm)
Hutton Buscel	SE 959867	Possible square enclosure burials	Stead (1979)
Seamer Moor	*c* TA 020860	Possible square enclosure burials	Stead (1979)
Pexton Moor	SE 848853	Cart burial	Stead (1979)
Seamer	TA 033839	Possible cart burial	Stead (1979)

heterogeneous slags were also discovered in the wall of the enclosure at Crown End, Westerdale (Harbord and Spratt, 1975) and technical examination left little doubt that they were the products of early smelting in a small bowl furnace, but here the operation could not be dated. Our current information, therefore, is of small-scale batch furnace operation in the late part of the Iron Age, in locations widely spaced across the area.

Iron Age burials

The distribution of square barrows and the chariot burials of the Iron Age are shown in Figure 65, which demonstrates their main concentration on the eastern and central parts of the Tabular Hills, just those areas which have produced the richest prehistoric finds from the Neolithic period onward (see also Table 40). These burials, which form part of the East Yorkshire Arras culture, described in detail by Stead (1979), are widespread and prolific on the Yorkshire Wolds, and those on the Tabular Hills comprise a small fraction of the total known in Yorkshire. There is also some evidence of these burials further to the north. G Young (1817) refers to the 'square or oblong square' barrows on Aislaby Moor near Whitby, the same description as applied by Hinderwell (1811) to the barrows on Seamer Moor near Scarborough. There are no square barrows discernable among the round barrows on Aislaby Moor at the present time; the corners of square barrows tend to become eroded, giving them the appearance of round barrows, and when square barrows have had a central pit dug into them, this also would tend to make them superficially indistinguishable from round barrows. The Whitby hinterland repeatedly shows concentrations of prehistoric finds on distribution maps, including beehive querns, so it may not be surprising to find Iron Age burials here rather than in the less productive prehistoric areas. Another possible outlying example survives in a prominent position on the summit of Carlton Bank, a likely location for an important burial. Further afield, a chariot burial of the first century bc was found at Stanwick fort Wheeler, 1954). It is probable that more will be discovered by careful field work in North-East Yorkshire.

A few square barrows seem to date before 400 bc but the majority of the Arras culture burials are dated to the 2nd and 1st centuries bc (Stead, 1979). The two cart burials in the study area at Cawthorn Camps and Pexton Moor do not seem to be datable to any degree of precision, as they contained no grave goods other than iron wheel hoops and parts of harness in poor condition. During survey work in Wykeham Forest in the 1980s H Mytum (pers comm) observed that most of the square barrows had been dug into with a central pit or single trench, but the results have not been recorded. There is thus little direct evidence by which to date the square barrows in the study area, but by analogy with East Yorkshire and Stanwick, they may be thought to belong to the last two centuries bc. We do not have the large cemeteries as found on the Yorkshire Wolds integrated with settlements. On the Tabular Hills four square barrows are near the putative Iron Age enclosure at Coomb Hill, but the rest seem isolated, not associated with settlements.

Figure 69 shows the plan and an orthographic projection of the square barrow at SE 95398944 in Wykeham Forest by Dr Mytum.

Ramm (1978) makes the case for regarding the square barrows as the identification of Parisian territory in East Yorkshire. Thus the boundary between the Brigantes and the Parisi would lie along the northern scarp of the limestone hills, as far west as the river Rye which would form part of the western boundary, perhaps in conjunction with the massive Double Dykes on the eastern end of the Hambleton Hills. Certainly, square barrows have not so far been found in aerial reconnaissance of the Hambleton Hills. The main doubt with Ramm's argument is that by the last part of the Iron Age, permanent settlement in North-East Yorkshire was mainly peripheral to the hills and in the valleys. In both these terrains the discovery of barrows by air photography of cropmarks is difficult and it is likely that had more square barrows existed to the north of the Tabular Hills, they could easily have remained undiscovered. However, the known square barrows do appear in the more productive farming areas and it may be that the square barrow ritual is a mark of the more prosperous economies, particularly prolific on the wolds, or of wealthier people. Thus we get a similar distribution of square barrows to the bronze artefacts of the Late Bronze Age (compare Figs 56 and 65).

Linear earthworks

We have seen in Chapter 5.2 how the dating of many linear earthworks can only be defined broadly as Late Bronze Age or Iron Age. In very general terms, the subdivision of the land seems to originate in the Early Bronze Age, when the watershed boundaries were marked by round barrows with urn cremations, and from the watersheds the streams were used as lines of division natural - even essential - to pastoral activity. Starting in the Late Bronze Age, these boundaries were augmented on the Tabular Hills by pit alignments and linear dykes along the watershed, or leading from the watershed to the valley heads. We do not know how far the process was taken before the Iron Age, or its relative progress in different areas. But it seems that by the early part of the Iron Age the terrain had been divided into substantial territorial units, each lying across the contours, so containing elements of low and high ground, and access to streams, to enable mixed farming to be efficient. What appears to have happened at a later date on the eastern part of the Tabular Hills is subdivision of these major units, presumably as population pressure and agricultural intensity increased. This does not appear to have occurred in the Cleave Dyke system, where its high situation would tend to inhibit intensification of farming, but it took place in the late part of the Iron Age or the Roman period on Levisham Moor, where the later dyke interconnects the late Iron Age/Roman enclosures. The later subdivisions in the area between Pickering and Scarborough cannot'be dated so securely, but some of the east-west dykes which subdivide the estates created by the main north-south dykes also have prehistoric or Roman enclosures attached or near to them. One of these is an enclosure with circular huts on the Moor Dyke in Wykeham Forest (OS 6-inch, 1854), still surviving but unexcavated, so that its date is unknown; and there were others attached to the easternmost dyke on Seamer Moor (Hinderwell 1824 MS, Scarborough Museum). The major primary dykes often serve as township boundaries in medieval and modern times, but this is unusual with the later, secondary dykes.

Hillforts

We have reviewed the evidence for the early construction of hillforts in Chapter 5.2. At Boltby the rampart was possibly built at about 1000 bc. There was a later construction of the main rampart at Eston Nab, supplementing the interior palisade which, from the pottery in its vicinity, seems to be of the 7th century or thereabouts. Nowhere have we evidence of either new construction or strengthening an existing fort in the last centuries of the millennium. Hilltops with pastoral enclosures remained unfortified; multivallation of existing forts was not undertaken.

Modern interpretations of hillforts portray their variety in many respects - purpose, occupation, density in the landscape, construction and date. Since nearly all these interpretations have been concerned with the forts of southern England, which differ in most respects other than superficial appearance from those of the study area, we should be ill-advised to draw parallels with them. Rather, it seems more profitable to think of the defence problems of the Iron Age population of North-East Yorkshire - a substantial one, as we now realize, disposed in the valleys and around the peripheries of the central moorlands and including the Tabular Hills. It no longer seems realistic to think of the forts mainly as refuges, for, with the possible exception of Roulston Scar, they would accommodate only a minute fraction of the population and their cattle in the event of an armed attack. (Many scholars - eg Fowler (1978) - now think of Iron Age populations as commensurate with those of the Domesday period.) And in any case the hillforts are spaced out very thinly and would provide an inadequate answer to the security problem in terms of refuges.

Although the concept of refuge is an unsatisfactory explanation of the local hillforts, convincing alternatives are not readily forthcoming. A striking feature of the hillforts is, however, that between them they survey visually the approaches from the north, west and south-west. If one considers the military problem of defending a population mainly spread out on the low ground peripheral to the moorlands, and in the valleys, then some concentration of force would be necessary to defeat insurgent bands, if individual farms were not to be overrun one by one. It might be possible to suggest the forts

