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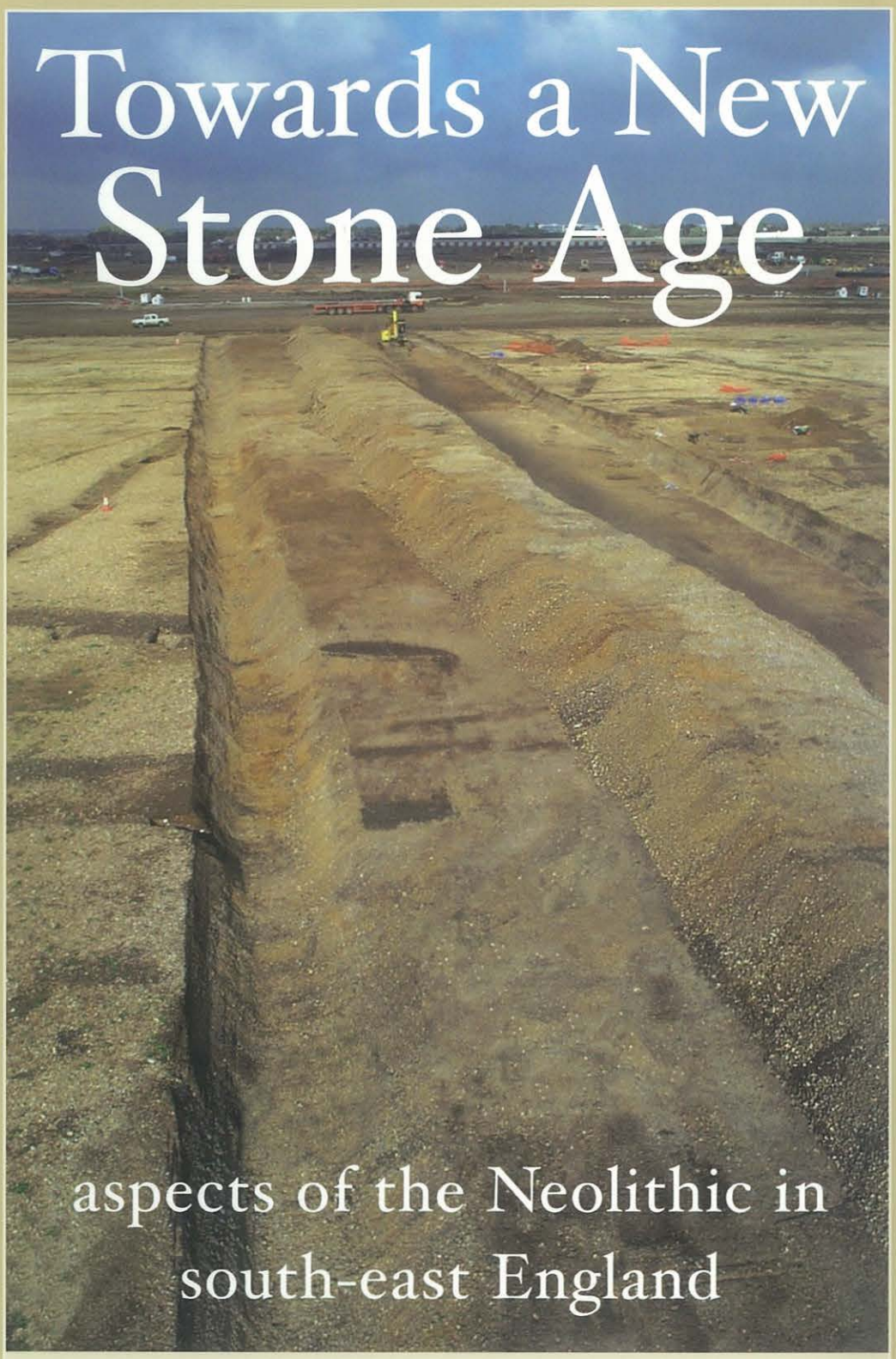
Towards a New Stone Age



aspects of the Neolithic in south-east England

Edited by Jonathan Cotton and David Field

Towards a New Stone Age: aspects of the Neolithic in south-east England

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Front cover, Full scale reconstruction of a section of the Stanwell 'cursus' at Perry Oaks, Heathrow. Photo: Elaine Wakefield, copyright Framework Archaeology
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Contents

Contents v
List of figures ix
List of tables xii
List of contributors xiii
Foreword *by Richard Bradley* xv
Preface xvii
A Note on the Dating xix
Summary (English, French and German) xxi

1 **'Rubbishy pots instead of gold': a brief history of the Neolithic of the South East** *by Martyn Barber* 1
Introduction 1
The personality of the Neolithic 1
The significance of monuments 3
Discoveries and personalities 4
Acknowledgements 11

2 **Food for thought: a late Mesolithic site at Charlwood, Surrey** *by Roger Ellaby* 12
Introduction 12
Topography 13
The site 13
Excavation 13
The pits 15
Radiocarbon dating 17
The flints 18
Discussion 22
Acknowledgements 23

3 **Managing change: the Mesolithic–Neolithic transition in south-east England** *by Robin Holgate* 24
Introduction 24
The palaeoenvironmental sequence 24
Flintwork analysis 26
The Mesolithic-Neolithic transition in south-east England 27

4 **Neolithic land use in south-east England: a brief review of the soil evidence** *by Richard I Macphail and Johan Linderholm* 29
Introduction and database 29
Soil science methods 29
Experimental studies 31
European background 32
The forest soils of the Neolithic and Mesolithic-Neolithic transition 33
Herding soils of the Neolithic 34
Occupation soils of the Neolithic 35
Discussion 36
Conclusions 36
Acknowledgements 37

5 **The central London Thames: Neolithic river development and floodplain archaeology** *by Jane Sidell and Keith Wilkinson* 38
Introduction 38
The river 38
The ecology of the floodplain 41
The archaeology 43
Discussion 47
Conclusions 48
Acknowledgements 49