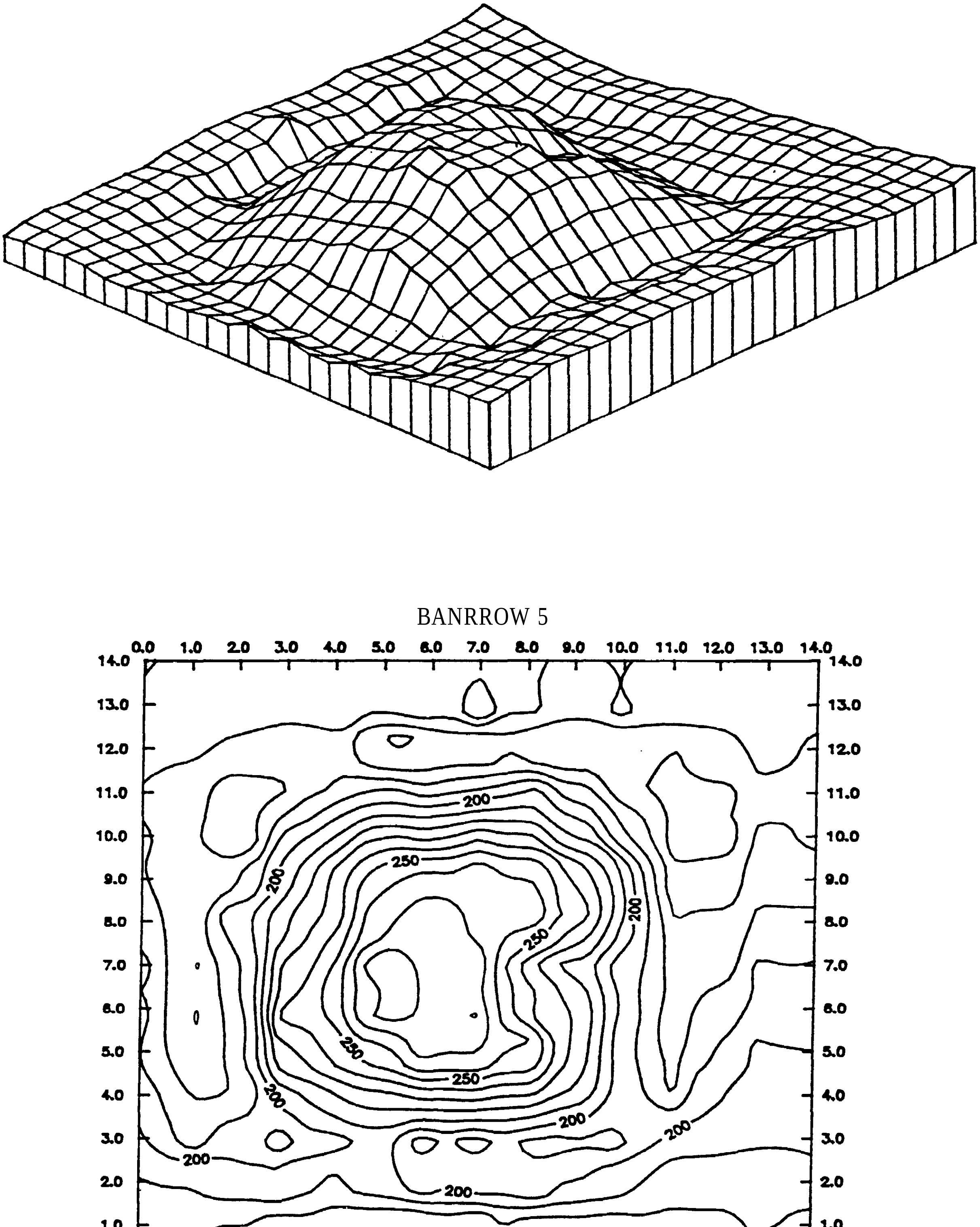


Figure 69 Plan and orthographic projection of square burrow 5 at SE 95398944 in Wykeham Forest (H C Myturn)

as command stations, rallying points, and signal posts to meet the needs of this military situation. If so, it is possible to see why no further forts were built in the Late Iron Age, since the existing forts were adequate for these military needs. Multivallation was unnecessary since the forts were not required to withstand siege, and in any case it is thought that the Brigantian clans had by the Late Iron Age formed a federal tribe which probably minimized incursions. If the defence strategy had comprised provision of refuge places there would probably have been construction of more and stronger forts in the last centuries of the Iron Age. The digging of the great linear earthworks in the 1st millennium shows that the effort to build more forts was available had they been wanted. The military needs seemed not to require them.

Summary

From being almost unknown 30 years ago, the Iron Age archaeology now shows the area to be heavily populated, certainly in the later part, and the forest clearances and mixed farming to be at their most intensive. The settlement pattern, economy and environment represented a culmination of trends which started early in prehistoric times. The pattern of lowland settlement originates in the Neolithic period, as does the mixed farming on the Tabular Hills. At all times the eastern part of the Tabular Hills was the most wealthy area, and it is no coincidence that here we find the largest concentrations of both Neolithic long barrows and Iron Age square barrows. The indications of a ranked society with the best military equipment comes also from this prosperous area, but by the Iron Age it seems likely that the whole study area was involved in hierarchical tribal cultures. Although there seems to be a continuity of settlement pattern through prehistoric times, there is little indication of continuity on individual settlements. Thus only occasionally, as at Spaunton Moor and Wykeham, do we have indications of continuity from early prehistoric times. Iron Age sites such as Levisham, Roxby, and Percy Rigg have no Bronze Age predecessors on them. Continuity of territorial boundaries seems much more usual, however. The simple Bronze Age system in the Snilesworth area seems to have been continuous to medieval times, and the Cleave Dyke system, originating in the earlier system based on round barrow alignments, also seems to have continued to the end of the prehistoric period and in parts into the medieval. The dykes on the eastern part of the Tabular Hills often continue as township boundaries in the Middle Ages (eg in the Pexton-Thornton Dale area), but the township boundaries almost completely ignore the massive Oxmoor, Scamridge, and Cockmoor Dykes. (The reasons for the disuse of these large dykes as boundaries are unknown, but prior to the Norman Conquest they lay within one manor which passed into royal hands in 1066. Change of boundaries would therefore have been easy from an administrative point of view, before and after the conquest.)

7 The Roman period, AD 70-410

By the time of the Roman occupation the high moors had come to be in much the same barren condition as we see them today, and Roman finds on the moors are very rare indeed. A 2nd-century glass bangle was found on Stony Ridge above Farndale (Hayes, 1968b) and there were coin hoards from the moorland at Ugthorpe and Glaisdale (Table 41). A scatter of Roman pottery near Wade's Causeway (Fig 70) completes the finds list from the moors (Hayes and Rutter, 1964). The distribution maps of beehive querns (Fig 64) and of Roman sites (Fig 70) show the familiar pattern of settlement on the Tabular Hills and lowland valley and peripheral areas; the settlement in the dales is exemplified by the many Roman finds in the Ryedale Windypits, natural fissures in the oolitic limestone (Hayes, 1963; 1987).

The prehistoric settlement pattern therefore continued in the Roman period, and we can think of a lifestyle on the native farms similar to that of the Late Iron Age, but probably with further intensification of the pastoral and arable farming. We can deal with the Roman period under two main heads: first, the settlement pattern of native, relatively unromanized farms and villa farms which were comparatively romanized, together with their enclosures and field systems; and, second the Roman military sites and the strategies which they represent.

1 Civil settlement

Native settlement sites

The Romano-British settlement pattern is very much a continuation of that of the Iron Age, as shown by a comparison of Figures 65 and 70. All the known Iron Age sites, with the exception of Scarborough Castle, the sites at Crossgates (Finney, 1989), and the hillforts, date to the last centuries of the period, and many of them continue, apparently uninterrupted, into the Roman period. The hillforts have given little evidence of being frequented after the Iron Age, and some of the Iron Age settlement sites also seem to have fallen into disuse by the Roman period. This applies particularly to settlements on marginal land, such as the Percy Rigg farm and the enclosures on Great Ayton and Roxby Low Moors, and may be explicable by the persisting decline of fertility in these areas. Many of the continuing sights seem to have been inhabited throughout the Roman period, but an appreciable number appear to have been abandoned in the middle of the period, during the 2nd or 3rd centuries. Occasionally this can also be attributed to the declining agriculture on the hill margins, as at Crag Bank at the head of Kildale, but it can also be observed in fertile lowland terrain, as at Guisborough, Brotton, and Lackenby. However, the many pottery scatters recently discovered by Inman (1988) show these to be exceptional cases; 85% of the 100 sites had sherds of grey ware (mainly Crambeck) and/or calcite-gritted ware, showing them to date to about AD 250-400. 60% of sites produced locally-made crude pottery which could date any time from the Late Iron Age to the end of the Roman period and beyond. 40% of the sites had sherds, 40% 3-10 sherds, and 20% >l0 sherds, so that there is some uncertainty in their interpretation. What is not in doubt is the existence of widespread settlement in the later part of the Roman occupation, but its status in the first two centuries AD is uncertain. Excavation evidence from Potto (Inman, 1988), Ingleby Barwick (Heslop, 1984) and Thorpe Thewles in Cleveland County (Heslop, 1987) revealed that enclosure sites were transformed into field systems in about AD200, showing that changes in farming practice are not necessarily obvious from pottery scatters. It is not unreasonable, therefore, to think in terms of some limited change in the lowland settlement pattern in the middle years of the Roman period, say about AD 200-250. On the whole these were the peaceful years of the occupation, and farm amalgamations or other reorganization seem the most likely explanation. Branigan (1980) has commented that nearly all the villas of the Brigantian and Parisian territory were founded in the second half of the occupation, and this would entail some rearrangement of the native farms. On the other hand we have no definite evidence of a villa estate in the Cleveland area where there were some 3rd-century changes in the native farms. The pottery sequences on all the other Romano-British settlements terminate at the end of the Roman period, except at Roxby, Seamer, Wykeham (Moore, 1965), and Guisborough (J W Inman pers comm). At all these we have stamped Anglo-Saxon pottery of about the 6th century. Some at least of the farms continued to be occupied, therefore, after the end of the Roman regime, but it is impossible to say what proportion. The problem is primarily the collapse of the economy, and the tendency for farms to return to a self-contained subsistence. As potteries slowly ceased operation, there would be a return to the crude home-fired wares, possibly idiosyncratic in style, and other simple materials. Thus we have at present few artefacts to date the continuing occupation where it occurred. There would also be a move away from cash crops produced for the integrated Roman economy to subsistence agriculture, though how far that would require a reorganization of the settlement pattern is doubtful. At Thorpe Bulmer, a few kilometres north of the Tees estuary, palaeobotanical work shows that 'although the departure of the Remans may have led to a partial return to pasturing, arable cultivation went on' (Bartley et al, 1976). The extent of continuity of settlement sites after the Roman period is therefore an open question; it has been reviewed in a wider Yorkshire context by Faull (1985). The main problem in the study area is lack of evidence; for what it is worth, the only four Anglo-Saxon dwelling sites known in the area are on earlier settlements.