6 Landscape evolution in the Lower Thames Valley: implications for the archaeology of the earlier Holocene period *by Martin R Bates and Kenneth Whittaker* 50
Introduction 50
Landscape change and sequence development in the Lower Thames area 51
The distribution of Mesolithic and Neolithic sites in the Lower Thames area 56
Key concepts for an integrated approach to the archaeological record 58
Conclusions 64
Acknowledgements 65
Appendix 1: Selected gazetteer of sites in the Lower Thames and Thames Estuary: Mesolithic and Neolithic 66

7 Aerial survey and its contribution to understanding the Neolithic of the South East *by Bob Bewley, Simon Crutchley, and Damian Grady* 71
Introduction 71
Recent aerial reconnaissance 71
Interpretation, mapping, and syntheses 71
Conclusion 74

8 Oval barrows on Thanet *by Dave Perkins* 76
Introduction 76
The small oval barrows 76
Discussion 80
Notes 81
Acknowledgements 81

9 Opening the wood, making the land: the study of a Neolithic landscape in the Dorney area of the Middle Thames Valley *by Tim Allen, Alistair Barclay, and Hugo Lamdin-Whymark* 82
Introduction 82
Chronology and definitions 82
Archaeological context 82
Themes 84
A brief outline of results 85
Interpretation at the local level 85
Conclusion 98
Acknowledgements 98

10 Neolithic occupation at Cippenham, Slough, Berkshire *by Steve Ford and Kate Taylor* 99
Introduction 99
The excavations 99
Earlier Neolithic 99
Later Neolithic 102
Discussion 103

11 Perry Oaks – Neolithic inhabitation of a west London landscape *by John S C Lewis and Ken Welsh* 105
Introduction 105
Location and archaeological background 105
The transformation of hunter-gatherer landscapes 105
Acknowledgements 109

12 A note on Neolithic human remains from south-east England *by S A Mays* 110
Introduction 110
Sites yielding human remains 110
Neolithic populations 113
Acknowledgements 114

13 Causewayed enclosures: monumentality, architecture, and spatial distribution of artefacts – the evidence from Staines, Surrey *by Philippa Bradley* 115
Introduction 115
Staines causewayed enclosure 115
Spatial patterning of material culture at Staines 115
Monumentality, architecture, and design at Staines 118

Causewayed enclosure architecture, deposition, and patterning 119
Conclusions 122
Acknowledgements 123

14 The Chelsea club: a Neolithic wooden artefact from the River Thames in London *by Mike Webber, with Helen Ganiaris* 124
Introduction 124
Description 124
Discovery 124
Conservation *Helen Ganiaris* 124
Discussion 126
Depositional context 126

15 Two decorated Peterborough bowls from the Thames at Mortlake and their London context *by Jonathan Cotton, with Rosemarie Johnson* 128
Introduction 128
The sherds 128
Discussion 134
Conclusion 146
Acknowledgements 146
Appendix: the fingertip casts 147

16 A bone 'scoop' and Grooved Ware vessel from a pit in the Lower Colne Valley, Surrey *by Phil Jones and Kathryn Ayres* 148
Introduction 148
Pit 22 149
Note on the excavations 152
Discussion 152

17 Sacred geographies in the Neolithic of south-east England *by David Field* 154
Introduction 154
The forest 155
The coast 157
The rivers 158
An open landscape 161
Land use, space, and movement 161
Acknowledgements 163

18 Franks' Sandpit, Betchworth, Surrey: a site of special significance? *by David Williams* 164
Introduction 164
The site 164

19 The treachery of images: deconstructing the early Neolithic monumental architecture of the South Downs *by Miles Russell* 168
Introduction 168
René Magritte and the art of asking questions 168
Supposition 1: 'this is not a burial monument' 169
Supposition 2: 'this is not an industrial monument' 171
Supposition 3: 'this is not a ceremonial monument' 172
'The cultivation of ideas' 174
Conclusion 175
Acknowledgements 176

20 The South Downs flint mines: towards an ethnography of prehistoric flint extraction *by Pete Topping* 177
Introduction 177
The ethnographic data 177
General observations 180
The comparative framework 180
The English prehistoric flint mines 181
Cissbury, shaft 27 183
Comparative analysis 186
Conclusion 189

Acknowledgements 190
Notes 190

21 Trans-manche: l'entente cordiale or vive la différence *by Ian Kinnes* 191
Background 191
Material culture 192
Monuments 193
Economy and settlement 194

Bibliography 196

Index 227

List of figures

Preface

Figure 0.1 South-east England -- numbers refer to chapters dealing with specific sites

Chapter 1

Figure 1.1 Kits Coty House, Kent 1901 (© National Monuments Record)
Figure 1.2 Lower Kit's Coty House (or The Countless Stones), Kent, *c* 1901 (© National Monuments Record)
Figure 1.3 RCHME's 1994 survey of the earthworks at Maiden Bower near Dunstable, Bedfordshire (© National Monuments Record)
Figure 1.4 RCHME's 1995 survey of earthworks on West Wickham Common (© National Monuments Record)

Chapter 2

Figure 2.1 Charlwood: Mesolithic sites
Figure 2.2 Charlwood: Site 1
Figure 2.3 Charlwood Site 1: excavated area
Figure 2.4 Charlwood Site 1: pit zone
Figure 2.5 Charlwood Site 1: pits
Figure 2.6 Charlwood Site 1: microliths
Figure 2.7 Charlwood Site 1: artefacts from pits

Chapter 4

Figure 4.1 Neolithic soils; LOI and phosphate
Figure 4.2 Neolithic soils; LOI and P ratio
Figure 4.3 'Tree-throw hole 3', Raunds, Northamptonshire
Figure 4.4 Microprobe elemental map of the distribution of Si and P in the Btg horizon of the Neolithic argillic brown earth beneath Barrow 5 at Raunds, Northamptonshire
Figure 4.5 Neolithic turf from Belle Tout, Sussex