Roman villas

The area lies at the northern limit of villa construction apart from those at. Piercebridge and Old Durham, and on the fringe of the concentration of villas which lie on the Yorkshire Wolds (Branigan, 1980). The only villa to be partially excavated is at Beadlam (Stead, 1971) some 2km east of Helmsley, at the southern end of Bilsdale and in a good position with respect to communication in all directions. This was an elaborate villa with buildings on three sides of a square, which like most others was modified fairly often throughout its life. We do not know its detailed chronology at present. The coin series indicates activity on this site from the early 2nd century to the end of the Roman period, but the great majority of coins are of the 4th century. An early or mid-3rd-century date of the first villa buildings seems likely; the excavation showed that the west wing had fallen into disuse by the end of the 3rd century, and the north range was altered considerably in the 4th century (Pacitto, pers comm). We do not know the whereabouts of the farm buildings, or the extent of the estate. There is strong evidence of a villa at Hood, in a boulder clay embayment into the south-west corner of the Hambleton Hills (Wenham, 1960). An inscribed sarcophagus was discovered during ploughing, of a type which indicates a well-to-do settler (Ramm, 1978). About 45m to the east, roof tiles have been found and a soilmark appeared, indicating the presence of a building. Colour-coated pottery found in the area showed that it had been occupied in the 3rd or 4th centuries AD. A stone coffin, reported as Roman, was found at Osgoodby Hall in 1862, 2km to

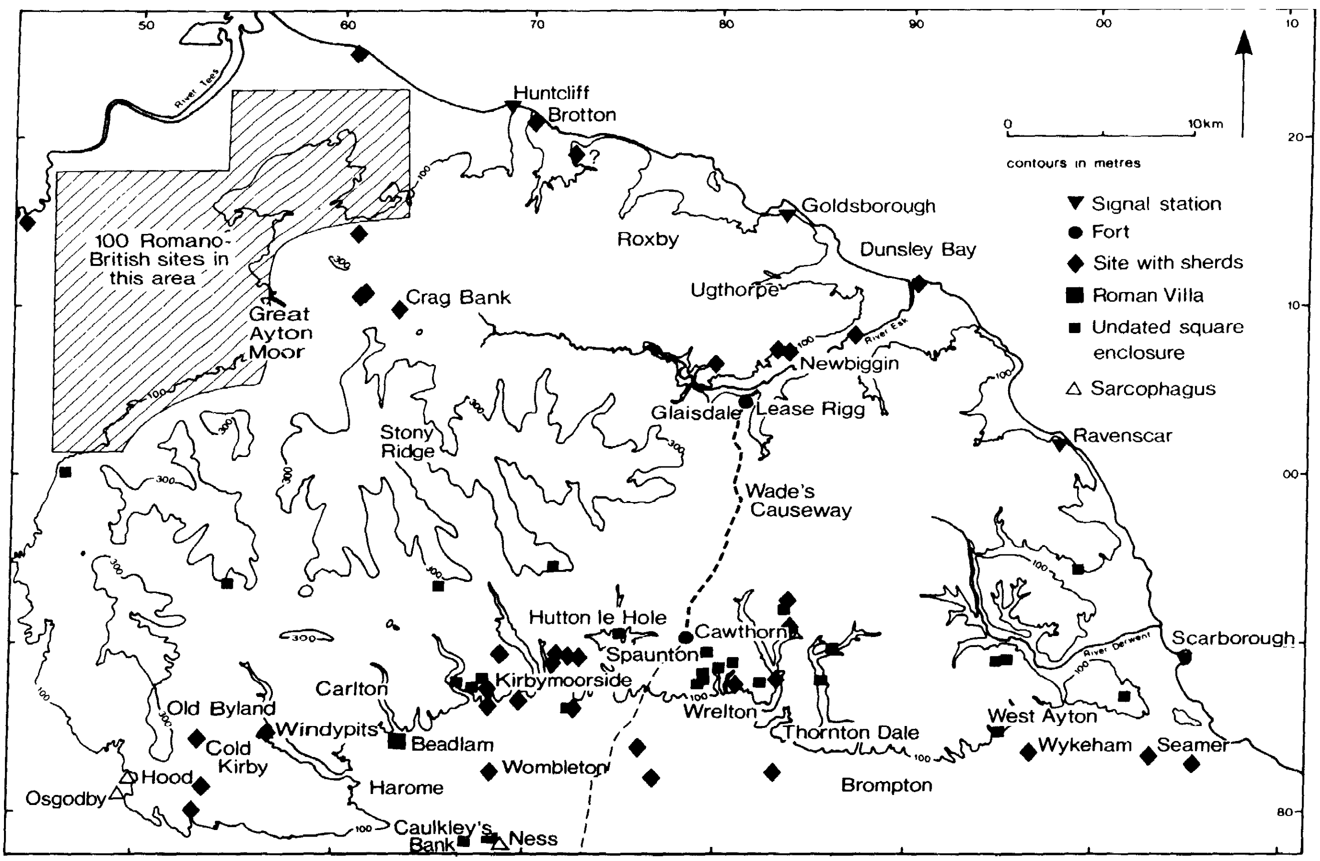


Figure 70 Distribution of Roman sites and finds

Table 41 Civil settlement (see also Table 34, square enclosures)

Place	OS Grid	Description	Reference
Redcar		Pottery from ditch IA-C4th	Unpublished
Brotton	NZ 700208	Cropmark and pottery of C2nd-3rd	Faull (1976)
Lackenby		Iron Age to about C2nd/3rd	Unpublished
Boulby, Hummersea	NZ 724188	Coins and burial 1875 (possible signal station?)	Clark M K (1935)
Eston Nab	NZ 568183	Asherd of samian ware, C2nd	Middlesbrough Museum
Normanby		Samian ware	Atikinson J C (1864)
Mount Pleasant	NZ 559166	Blue melon bead in beaker barrow	Sockett (1971)
Upsall		Greyware, mortarium	Unpublished
Ingleby Bar-wick	NZ 437151	Ditched site, pottery Iron Age to C4th	Heslop (1984)
Kemplah Top	NZ 608142	Cup and Crambeck dish	Clark M K (1935); Hayes (1988)
Whitby Abbey	NZ 903114	Coins and sherds	Clark M K (1935)
Lounsdale	NZ 613107	Extensive settlement; pottery C1st-4th	Close *et al* (1975)
Pale End	NZ 610103	Huts, late Iron Age C3rd4th	Hayes (1966b)
Crag Bank	NZ 631098	Late Iron Age C2nd	Close *et al* (1975)
Sleights, Briggswath	NZ 870082	C4th pottery	Hayes & Rutter (1964)
Topstone Folly	NZ 832075	Late Iron Age-C4th	Hayes & Rutter (1964)
Newbiggin Hall	NZ 836073	Crambeck ware, calcite gritted to C4th	Hayes (1968c)
Little Broughton, Chapel Garth	NZ 557068	Samian ware on medieval site	Hayes (1988)
Egton Church	NZ 799066	Pottery and coins, C2nd-4th	Hayes & Rutter (1964)
Hutton Rudby		Prolific pottery site to C4th	Inman (1988)
Sexhow		Prolific pottery and quern site to C4th	Unpublished
Westerdale	?	Jar of Norton ware found 1872	Malton Museum
Potto	NZ 4704	C2nd glass bangle, beehive quern	Price J (1988); Inman (1988)
Goathland	NZ 8003	Quern factory, beehive and Roman types	Hayes *et al* (1980)
Whorlton	NZ 484024	Large settlement, pottery Clst-4th	Elgee (1923); Inman (1977; 1978)
Brown Howe	SE 809952	Ploughed barrow, calcite-gritted ware	Hayes (pers comm)
Levisham Moor	SE 838925	A few C1st-2nd sherds and finds in interconnected square enclosures	Hayes (1983)
Spaunton Moor	SE 7393	Quern factory, beehive and Roman types	Hayes *et al* (1980)
Lockton	*c* SE 840910	Flue tile and pottery, C3rd-4th	Hayes (1980c)
Bawsby Banks	SE 738888	Scatter of Roman pottery	Hayes (1988)
Adderstone Rigg	SE 8890	Roman pottery and coins	Hayes (1988)
Gillamoor	SE 688894	Remains of C4th hut, pottery, loom weights	Hayes (1988)
Hutton-le-Hole, Riccall Field	SE 717894	C4th dwelling, many sherds and querns	Hayes & Rutter (1964)