Chapter 5

Figure 5.1 Map of sites mentioned in the text
Figure 5.2 Sea level curve for the middle and inner Thames Estuary. All points have been reduced to mean sea level
Figure 5.3 The estuarine diatom *Cocconeis placentula*
Figure 5.4 Pollen diagram from Southwark, from Sidell *et al* 2000 (courtesy of MoLAS)
Figure 5.5 Yew trees from Wennington Marsh
Figure 5.6 Beaker bowl from Hopton Street (courtesy of PCA Ltd)

Chapter 6

Figure 6.1 Lower Thames/Thames Estuary location plan (modified from Union Railways (South) Ltd 1999)
Figure 6.2 Site location plan for Lower Thames area showing selected profiles through Holocene fine-grained sediments (modified from Union Railways (South) Ltd 1999)
Figure 6.3 Schematic distribution of 'Neolithic' sediments peat downstream of Tower Bridge
Figure 6.4 Topographic reconstruction, based on borehole lithological data, of the Barking Reach area
Figure 6.5 Distribution of find spots by geological context in the Lower Thames area
Figure 6.6 Simplified cross-section through sediments at Woolwich Manor Way (modified from Gifford and Partners 2001a)
Figure 6.7 Time/depth model used to calibrate the speed of landscape change on the north Thames floodplain in the area of Barking Creek

Chapter 7

Figure 7.1 A possible new long barrow on the golf course at Rottingdean
Figure 7.2 Neolithic house discovered at Blue Bell Hill in Kent

Figure 7.3 The Coldrum chambered long barrow from the air
Figure 7.4 A distribution of specialist oblique aerial photographs held by the NMR
Figure 7.5 The current extent and progress of NMP projects

Chapter 8

Figure 8.1 Plans of small oval barrows 1, 2, and 3; scale as shown
Figure 8.2 Phases of interment in the Barrow 2 pit complex

Chapter 9

Figure 9.1 Cropmark and other Neolithic sites in the Dorney area, showing the extent of the Eton Rowing Course, the Flood Alleviation Channel, and palaeochannels of the Thames
Figure 9.2 Early Neolithic sites discovered within the two schemes and in other recent work, including an indication of the character of activity
Figure 9.3 Middle and later Neolithic activity discovered within the two schemes and in other recent work
Figure 9.4 Plan of the Area 6 hollow showing the surface and tree-throw hole middens and lesser artefact concentrations
Figure 9.5 Overall view of the Area 6 hollow and ring-ditches, with the Thames in the background, from the north-east
Figure 9.6 The Area 6 midden at the Eton Rowing Course during cleaning in 1996
Figure 9.7 The Area 6 midden showing a smashed Carinated Bowl during excavation
Figure 9.8 View of pit 1050 at Lake End Road West, showing the upper deposit of Mortlake Ware
Figure 9.9 The reconstructed Mortlake Ware vessel from the upper deposit of pit 1050
Figure 9.10 Arrowheads and blanks from an early Neolithic activity area on EX1 at the Eton Rowing Course
Figure 9.11 Distribution of early Neolithic and late Neolithic/early Bronze Age lithic clusters on the floodplain at the Eton Rowing Course, Areas EX1-3

Chapter 10

Figure 10.1 Location of Cippenham within the Middle Thames region plus local sites mentioned in the text and showing site areas with Neolithic features and stray finds
Figure 10.2 Sections of Neolithic features
Figure 10.3 Plan of features and stray finds on Brook Farm, trench B
Figure 10.4 Pottery from late Neolithic pit 30 in Wood Lane extension trench

Chapter 11

Figure 11.1 Perry Oaks: site location plan
Figure 11.2 Perry Oaks: plan of excavated features, with Neolithic monuments in bold

Chapter 12

Figure 12.1 Location of sites listed in Table 12.1

Chapter 13

Figure 13.1 Location of Staines causewayed enclosure (after Needham and Trott, 1987)
Figure 13.2 Detailed plan of the Staines causewayed enclosure showing excavated sections and distribution of human bone (after Robertson-Mackay 1987)
Figure 13.3 Selected enclosures showing various forms and architectural traits (various authors)

Chapter 14

Figure 14.1 Alder wood 'beater' or club from the Thames foreshore at Chelsea, overall length 640mm (© Museum of London)

Chapter 15

Figure 15.1 Michael Crockett, fingerprint officer attached to the City of London Police, holds up a cast of one of the fingertip impressions obtained from the sherd from Mortlake
Figure 15.2 Sherds A13667 and A13666 from the Thames at Mortlake; scale in cm
Figure 15.3 Casts of impressions showing fingertip with long fingernail (A13667)

Figure 15.4 SEM image of fingerprint from A13667
Figure 15.5 Distribution of Peterborough Ware from the London region
Figure 15.6 Peterborough Ware from the London region: contexts of deposition

Chapter 16

Figure 16.1 Lower Mill Farm: site location map
Figure 16.2 Lower Mill Farm: part of the quarry edge exposure showing late Neolithic features
Figure 16.3 Lower Mill Farm: plan of excavated features
Figure 16.4 Lower Mill Farm: the aurochs bone 'scoop'
Figure 16.5 Lower Mill Farm: the Grooved Ware vessel

Chapter 18

Figure 18.1 Franks' sandpit, Betchworth: site location.
Figure 18.2 Franks' sandpit, Betchworth: plan of multi-phase pit concentration.
Figure 18.3 Franks' sandpit, Betchworth: group of reconstructed Grooved Ware vessels from the Phase B pits

Chapter 19

Figure 19.1 Supposition 1
Figure 19.2 Supposition 2
Figure 19.3 Supposition 3
Figure 19.4 Postulated primary phase of monument construction upon the South Downs (*c* 4500--3500 cal BC)
Figure 19.5 Postulated secondary phase of monument construction and redefinition upon the South Downs (*c* 3500 -- 2500 cal BC)