Place	OS Grid	Description	Reference
Spaunton, Old Pasture	SE 721893	Late Iron Age-C4th	Hayes (1964a, 1988); Whitaker (1967)
Clark close	SE 729892	Burial cist	Hayes (pers comm)
Hutton-le-Hole	SE 714889	Sherds and quern fragments	Smith D (1976)
High Riggs Farm, Dalby	SE 864888	Loom weight, spindle whorl, jet bead, beehive quern	Rushton (1976)
Stonygate	SE 833879	Much C4th pottery and tile (dump from villa?)	Goodall & Smith (1977); Hayes (1988)
Blansby Park	SE 812875	Pottery, C2nd-4th	Hayes (1973; 1988)
Kirkbymoorside Hagg Lane	SE 812875 SE 680-2 874-9	3 sherd sites	Hayes (1988)
Applegarth	SE 698867	Enclosure on air photo; pottery sherds	Hayes (pers comm)
Snapes Wood	SE 683863	Grey ware and beehive querns	Hayes (1980a; 1988)
Sinnington Manor	SE 722854	C4th hut site	Hayes (1980b; 1988)
Ashberry Windypit	SE 570848	Varied finds of Clst-4th dug from windypit	Hayes (1963; 1987; 1988)
Cold Kirby	SE 534843	Querns, fields	Clark M K (1935)
Alfreds Cave, Ebberston	SE 89798323	4 Romano-British sherds	Scarborough Dist Archaeol soc 1959
Allerston Manor	SE 87858295	6 Romano-British sherds	Scarborough Dist Archaeol Soc 1964
Beadlam	SE 634842	Villa to C4th	Stead (1971); Pacitto (forthcoming)
Riseborough Hill	SE 7684	Amphora	Clark M K (1935); Hayes (1988)
Wykeham	SE 968837	Late C4th sherds mixed with Anglian ware on hut sites	Moore J W (1965)
Seamer, Crossgates	TA 030834	Native from Iron Age to C5th/6th	Rutter & Duke (1958)
Cayton	TA 055830	Pottery to C4th	Rutter (1967a)
Wombleton, Sonley Hill	SE 684824	Field system on air photographs, fibula, pottery	Hayes (1963; 1988)
Thornton Dale	SE 834823	Brooch, samian and native ware	Clark M K (1931)
Hood Grange	SE 499820	Stone inscribed coffin. Flue tiles and cropmarks nearby	Wenham (1960); Hayes (1988)
Costa Beck	SE 770820		Clark M K (1931)
Cold Cam	SE 534816	Pottery kilns, C3rd-4th	Hayes (1963; 1988)
Osgodby Hall	SE 493809	Roman (?) stone coffin	Malton Messenger, 6 Dec 1863
Oldstead	SE 534800	C3rd-C4th pottery	Hayes (1973); McDonnell (1969)
East Ness	SE 6978	Inscribed sarcophagus, C4th, and coin	Hayes (1963); Clark MK (1935)

Notes: About 100 sites with Romano-British pottery have been discovered by Inman in lowland Cleveland. These are not in the above table, but are described in Inman (1988). For querns, see Hayes et al *(1980).*

Table 41 continued - Coin hoards*

Place	Description	Reference
Wilton	Found 1856.80 coins 364-423 AD	Elgee (1923), 4 Clark M K (1935)
Eston	Found about 1817. Some copper coins 50-337 AD, possibly a hoard	Young (1817), 944
Ugthorpe	Found 1792.200? coins 69-140 AD	Elgee (1923), 21 Hayes (1988)
Whorlton	Found 1810. Coins 324-423 AD. Silver spoon, buckle, rings, basin	Elgee (1923), 8
Glaisdale, Blue Wath	Found 1912.30 coins dated 268-273 AD	Hildyard (1958)

** For small numbers of coins, see Hayes (1988)*

Table 41 continued - Other Roman finds

Place	Description	Reference
Mount Pleasant, Eston Hills	Blue' melon' bead in Bronze Age barrow	Sockett (1971)
Barnaby	Bronze parade helmet	Atkinson J C (1864)
Charltons, near Boosbeck	Terracotta lamp	Clark M K (1935)
Stokesley	Pewter jug	Middlesbrough Museum
Potto	Glass bangle	Price J (1988)
Stony Rigg	Glass bangle	Hayes (1968b)
Farndale	Bronze arm-purse	British Museum
Helmsley Church	Roman pot found in 1868	British Museum
Helmsley Castle	Terracotta lamp	OS card SE 68SCW24

the south-west of Hood. The area is relatively rich in native Roman sites, but the coffin has unfortunately disappeared, and its Roman origin has not, therefore, been confirmed. At East Ness, however, we have a description of the inscribed stone coffin found in 1612 which shows it to be of a similar type to the Hood Grange sarcophagus, indicating a wealthy settler, and perhaps his villa in this good farming country. The sarcophagus was found in fact only about 4km north-east of the villa at Hovingham, which is at SE 662757, just to the south of the study area. The large bathhouse of this villa, and a nearby mosaic pavement, discovered in 1745, are of very fine construction (M K Clark, 1935), and the coin series extends from the middle of the 2nd century to the end of the 4th. There is no evidence, however, that the sarcophagus was connected with the Hovingham villa, and it is possible that another villa existed in the Ness area.

It is at first sight surprising that no villa has been identified on the Cleveland Plain, where recent work shows the presence of large numbers of native farmsteads. The site at Parish Crayke, near Stokesley, originally discovered in 1862 (Elgee, 1923), has been rediscovered in recent years. The original observation was of a skeleton in what seems to have been part of a hypocaust, while the recent finds have been of prolific pottery sherds dating throughout the Roman period. Trenching in the area has so far revealed no structure. Unfortunately the site is close to the River Leven which, being fed from the nearby moorlands, has until recently been subject to sudden surging floods, so that little or none of the Roman building may survive. Another possible location for a villa is within the town of Guisborough, which has produced a number of isolated finds, including nearby a Roman parade helmet (J C Atkinson, 1864), which may, however, be buried loot. Some of the native farms in the vicinity seem to have ceased functioning in about AD 200-250, as already discussed, which might indicate the kind of reorganization which would accompany the setting up of a villa estate or estates. The important Roman site at Whorlton (Table 41) which is placed, like the medieval castle which succeeded it, with commanding views over the Vale of Mowbray to the Pennines and northward across the Tees to County Durham, has not produced evidence of being a villa. Branigan

(1980) has pointed out that villas in Yorkshire are sited not only with a view to profitable markets for agricultural products, but also by consideration of the need of security from attack. These may possibly be the reasons that the villas in North-East Yorkshire lie within reach of the garrisons at Malton and York; in Cleveland there would have been no such nearby markets and no such protection close at hand.

Industrial activity

Few sites in the area have shown evidence of manufacture of pottery, glass or metals, and it is clear that the area was served largely by cheap imports; certainly pottery from the 4th-century Crambeck kilns is found widely throughout the area, and it is reasonable to think that other industrial products would have been traded from East Yorkshire (Ramm, 1978). A pottery kiln has been discovered at Cold Cam, on the south-west scarp of the Hambleton Hills, in a position well-placed to serve the villas and farms of this area (Hayes, 1963). It dates approximately to AD 275-350. As its products (mortaria, bowls, jars, and dishes) are difficult to distinguish from Crambeck ware, and their chemical compositions shown by Neutron Activation Analyses are identical (Evans, 1989), they may in fact be widely dispersed, though unrecognized, through the area. The site seems to have been a branch factory set up by Crambeck-trained potters. Other industrial activity has been rarely discovered, the only sign of metallurgy being the iron slag and a small furnace at Crossgates, Seamer (Rutter and Duke, 1958). It seems surprising that no evidence of Roman iron-ore mining has been discovered. Evidence of skilled jet-working was discovered at the Romano-British site at Newbiggin (Hayes, l968c), not far from Whitby, and it is unlikely that this is unique in the Whitby area. Four quern factories are known which produced the early beehive type and the later flat Roman querns, one at Goathland, two on Spaunton Moor, and one at Swinacle. The Goathland products seem to have been distributed locally, within 15-20km of the factory (Hayes et al, 1980).

Square enclosures

Small enclosures up to about 70m square have been found as earthworks, or revealed as cropmarks by air photography, mainly in the central and eastern parts of the Tabular Hills (Hayes, 1988). There are also three good examples at the eastern end of Caulkleys Bank near Nunnington. This kind of enclosure occurs frequently in the North Midlands, sometimes associated with extensive rectilinear ('brickwork') field systems, where excavations have shown them to be Roman (Riley, pers comm). There are few left upstanding in our area, and where pottery has been recovered after ploughing, it has also been Roman (Table 42). Until full excavations of some of these square enclosures have been undertaken, there is little that can be said about them. They seem to be a feature of Roman farming practice in the more prosperous areas, for none have yet been found on the Hambleton Hills, and none on the northern boulder clay.