Chapter 20

Figure 20.1 John Pull's plan of his 1930 excavations at Blackpatch Barrow 12
Figure 20.2 Cissbury: Pull's section drawing of the Shaft 27
Figure 20.3 Cissbury: Pull's plan of Shaft 27
Figure 20.4 A schematic recording of the spatial and temporal distribution of artefacts and event-horizons in the English flint mines

List of tables

Chapter 2

Table 2.1 Charlwood Site 1: pit details
Table 2.2 Radiocarbon dates from Pit 1
Table 2.3 Analysis of 'assemblage' from pits

Chapter 4

Table 4.1 Neolithic soil sites of south-east England and other sites mentioned in the text
Table 4.2 Neolithic soils: mean soil chemical and magnetic signatures in comparison to other sites

Chapter 6

Table 6.1 Stages in the evolution of the Lower Thames area during the late Pleistocene and Holocene
Table 6.2 Radiocarbon age estimates from selected sites in the Lower Thames area

Chapter 8

Table 8.1 Summary of burials in Barrow 2, Thanet

Chapter 12

Table 12.1 Neolithic human skeletal remains from south-east England
Table 12.2 Sexed adult burials at enclosures and megalithic long-barrows in south-east England

Chapter 13

Table 13.1 Causewayed enclosure complexity: structural elements and artefacts – relative frequency (selected sites)
Table 13.2 Causewayed enclosures: structural elements – relative frequency (selected sites)

Chapter 15

Table 15.1 Peterborough Ware from the London region: context and associations

Chapter 20

Table 20.1 Ritualised extraction processes at the Red Pipestone Quarry, Minnesota
Table 20.2 A hypothetical model for 'ritualised' flint procurement strategies
Table 20.3 Finds from the shaft
Table 20.4 Finds from the galleries
Table 20.5 Ethnographic data for extraction strategies compared to the archaeological record from the Neolithic flint mines in England

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Foreword *by Richard Bradley*

Here is a book that prehistorians have needed for years. There is no up-to-date survey of many of the areas that it covers and certainly no account that does full justice to their earlier prehistory. That is curious, for the region has one of the richest archaeological records anywhere in England and was uniquely placed to promote contacts with the continent. It may seem to lack the spectacular monuments that have biased our understanding of the Neolithic period, but this may be the result of later activity. Indeed, it is the development of more recent threats to its buried remains that has been behind a new campaign of fieldwork which would be hard to match in the work of earlier generations. Of course it has led to surprises, but, more important, it has helped to demonstrate the distinctiveness of the prehistory of south-east England.

That makes this book particularly timely, but it does something else as well. Because so much of the material that it covers is novel and unexpected, it poses a challenge to accounts of British prehistory that have been based on areas with a longer history of large-scale survey and excavation. The archaeology of south-east England has implications for our understanding of a much larger region and, in doing so, it has important lessons to teach us all. I am sure that these studies will have an impact well outside the area about which they were written, for they are topical, original and significant. Do read them.

Richard Bradley
University of Reading, December 2002

Preface

To many, the fourth and third millennia BC are synonymous with the great earth and stone monuments of Wessex and areas beyond. This is understandable. These impressive funerary and ceremonial structures have attracted interest since the very beginnings of archaeological enquiry, and successive generations of students have revisited them, secure in the knowledge that they provided superb quarries for fruitful research. The South Downs flint mines and Medway megaliths apart, the South East has, by comparison, provided little to detain even the most enquiring fieldworker.

However, the last two decades or so of developer-funded archaeology allied with aerial photographic and inter-tidal surveys, have begun to yield evidence to challenge the traditional dominance of the so-called 'core' areas. We can now see, for example, that funerary and ceremonial monuments were extremely widespread, to such an extent that the density of ring-ditches identified on the Isle of Thanet matches that of the greatest concentrations of Wessex barrows. At the same time, surveys of these great chalkland archaeological landscapes have revealed that, by and large, monuments survive here only because of the marginal nature of the land, little cultivated until recent times.

As a contribution to the steadily accelerating regionalisation of the fourth and third millennia BC, the papers contained within this volume have sought to focus explicitly on the relatively neglected south-eastern corner of England, ie that part of the island east of Wessex that faces directly across the channel (Fig 0.1). Within this relatively limited geographical area we have attempted to provide something of the flavour of the work currently going forward. Inevitably, the coverage is not as complete as we originally intended it to be. For various reasons, for example, it has not proved possible to incorporate papers on the important campaigns of work being undertaken on sites in Essex, or at Runnymede Bridge on the Thames west of London, or even along the line of the Channel Tunnel Rail Link in Kent. However, we are comforted by the fact that some of this will already be broadly familiar to students of the period through recent publications (eg Wilkinson & Murphy 1995; Holgate 1996; Brown 1997; Glass 1999; 2000; Dyson *et al* 2000; Needham 2000; Buckley *et al* 2001). Moreover, other important projects within the region are either being actively assessed for publication eg the *West London Landscapes* – (Nick Elsden, pers comm) or the reports are nearing completion eg Lower Horton (Steve Ford, pers comm), Staines Road Farm, Shepperton (Phil Jones, pers comm) and The Stumble (Nigel Brown, pers comm). Perhaps the single most regrettable omission, however, is the paper that was planned to gather together and analyse the trends discernible in the available radiocarbon evidence from the region. This is clearly something for another day.

The volume kicks off with an overview of the period within the South East (Barber), and concludes with a trenchant paper on the wider cross-channel question (Kinnes). In between are papers dealing with an important late fifth-millennium BC Wealden site at Charlwood, Surrey (Ellaby), and the nature of the Mesolithic-Neolithic transition (Holgate). Thereafter the volume is interspersed with a series of overviews: these deal with matters as diverse as the soils (Macphail and Linderholm), aerial survey (Bewley *et al*) and human remains (Mays). Other environmental concerns are embedded in contributions relating to the archaeology of the Thames and its floodplains (Sidell and Wilkinson; Bates and Whittaker); these include a first extended interim account of the important Neolithic deposits recorded at the Eton Rowing Lake (Allen *et al*).

The archaeology of the higher Thames gravel terraces is represented by sites at Cippenham near Slough (Ford and Taylor), and by the impressive collaborative campaign of work conducted on a series of earthen monuments at Perry Oaks near Heathrow (Lewis and Welsh). Other monuments dealt with include a reassessment of the spatial patterning of the finds from the causewayed enclosure at Yeoveney Lodge, Staines (Bradley), and the oval barrows on the Isle of Thanet (Perkins). A trio of papers focus on artefacts. These comprise Peterborough Ware from the London area (Cotton and Johnson), an aurochs bone scoop and Grooved Ware from the Lower Colne Valley (Jones and Ayres) and, most remarkably, a radiocarbon-dated alder wood club or 'beater' from the Middlesex foreshore of the Thames at Chelsea (Webber). Finally, following a paper introducing sacred spaces (Field), three contributions explore the notion in more detail, using case studies drawn from the South Downs (Russell; Topping) and the Weald (Williams).

The present volume is intended therefore both as a summary of recent work and as a reminder of the richness and diversity of the record available for study in the South East. While it is still too early to claim to have erected a New Stone Age for the region, we hope that the present collection of essays will come to be regarded as a useful step along the way. As such, perhaps, it can best be viewed as a south-eastern counterpart to the set

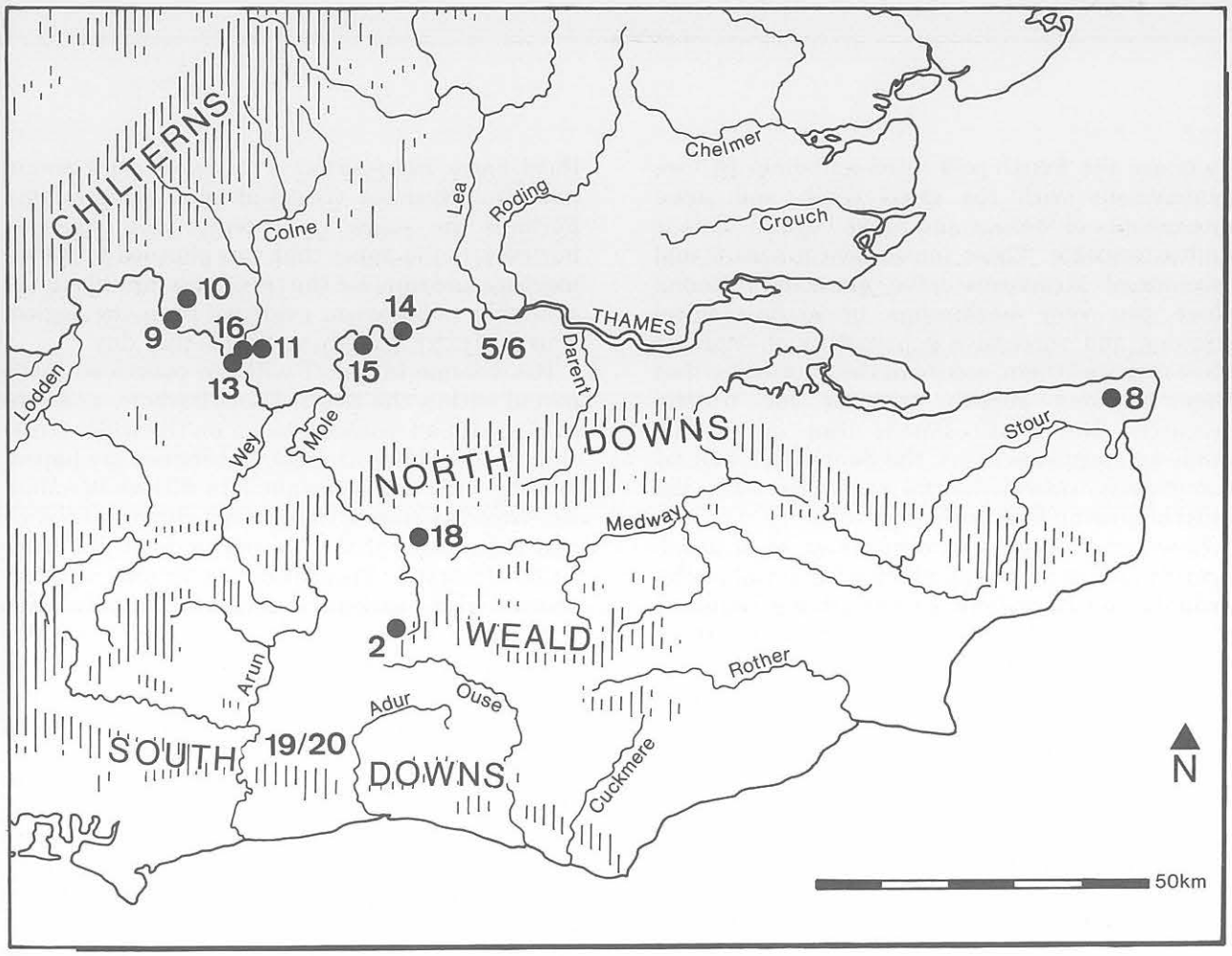

Figure 0.1 South-east England - numbers refer to chapters dealing with specific sites

of essays dealing with the Neolithic of the 'No-Man's Land' between the Trent and the Tweed (Frodsham 1996).