Field systems

Air photography (mainly by North Yorkshire County Archaeology staff) across the Tabular Hills and the northern part of the Vale of Pickering has revealed a number of areas of field systems with trackways and enclosures, none of which have been dated, but which, by comparison with systems in other areas, are probably best identified as Romano-British. It would be misleading to present a list or map of those currently known, for they were probably very widespread in the settlement areas. They have been revealed extensively on the Tabular Hills at Cawthorn, particularly near the Roman camps, and there are groups near Carlton and in the vicinity of Kirkbymoorside, Hutton-le-Hole and Spaunton. A 'brickwork' field pattern, which in the Doncaster area appears to date to the Roman period, has recently been photographed (D N Riley) 2.2km north of Snainton village (83922843). On the northern part of the Vale of Pickering, field cropmarks have appeared at Harome, Wombleton, Wrelton, Thornton Dale, Brompton, and West Ayton, confirming the continued working of the flat carr lands. The Hambleton Hills have not yielded very prolific results from air photography, but many cropmarks of field boundaries have appeared near, and to the west of, Old Byland. Coupled with the 'Celtic' field systems and Roman finds reported from neighbouring Cold Kirby (M K Clark, 1935), they indicate arable farming on the lower eastern slopes of the Hambleton Hills, probably in conjunction with pastoralism on the higher parts, in the vicinity of the dyke systems.

2 Military activity

B R Hartley

Whenever possible, Rome preferred to make treaties with tribes outside the imperial frontiers, to avoid using valuable troops in heavy garrisoning of such frontiers. So it was with the Brigantes down to AD 69, when the anti-Roman faction led by Queen Cartimandua's former consort Venutius gained control of Brigantia. Eventual Roman annexation of the North then became inevitable, though the necessary steps could only be taken in AD 71, when Vespasian was firmly in control of the Empire. Virtually all students of Roman Britain seem to agree that Vespasian's second governor, C Petillius Cerealis, first overran the Parisi in South-East Yorkshire, establishing major garrisons at York and Malton either in AD 71 or 72 before attacking Venutius. There is no evidence of any attempt to penetrate north of the Vale of Pickering, and such a course is perhaps unlikely at that time. Despite the clear evidence for a

Table 42 Square enclosures

Place	OS Grid	Description	Reference
Hinderwell	NZ 781170	Air photograph	Hayes (1988)
Barnaby Grange	NZ 575162	On OS maps. Roman sherds	Hayes (1988)
Scaling	NZ 734132	Air photograph	Menchan, AP 28756260; Hayes (1988); RAF, AP 1183 27/8/46
Live Moor	NZ 496012	Ditched enclosure	Hayes (1988)
Ingleby Arncliffe	NZ 461000	SE entrance. No internal features visible	Chadwick, AP ANY 62/5.6
Spaunton Moor	SE 715946		Hayes (pers comm)
Cloughton	SE 992944		Smith D (pers comm)
Hawnby, Ladhill Beck	SE 549936	Rectangular (sheep-clipping fold?)	
Bog House	SE 655934		Hayes (pers comm)
Horness Rigg	SE 838920	Iron Age and Roman (70-100AD sherds from trial trench	Hayes (pers comm)
Blackpark	SE 751906	Excavated. No finds	Hayes (1969)
Staindale	SE 861897	Earthwork in grassland	Rushton (1976)
Haugh Rigg 1	SE 798895	Surface finds of Romano-British pottery	Hayes & Rutter (1964)
Wykeham Forest	SE 955890	7.5M square enclosure	Pacitto (pers comm)
Wykeham Forest	SE 950889		Smith D (pers comm)
Haugh Rigg 2	SE 801888	Surface finds of C3rd - 4th pottery	Hayes & Rutter (1964)
Haugh Rigg 3	SE 802886	Ploughed out 1952. No finds	Hayes & Rutter (1964)
Nova	SE 795881 SE 795880 SE 795878 SE 792877	All sites ploughed out Uncertain site	Hayes & Rutter (1964)
Dalby	SE 857878	Air photograph	Rushton (1976)
Hagg Farm, Kirkbymoorside	SE 680879 SE 666877 SE 675873		Riley, APs 991/23 and 24 (1976)
Kirkdale	SE 665878	Air photograph, 3 enclosures	Hayes (1988)
Blansby Park	SE 825877	Ploughed out	Hayes & Rutter (1964)
Riggs Head	TA 019868	Still faintly visible	Knox (1949)
Whinney Hill, Spaunton Moor	SE 729860	Ploughed out	Hayes & Rutter (1964)
Wykeham	SE 951847	part of a more extensive system	Riley, AP 539/15 (1974)
Oldstead Grange	SE 536798	Air photograph, 1 Roman sherd	Hayes (1988)
Caulkleys Bank	SE 685784	Cropmark, 2 square enclosures	Pacitto AP 96-6; Hayes (1988)
Caulkleys Bank	SE 672782	Cropmark	Riley, AP 743/11 (1975); Hayes (1988)

For details of some sites, see Hayes (1988).

considerable Iron Age population in the valleys of the moors, in Cleveland and on the Tabular Hills, there is no hint of the destruction of sites which hostility to Rome would have prompted. As it was, the need to deal with Venutius would surely have been given priority. Indeed, everywhere else in Brigantia, York apart, it looks very much as if consolidation was delayed until the governorships of Frontinus (AD 74-8) and Agricola (AD 78-84) (Hartley, 1971, 56-7). Unfortunately the only early fort in the area with much excavation, the one at High Burrows, Lease Rigg, has produced only meagre dating evidence, none necessarily earlier than AD 80. However, by Agricola's tour of duty, most of Brigantia had been firmly garrisoned and it is unlikely that the building of forts would be further delayed in our area. Accordingly the building of Lease Rigg, sited on the ridge between the valleys of the Esk and Murk Esk, close to their confluence and in a fine position commanding the lower Esk, is almost certain to belong to the 80s. The fort (Fig 71) is unusually elongated because it had to fit on top of a narrow hillock on the ridge at 154m above sea-level, though its annexe stretches downhill to the west. A single ditch surrounded a turf ram part 5m wide laid on a stone base. Almost all the internal buildings were timber-framed and several may be identified, including the headquarters (F), commander's house (E) and a granary (C). The presumed barracks and stables (D, H, G and J) are unusual in some ways and need the kind of detailed appraisal not possible in this survey. However, it is certain that no building ever stood between G and the central road and there seems to have been a similar blank west of building L. In other words, the fort never held more than a detachment. The latest finds are Hadrianic and it is evident that the fort was evacuated when Hadrian's Wall was built, and just after a start had been made on rebuilding in stone (building K).

Obviously a fort like Lease Rigg could not be held in isolation. The distance between it and Malton, over 40km, is roughly twice the normal spacing for forts. It is no coincidence that the distance is almost bisected by Cawthorn, where one must now suspect that Richmond's Camp D was also an auxiliary fort, rather than a practice work (Richmond, 1932, 70ff), though the three other earthworks are clearly connected with field exercises and practice in construction, as Richmond thought. Similarly, Lease Rigg could scarcely be the terminal fort of a system, and a coastal site with good harbourage is to be sought for the next fort. As the spacing from Lease Rigg is likely to be of the order of 13km, this site may have housed the rest of the Lease Rigg unit, which was probably a mixed cohort with some of the troopers at Lease Rigg.

Neither Cawthorn nor Lease Rigg has yielded anything later than the early 2nd century and they will have been evacuated when Hadrian's Wall was built. The corollary is that they were not essential, for Hadrian did keep other hinterland forts in areas of doubtful loyalty to Rome. Nor does the apparent absence of forts elsewhere in the area suggest anxiety about local attitudes even in the Flavian period.

The forts would have been built immediately after the military occupation of the area, but the provision of the road between them would have been essential and would have been made in the course of the next year or so. Wade's Causeway (Hayes and Rutter, 1964) is usually thought to have branched from the minor road from Malton to Hovingham at Amotherby, though confirmation would be welcome. Similarly, there is doubt about the road's course beyond Lease Rigg. It is usually thought to have continued down the Esk valley to Whitby, a suitable site for a terminal fort. Alternatively, the old views of a route crossing the Esk valley and aiming for Dunsley Bay or the Goldsborough-Runswick Bay area are not totally impossible. Indeed, both routes might have existed, but there are no convincing traces of either.

Although the road was built for the army, it would obviously be a great boon to local folk who needed to journey or trade, and once its initial military purpose was over, it is most unlikely that the road was disused. Some degree of trading of animal products, querns and iron ore or crude iron, as well as the attested trade in jet, may be suggested for the area. Local trading in pottery also occurred, for the native, hand-made pottery was used in the Lease Rigg fort, alongside standard Roman ware. This is important, because it shows that the native style of production continued at least to AD 100 and possibly into the 2nd century.