It remains to thank the various contributors for keeping faith with the volume in the face of seemingly endless editorial difficulties and delays; to the anonymous referee for his speedy and efficient work on our behalf; and to Jane Sidell for recalibrating all radiocarbon dates cited herein. Particular and very special thanks are extended to Roz Sherris for her formatting and copy-editing work, an arduous and lengthy task completed with despatch and good humour. We are also grateful to Richard Bradley for his generous support, and for kindly contributing a Foreword.

Last, but by no means least, it is more than a pleasure to acknowledge the financial support of the Museum of London, the London and Middlesex Archaeological Society, the Surrey Archaeological Society, and the Council for British Archaeology, without which this volume would not have seen the light of day.

Jonathan Cotton and David Field
London, Christmas 2002

A Note on the Dating

Radiocarbon dates used herein are quoted in accordance with the international standard known as the Trondheim convention (Stuiver and Kra 1986). They have been calibrated with data from Stuiver *et al* (1998) using OxCal (version 3.5) (Bronk Ramsay 1995; 2000). The date ranges have been calculated according to the maximum intercept method (Stuiver and Reimer 1986) and are cited in the text at two sigma (95% confidence). They are quoted in the form recommended by Mook (1986). Dates are normally given as calibrated BC dates, or actual radiocarbon measurements are given with calibrated BC dates in parentheses.

Summary

Ever since the publication of the first volume of Sir Richard Colt Hoare's seminal *Ancient Wiltshire* between 1810 and 1812, the study of the Neolithic and Early Bronze Ages within Britain has tended to centre upon the chalk downland of an imprecisely defined area of central southern England known as Wessex. Recent work, however, has laid much greater emphasis on the importance of other regional studies, and the present volume responds to this by taking the south-eastern corner of Britain as its primary area of concern.

Situated closest to the continent and in large part drained by the Thames, the south-east is amongst those regions where much new and distinctive information relating to the Neolithic is beginning to emerge. The volume summarises a range of projects, from downland flint mines to valley bottom environments and settlement. Not only will the appearance of this body of data allow more meaningful comparisons to be drawn with other regions within Britain, but it will also hopefully act as a catalyst in the wider study of cross-channel relations.

Sommaire

Depuis la publication, entre 1810 et 1812, du premier volume de *Ancient Wiltshire*, de Sir Richard Colt Hoare, une œuvre qui a fait école, l'étude du néolithique et du début de l'âge de bronze en Grande-Bretagne a eu tendance à se concentrer sur les collines d'une région aux limites floues, située au centre du sud de l'Angleterre, qu'on appelle le Wessex. Les travaux plus récents ont toutefois davantage mis l'accent sur l'importance d'autres études régionales, et le présent volume répond à cette attente en s'occupant principalement de la partie sud-est de la Grande-Bretagne.

Très proche du continent européen, le sud-est, dans une grande partie duquel coule la Tamise, est l'une des régions où des informations bien plus récentes et bien plus caractéristiques relatives au néolithique commencent à apparaître. Le volume résume divers projets, comme les mines de silex dans les collines, les fonds de vallées et le peuplement. Non seulement l'apparition de cet ensemble de données permettra-t-elle d'établir des comparaisons plus sérieuses avec d'autres régions de la Grande-Bretagne mais on peut également espérer qu'elle servira de catalyseur au niveau de l'étude plus large des relations outre-manche.

Zusammenfassung

Seit der Veröffentlichung des ersten Bandes von Sir Richard Cold Hoare's bahnbrechenden Werks "Wiltshire im der Vorzeit" in den Jahren von 1810 bis 1812 liegt das Kerngebiet der Forschung über das Neolithikum und der Frühen Bronzezeit in Großbritannien im Tiefland der Kreideregion, einem vage definierten Gebiet in zentral Südengland, auch Wessex genannt. Jüngste Forschungsstudien haben die Bedeutung anderer Regionen hervorgehoben, und der vorliegende Band reflektiert diesen Trend, indem er den Südosten Großbritanniens als Hauptschwerpunkt seiner Studien hervorhebt.

Der Südosten liegt dem europäischen Kontinent am nächsten, wird größten Teils von der Themse entwässert, und hier kommt neue und spezifische Information über das Neolithikum zum Vorschein. Dieser Band fasst die Ergebnisse von Projekten mit verschiedenartigen Themen zusammen, von Feuersteingruben im Tiefland, Ökologie von Talregionen und Siedlungsgeschichte. Die Veröffentlichung dieses Datenmaterials erlaubt bedeutsame Vergleiche mit anderen Regionen in Großbritannien, und es lässt hoffen, dass es als Anstoß für breit angelegte Studien fungiert, die grenzüberschreitenden Beziehungen mit dem europäischen Kontinent zum Thema haben.

1 'Rubbishy pots instead of gold': a brief history of the Neolithic of the South East *by Martyn Barber*

Introduction

The South East occupies a rather ambiguous position in the history of Neolithic studies in Britain. As a whole, the region contains a vast array of earthwork and cropmark sites, some of which have occupied important places in the archaeological literature, most notably the flint mines and causewayed enclosures of the South Downs. Many of the key figures in the history of British archaeology have excavated in the region, including William Greenwell, Lt General Pitt Rivers, Alexander Keiller, Stuart Piggott and so on. Place-names from the region periodically crop up as type-sites for particular classes of artefact (eg Cissbury, Clacton, Ebbsfleet, Mortlake etc). However, synthetic overviews of the period show a tendency to focus on other parts of the British Isles, drawing only occasionally on sites from the South East when seeking supporting evidence for their more generalised narratives. In highlighting selected themes, sites, and individuals, the main aim of this paper is to provide a brief overview of Neolithic studies in the South East, and their relationship to the development of Neolithic studies in general rather than offering an exhaustive trawl through the various highs and lows. Time and space prevent a more comprehensive treatment, while the purpose of this volume overall and the papers within it negate the need to bring the story here as far as the 21st century.