After the Hadrianic evacuation by the military, the area was probably completely peaceful down to the 4th century. It is true that Malton was regarrisoned about AD 160, but there is no hint that sites to its north were, and this shows that the moors were not involved in the supposed Brigantian rebellion of the 150s. When army installations did reappear, they did so because of external and not internal threats. Coastal raiding had been going on in the south-east of England from the late 2nd or early 3rd century, and shore forts had been appearing since that time. However, no provision was made for defence of the Yorkshire coast until after the concerted barbarian raids of AD 367. Count Theodosius, sent to Britain to sort out the resulting chaos, is credited by most modern historians with his completion of defences on the east coast by the addition of the fortified towers usually called signal stations. The survivors of this series, from Huntcliff in the north to Scarborough in the south, cannot have been isolated, and comparable coastal stations, not necessarily of identical pattern, have been postulated for the Durham and Lincolnshire coasts (Richmond, 1969, 90; Whitwell, 1970, 49). It has recently been suggested that the Yorkshire towers could have been post-Theodosian (Casey, 1979), though that seems unlikely. The structures (Fig 72) were described in a building inscription from Ravenscar as turrets and forts. Their purpose was undoubtedly to spot potential raiders and to signal warnings along the chain to the nearest fleet base,

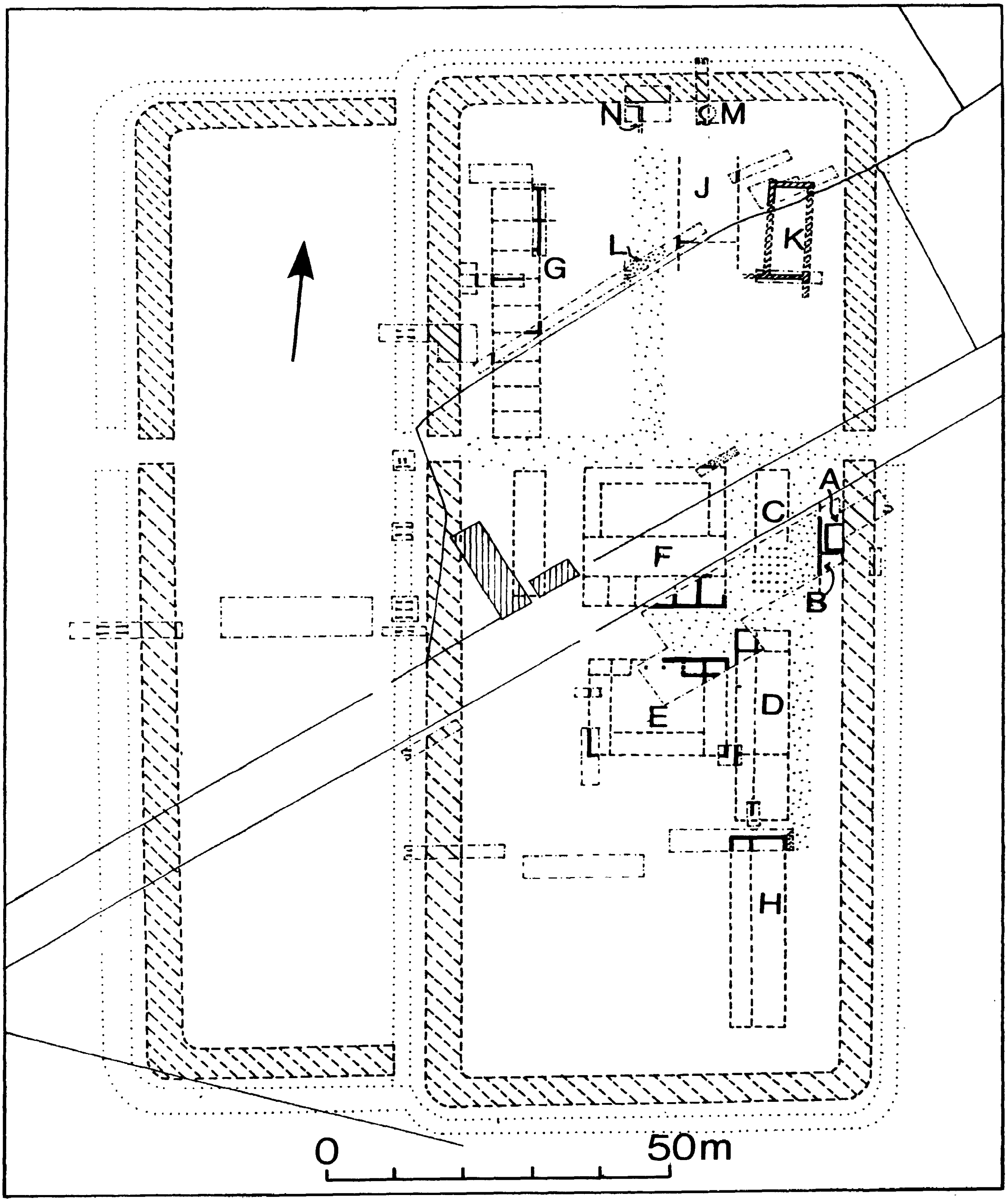


Figure 71 The Roman fort at Lease Rigg

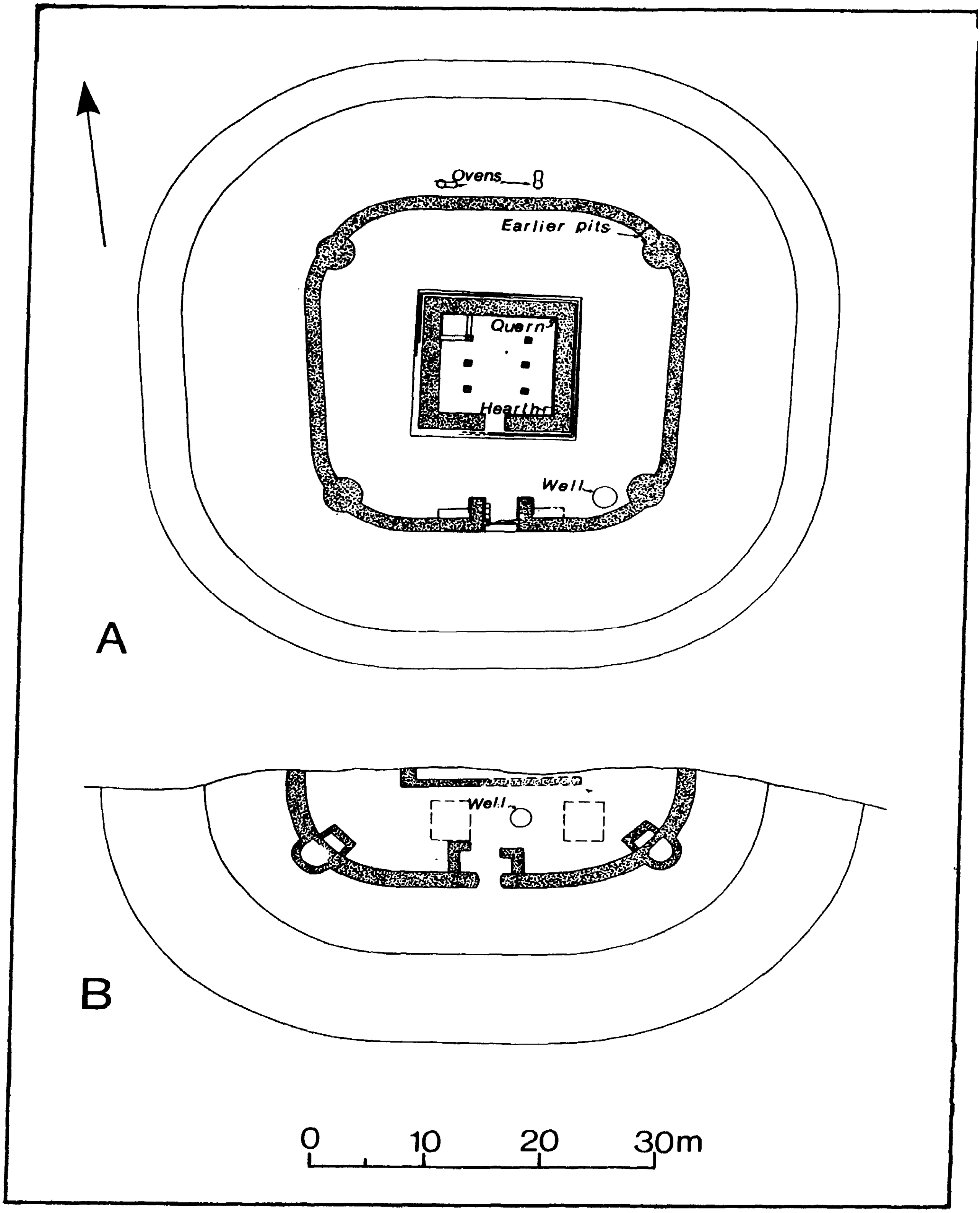


Figure 72 Roman signal stations at a) Goldsborough (R Inman) and b) Huntcliff (Saltburn)

and perhaps also to get messages to the nearest major force at Malton. The bearing of this on the road system radiating from Malton is interesting, though here only the implication that Wade's Causeway was bound to be used need be noted. Final disasters obviously overtook the sites at Huntcliff and Coldsborough, where there is clear evidence from the human remains (Hornsby and Stanton, 1912, 212ff; 1932, 216-9). However, the dates of these events are unknown and are at least as likely to have been after the removal of the British Fleet and army as before. Neither for AD 367 nor for the end of the Roman period is there any sign of devastation in our area. The army once gone, the Roman way of life slowly and quietly disappeared.