The personality of the Neolithic

A few years ago, in an oft-cited paper, Julian Thomas (1993) offered a brief historiography of the British Neolithic with the aim of demonstrating that 'there is no single, self-evident phenomenon which has been signified by the term 'the Neolithic' throughout the history of archaeology' (Thomas 1993, 389). Furthermore, in criticising a longstanding tendency among archaeologists to treat the Neolithic as a coherent entity defined across the whole of Britain by a fixed set of criteria, he argued that the period was in fact marked by considerable regional variation. 'The Neolithic has to be broken down, and recognised as something fragmented and dispersed, localised in its effects, with no overall direction or intention behind it' (Thomas 1993, 390). Coincidentally, and perhaps ironically, broad acceptance of these points has occurred in parallel with the appearance of a number of general syntheses of the Neolithic which draw primarily on the evidence from certain well-studied parts of the British Isles (eg Thomas 1991; 1999; Barrett 1994; Edmonds 1999) or which deal with specific site types (eg Darvill and Thomas 1996; Barclay and Harding 1999; Barber *et al* 1999; Oswald *et al* 2001), alongside a series of publications attempting to raise awareness of lesser known regions (eg Ashwin 1996; Frodsham 1996; Topping 1997; Clay 1999).

Typical of the latter is Clay (1999). In discussing the evidence from Leicestershire and the recently re-emerged Rutland, he has described how what was largely a 'blank sheet' has, in the last couple of decades or so, been increasingly filled to the extent that meaningful synthesis at this more localised scale is possible. The previous blankness was attributed to a combination of 'visibility, lack of fieldwork and preconceptions rather than a genuine lack of an archaeological resource' (Clay 1999, 1). Similar problems have been highlighted for other areas (and indeed for other periods – see for example Young 1994; Bevan 1999; Harding and Johnston 2000). Certain 'core' areas, blessed by a combination of highly visible monuments and a long history of well-documented antiquarian and archaeological research, were central to early constructions of the Neolithic. They continue to occupy a central position because of the wealth of empirical evidence already generated, and because many of the questions posed today by archaeologists arise directly or indirectly from the study of those regions in the first place. But is the situation really so straightforward?

The reasons for the current situation are complex and far from new, their roots deeply embedded in the history of archaeological endeavour. For the British Neolithic, an important benchmark is Stuart Piggott's (1954) *Neolithic Cultures of the British Isles*. Prepared around the mid-point of the 20th century, it comprised a detailed presentation and discussion of accumulated knowledge and understanding of the period in the British Isles. By the time of the book's publication, Piggott had been actively involved with pioneering research on the Neolithic for around a quarter of a century, his interest in part stimulated by his involvement in the late 1920s in E C Curwen's excavations of a causewayed enclosure at The Trundle, near Chichester in West Sussex (Piggott 1983). However, it was another such enclosure, that at Windmill Hill near Avebury in Wiltshire, identified and first excavated just a few years prior to The Trundle, that provided the real springboard for the developments that culminated in Piggott's book. Much of what he

wrote concerned the sites, artefacts, and ideas that had emerged since the Revd H G O Kendall's discovery of Neolithic pottery at Windmill Hill in 1922 (Kendall 1923) had set the ball rolling. The causewayed enclosures, the henges, the pottery, the lithics – many strands of evidence and the framework within which they were arranged would have been either partly or wholly unfamiliar to archaeologists just 30 years before.

By 1954, although accepting the 'dubious validity' of terms such as 'Neolithic' (Piggott 1954, xvii), Piggott nonetheless argued for a distinctive phase in British prehistory, its beginnings tied firmly to 'the arrival of immigrants from the European continent bringing the first elements of an agricultural economy' (*ibid*). Its other end proved more difficult to get a firm grip on. Piggott settled upon a number of what seemed, within the bounds of contemporary knowledge, to be broadly synchronous developments. These included the appearance of metalworking, but in particular he highlighted a change in funerary practice from a collective treatment of the dead towards the burial of individuals. The intervening period, to which in those (just) pre-radiocarbon days he assigned a span of just 500 years (from 2000 BC to 1500 BC), was a time in which the British Isles were occupied 'by a number of groups of stone-using agriculturalists, united by trade and intercommunication and forming a recognisable entity in the archaeological record ... ', and who appeared 'sufficiently homogeneous to justify their treatment as a group' (*ibid*). The short, and late, chronology can raise eyebrows today, though this occurs largely with the benefit of hindsight. As has been noted already, Piggott's book was published before the full impact of radiocarbon dating. Furthermore, since the 1930s in particular there had been a tendency to regard the British Neolithic as a prelude to the British Bronze Age. The adoption of a sedentary, agricultural lifestyle was presumed to have diffused across the European mainland and ultimately across the English Channel at a greater rate of knots than the more closely guarded knowledge of metalworking. Despite the havoc caused to Piggott's framework by the advent of scientific dating techniques and also by the eventual decline of the culture-historical approach to the arrangement and understanding of archaeological evidence, the importance of his book lies in more than just its historical interest. The manner in which Piggott and his contemporaries analysed the available material and structured the Neolithic period has continued to influence the way that the period has been studied.

The earlier part of Piggott's Neolithic was dominated by the Windmill Hill Culture:

> Within an area of southern England roughly bounded on its north by a line from the Severn Estuary to the Wash, remains of an immigrant Neolithic culture occur in the form of certain field monuments and finds of characteristic objects, mainly pottery. This area approximates to the natural geographic region of the Lowland Zone of Britain as defined by Fox in his studies of early settlement in these islands; and the culture under discussion, while divisible into local groups with regional variants in pottery styles (and less often other elements of material culture), has an underlying homogeneity that justifies us in treating it as a unit (Piggott 1954, 17).

It was named, of course, after the aforementioned causewayed 'camp' near Avebury where, although not published until 1965, 'in the early 1920s the existence of a Neolithic culture in Wessex, stratigraphically earlier than the Beakers, was first demonstrated' (*ibid*).