Summary

The settlement archaeology of the Roman period shows extensive farming on the Tabular Hills and on the areas peripheral to the central moorland, including the dales, Cleveland, and the Vale of Pickering, in much the same pattern as the present day. Only in the south-west sector do a few romanized villas appear, their location apparently being determined by the markets afforded by Malton and York. Thus we see a continuation of the prehistoric settlement pattern, modified particularly in the 3rd and 4th centuries by the Roman trading network. The area, like East Yorkshire and Lincolnshire, gives the impression of a peaceful life under the Roman occupation, and the only signs of violence come at the end, with the massacres at the signal stations. What happened after AD 410 is still obscure, mainly because so few sites of the Dark Ages have been discovered. All four sites known for the immediate post-Roman centuries are in fact on early settlements. There can be no doubt that the basic settlement pattern survived for it changed little between the time of Neolithic settlement and the medieval period, as will be seen by comparing the distribution of Neolithic settlement (Figs 29; 31) with that of medieval villages (Fig 73). Following Inman's (1988) discovery of prolific Late Iron Age/Romano-British settlements in lowland Cleveland, the question arises, how far do they extend to lowland areas as yet unsearched? If the work were extended to the Vale of Mowbray and beyond, there could be a complete transformation of our view of North Yorkshire in Iron Age, Roman and perhaps Saxon periods. Roman finds of coins, pottery, stone coffins and querns in the Vale of Mowbray suggest that further search would be fruitful (Wilson pers comm).

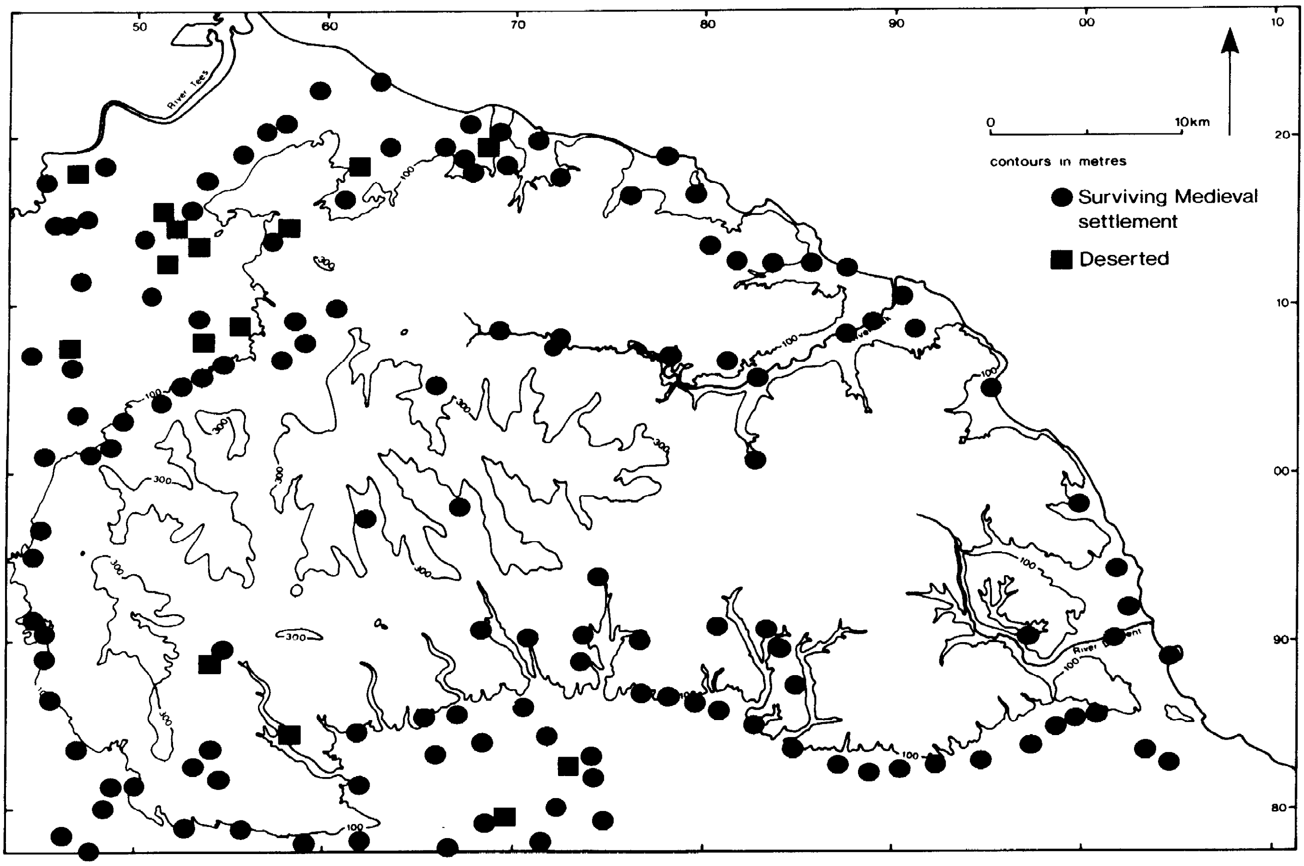


Figure 73 Distribution of medieval settlements

Table 43 Saddle querns (Neolithic to Roman period)

Place	OS Grid	Description	Reference
Boulby	NZ 750195	1 from barrow with collared urn	Elgee (1930); Hornsby & Laverick (19 18)
Ritual monument, Street House	NZ 739189	1 mid-late Neolithic, 2 in palisade blocking c 1750 bc	Vyner (1988a)
Eston Nab hillfort	NZ 567186	2 from boulder wall in rampart	Vyner (1988b)
Eston Nab barrow	NZ 574184	1 in barrow with cupstone	Goddard *et al* (1978)
Wilton	NZ 579179	1 casual find	Zealand (1973)
Guisborough, Park Farm	NZ 597171	1 on cropmark site (Iron Age?)	Spratt (1971)
Roxby	NZ 762144	2 from Iron Age, 1 from Romano-British house	Inman *et al (1985)*
Percy Rigg	NZ 610115	2 in Iron Age house	Close (1972)
Crag Bank	NZ 631098	2 with C2nd AD pottery	Close *et al* (1975)
Maddy House	NZ 668080	1 casual find	Dowey (pers comm)
Gallow Howe	NZ 682075	1 found near Gallow Howe	Elgee (1930)
Topstone Folly	NZ 832075	3 on Iron Age Romano-British (C4th) site	Hayes (196633)
Newbiggin Hall	NZ 836073	1 in paving of late Roman site	Hayes (1968c)
Bilsdale	NZ 566008	43 x 30cm	Dorman Museum
Bransdale	SE 623976	1 in field wall	Spratt (1987)
Snilesworth	SE 512960	1 casual find	Browarska *et al* (1979)
Levisham Moor	SE 831923	Possibly fragments	Hayes (1983)
Staintondale	SE 995998	1 ploughed from tumulus	Hayes (pers comm)
Near Broxa	?	2 ploughed from tumulus	Hayes (pers comm)
Spindlethorn	SE 715929	Casual find, now in Ryedale Folk Museum	Hayes (pers comm)
Spaunton, Old Pasture	SE 721893	Several in pit in Romano-British site	Whittaker (1967)
Hutton-le-Hole	SE 715890	Casual find, now in Ryedale Folk Museum	Hayes (pers comm)
Scarborough, Castle Hill	TA 050890	1 on Late Bronze Age/Iron Age site	Elgee (1930)
Hutton-le-Hole, Lingmoor	SE 725883	Ploughed out near tumulus	Hayes (1978)
Cold Kirby	SE 5384	1 large quern, now in Middlesbrough Museum	Hayes (1974a)
Riseborough Hill	SE 758832		Pacitto (pers comm)

Concluding summary and research suggestions

The main points emerging from the work are summarised below, in chronological order.

1 In the Late Upper Palaeolithic period the study area was occasionally visited by hunting groups. It was in an Exploratory Zone.

2 In the Early Mesolithic period, the area formed the northern frontier of settlement in eastern England. Important settlements, some probably permanent, existed on the north side of the Vale of Pickering, and hunting, probably seasonal, was active on the high moors. Occasional forays were made to the north.

3 In the Late Mesolithic, there was settlement throughout the area, and the seasonal movement to the high moors is basically explained on environmental grounds, though social reasons were probably also important. The movements to and from the high moorland hunting stations continued until about 2000 bc.

4 From the advent of agricultural and pastoral farming in the Neolithic period, the evidence is of a continuous pattern of occupation until post-medieval times. Settlement was concentrated on the Tabular Hills, the dales, and the peripheral lowland areas of the Vale of Pickering and the boulder clay terrain in the east, north, and west. The hills were used for hunting and pastoralism in the Neolithic, for free-ranging pastoralism and mixed farming in the Early Bronze Age, reverting to pastoralism alone as the hill terrain became infertile during the later prehistoric period.

5 The factors which determine the density and wealth of settlement in different parts of the area are those which determine farming yields, namely soil fertility and climate. The evidence of all periods shows the Tabular Hills to be the most prosperous area; the peripheral areas and valleys were less rich, and the sandstone moorlands were only exploited agriculturally for a comparatively short period, starting in the Early Bronze Age, before their fertility declined catastrophically. Within the Tabular Hills, the eastern and central areas appear at all times to be more prosperous than the western part, and this can be associated with their low altitude, giving a better climate for both agriculture and pastoralism.

6 In the Early Bronze Age, population pressure and, in parts, declining soil fertility were met by establishing a territorial system based on the natural features of river valleys and watersheds, the latter being marked by lines of round barrows containing collared urn cremations. The barrows of this period usually contained pottery but few other grave goods, and give the impression of commemorating local leaders of equal status. The organization seems to be that of a ‘segmentary’ tribe, and there are few and insignificant stone circles or other communal places. Only one or two rich burials indicate a level of society higher than the local leaders.

7 The Late Bronze Age gives a much greater impression of a ranked tribal structure, The territorial system on the watersheds and valley heads was augmented on the Tabular Hills by linear earthworks, and hillforts were started, both activities continuing into the Iron Age. The richest metal finds are on the eastern part of the Tabular Hills, as are the most impressive earthworks.

8 There are few sites and finds dating to the early part of the Iron Age, but many to the immediate pre-Roman period. Forest clearance and mixed agriculture were now extensive and there are signs of nucleated hamlets. The cart burials and square barrows indicate a ranked tribal society, at least in the eastern part of the Tabular Hills. Signs of military stress are slight, as no further hillforts were developed and existing ones were not strengthened appreciably

9 Many Iron Age settlements continued into the Roman period. There are a few villas, in the lowland of the south-west corner of the area, and large sites with prolific pottery scatters elsewhere, particularly in Cleveland. Some settlements were abandoned in the 2nd or 3rd centuries, giving a hint of reorganization at this time. Roman military activity is confined to forts at Cawthorn and Lease Rigg, interconnected by a road from the vicinity of Malton to Lease Rigg in the Esk valley, built in

AD 80 and abandoned by AD 120, and the chain of signal stations on the coast at the very end of the occupation.

10 Few Saxon sites have been excavated, so there is little data by which to assess the transition from Roman to Saxon settlement and economy Place-name evidence indicates continued activity on the traditional settlement areas. The prehistoric territorial organization emerges as the medieval township boundaries in remote and infertile areas. In the more prosperous areas of the Tabular Hills, the linear earthworks frequently comprise township boundaries, but the massive multiple dykes in the Ebberston-Snainton area are almost completely ignored by modern township boundaries.

Gaps in our knowledge

1 There is very little knowledge of the extent of hillwash and valley alluviation in the North Yorkshire Moors, and it is not possible to make a proper appraisal of the prehistoric settlement pattern without it. A project in this field would need the cooperation of geomorphologists and archaeologists.

2 Palaeobotanical evidence is lacking in two fields. First, we know little of the vegetation history of the Tabular Hills, particularly of periods prior to the Early Bronze Age. Second, the changes of the Bronze Age vegetation on the moors are insufficiently dated to allow correlation within the several archaeological phases of this period, in which marked alterations of environment, subsistence methods, technology, and social organisation occurred.

3 With the possible exception of the late part of the Iron Age, the overriding archaeological need is for settlement studies for all periods, embracing fieldwork, excavation, and environmental work specific to the sites.

4 Although most substantial round barrows have been dug into in the past, much material must still be in them, and they should be excavated on a rescue basis. There is also the further possibility that what appear to be round barrows are in fact Neolithic long barrows or Iron Age square barrows. Recent work has shown that excavation can yield unexpected results.

5 The dating of cairnfields is still very uncertain. This is a difficult matter and can only be done in conjunction with a study of cairnfield formation and abandonment.

6 Dating of linear earthworks is still at best within very wide time-spans. Excavation at carefully chosen points is needed to provide dating evidence.

7 The field systems and square enclosures revealed by air photography, particularly on the Tabular Hills, are potential sources of information for the Roman period and would profit from in-depth studies.

8 We have little understanding of prehistoric trackways in the area. They are better studied as parts of total landscape analysis, rather than as isolated projects.

Appendix 1 Prehistoric trackways

It is possible to identify two kinds of trackway in this area which are almost certainly prehistoric in origin. First, there are many local tracks of one or two kilometres in length which run up and down the hillsides, interconnecting moorland and lowland; and second, there are long-distance tracks of 15-20km. The short-distance tracks must have been important at all prehistoric periods, given the integrated lowland/upland economies of various kinds which would have required constant travel between the moors and the surrounding low ground. We may well suspect, therefore, that some of these short tracks are of very ancient origin. The trackway (now the Boltby-Hawnby road) up the scarp at Sneck Yat can be shown to be older than the Cleave Dyke, dated to the 1st millennium bc (Spratt, 1982). In fact it runs up to a very large Mesolithic/Neolithic flint site at the top of the scarp, and one may well suspect a Mesolithic origin of the track. The same may be true of the track leading from the western scarp to Steeple Cross, where there are also flint sites at the scarp summit. (As described in Chapter 1, these early tracks make use of the stable nabs on the western scarp.) Certainly many trackways from the peripheral lowland and the valleys leading to and from the hills must have been in use contemporary with the cairnfields, and the ubiquitous coexistence in the landscape of cairnfields and hollow-ways is surely evidence of this. As has been argued in Chapter 5.1, it is also frequently possible to see an association between cairnfields, cross-ridge dykes, and the trackways in their vicinity. There is a typical situation of this kind at Danby Rigg: there is a track leading from the main valley onto the spur where the cairnfield is situated, and tracks from the side valleys to the vicinity of the cross-ridge dykes. In some places — Castleton Rigg, for example — these tracks have become modern roadways; in other places, as at Danby Rigg, they remain as hollow-ways. At Caulkley's Bank near Nunnington, the modern roadway crosses the spur within about 45 metres of the cross-ridge dyke, and an old trackway runs across the point of the spur to West Ness. We can reasonably think of these patterns of tracks interconnecting lowland and high ground in the vicinity of Bronze Age sites as dating back to that period. A certain amount of caution is needed, however, before assigning ancient origins to any particular track, for constant use can wear a track on a hillside in a matter of decades.

On the whole, our present evidence of long-distance routes tends to date them somewhat later, though it is probable from artefact distribution that long-distance travel originated from the earliest times. There is some evidence of Late Iron Age or Roman dates for three tracks, all of them lying in a north/south direction. First, the Hambleton Street (Fig 59), which runs parallel to the scarp along the western side of the hills. It is clearly later than the Cleave Dyke system, for at Kepwick Moor it cuts transversely across the dyke system, but it was certainly in use by 1209, when it was 'the main road leading to Cleveland' (Spratt, 1982). It interconnects several Roman sites. Second, the Guisborough-Ralph's Cross track, which interconnects Iron Age sites at Percy Rigg and Crag Bank (Kildale), crosses Crown End settlement near the cross-ridge dyke and joins at Ralph's Cross with the spur road on the crest of Castleton Rigg, already discussed as an early track. Third, the road running south from Roxby village which has Iron Age settlements disposed either side of it and continues as a moorland track to the vicinity of Danby Beacon. It would seem reasonable to date all these tracks at least as far back as the Roman, and probably in the case of the last two, to earlier periods. By extension one might argue for other long-distance north-south throughways also to be prehistoric in origin, for example the Pickering-Egton moorland road running through the extensive Mesolithic site at Mauley Cross and through the spur cairnfield on Egton Moor, and the track from Botton Howes down Rudland Rigg to the spur cairnfields at Harland Moor. This is as far as we may legitimately push the evidence on this notoriously elusive subject. Christopher Taylor (1979) cautions against too much reliance on dating by association, especially with regard to ridge-roads. Only when the roads contain artefacts or interact with features such as settlements, dykes, and field systems do we have reliable dating evidence. Of these, there are unfortunately only very few local examples. In view of the large late-prehistoric population one cannot dissent from Taylor's (1979) view that 'by the end of prehistoric times almost all parts of the British Isles were criss-crossed by trackways', and that many of the roads and tracks in use today developed from them. It is simply very difficult to find definitive proof of this for specific instances in the study area.

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by Peter Rea

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The landscapes we live in can tell us a great deal about our ancestors and their ways of life. Their remains can be found almost everywhere we go if we only know how to recognise them — from the traces of their settlements, fields and burial sites through to the military camps and roads of the Romans.

This book draws together the results of the most recent studies to tell the story of the first people to inhabit North-East Yorkshire. It describes the landscape they discovered when they arrived and the changes which they brought about – changes that eventually led, through generation upon generation, to the formation of the land we live in today.

Aspects of this story may surprise you, opening up a vision of the past which will change your perception of the present.

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ISBN 1 872414 28 1