Piggott's reference to Sir Cyril Fox is of considerable importance in understanding how the geographical variation evident today could be subsumed within a generalised model of Neolithic society. If the apparent 'underlying homogeneity' of the monuments and material culture allowed Piggott and others to treat the whole of the British Isles as a single unit, then Fox's ideas seemed to explain any regional diversity that might seem apparent. In outlining what he termed the 'Personality of Britain', Fox (1932) had made extensive use of distribution maps in an attempt to 'express the character of Britain in prehistoric and early ages, and to indicate the effect of the environment she avoided on the distribution and fates of her inhabitants and her invaders' (Fox 1932, 9). He sought to explain the basic geographical spread of certain selected archaeological phenomena – megalithic tombs, flint daggers and so on – and by extension the cultural groups they represented in terms of geology, topography, climate, flora, and fauna. The combination of a culture-historical approach, as typified by Piggott's synthesis, and the environmental and geographical determinism of Fox, represented the culmination of the development of particular ways of looking at archaeological evidence, something that can be traced back to the previous century, the period when archaeology was emerging from its antiquarian origins and was dominated by the need to arrange objects and monuments in time and space. It came to be assumed that sizeable geographical areas and blocks of time could be characterised by particular sets of criteria – certain artefacts, certain types of sites – which themselves represented particular ways of living, and by extension particular groups of people (or 'cultures'). Geographical variation could be explained by the nature of the physical environment encountered and exploited by the immigrant agriculturalists.

The significance of monuments

The interpretation of monuments has occupied a central role in Neolithic studies almost from the start. Although initially separated from the Palaeolithic according to technological criteria, the association of the Neolithic with the adoption of agriculture and the construction of the first monuments quickly followed, either as a result of direct evidence or via assumptions about the nature of Stone Age life. As a novelty of the Neolithic, monuments were seen as reflecting the changes in society associated with the adoption of agriculture. Even today they continue to occupy an important role in framing our understanding of the period, notably since the 1960s as the importance of monuments was reinforced in the archaeological literature as an index of social complexity, most notably in Renfrew's (1973) insistence that size mattered. Given this background, the lack of upstanding monuments of Neolithic date can be considered a significant reason for the under-representation of the South East and other regions in considerations of the period. But of course, while the region as a whole is perhaps lacking in surviving monumental earthworks when compared to other parts of the British Isles, they are far from absent, either in cropmark or earthwork form. The megaliths of the Medway Valley (Figs 1.1, 1.2, and 7.3) are well known and possess a lengthy history of investigation (Ashbee 1993), although it is only in recent years that they have begun to be considered in local or regional terms rather than purely as an isolated outbreak of an otherwise widespread and imported phenomenon (see eg Holgate 1981). Potentially of greater significance are the earthwork monuments (or what's left of them) of the South Downs in Sussex. But with these notable exceptions, monuments of Neolithic date did not survive as earthworks, effectively putting them beyond the reach of antiquarians and archaeologists until the establishment by the middle decades of the 20th century of aerial photography as a survey technique. Only then could the density of Neolithic activity in the South East, or at least those parts most susceptible to cropmark formation, be appreciated. Of course, discoveries had occurred anyway. The south-eastern counties possessed their own investigative antiquarians and archaeologists who explored countless upstanding earthworks and collected innumerable flints and other objects from the surface. However, in contrast with areas such as Wiltshire and Dorset, the earthworks they dug into proved to be almost entirely of Iron Age or later date. Gardner's (1924) claim that 'Surrey is unfortunate in not having produced in years gone by men like Sir Richard Colt Hoare and Frederick Warne of Wiltshire and Dorset to record its Prehistoric Past' was more than a little unfair, not just for Surrey but for the South East as a whole. The problem was not one of having the wrong sort of antiquary, but the non-survival of upstanding earthworks. Thus in Kent, 18th and 19th-century antiquaries such as Cromwell Mortimer, Bryan Faussett, James Douglas and others dug into hundreds of barrows without encountering more than a handful of pre-Roman date (Marsden 1999).

This apparent shortage of upstanding monuments of Neolithic date in the South East has long been of concern to locally based antiquarians and archaeologists, as artefacts and findspots instead dominated the surviving remains of the period. Flint was abundant on the surface of much of the arable land in the region, and its significance was realised at an early stage by some at least. Lane Fox's work at Cissbury and other South Downs sites (see below) was influenced by the co-location of lithic scatters and earthworks. Similarly, Maiden Bower in Bedfordshire (see below) first came to the attention of Worthington Smith because of the abundance of flint on the surface. Where monuments were absent, the presence of flint could at least be taken as an indicator that Neolithic activity had occurred. For example, Clinch (1908) claimed that: 'From the large numbers of implements found in nearly every part of Kent, one is justified in assuming that there was a large population here during the Neolithic Age', while Westell (1931) complained that: 'We could quite well cover a good part of a map of Hertfordshire with red dots to indicate odd "finds" of the Stone Age, but the use of other symbols, indicative of further remains, would be very infrequent'. For Surrey, Clinch and Kershaw (1895, 8) insisted that 'While it is very probable that the County of Surrey in these early days was densely wooded and difficult of access ... there would seem to have been a large Neolithic population, "flakes" of flint, one of the principal evidences of man's handiwork, being easily found on the surface of very many fields'. Almost a century later, Field and Cotton (1987) noted that for Surrey still '...the bulk of the material available for study comprises artefactual evidence in the form of seemingly diagnostic surface concentrations of flintwork contained in the public and private collections that are scattered around the country'.

Nonetheless there are difficulties associated with the use of this material today, among them being the rather unsystematic approach to collection, at least when compared to the best modern standards. A marked preference for implements over debitage when deciding what to retain is a particular problem. Moreover, much of this material was collected at a time when many uncertainties still surrounded the understanding of lithic technology and chronology (see discussion of the flint mines below). There is no guarantee that material published in the past as Neolithic is indeed of that date. Until well into

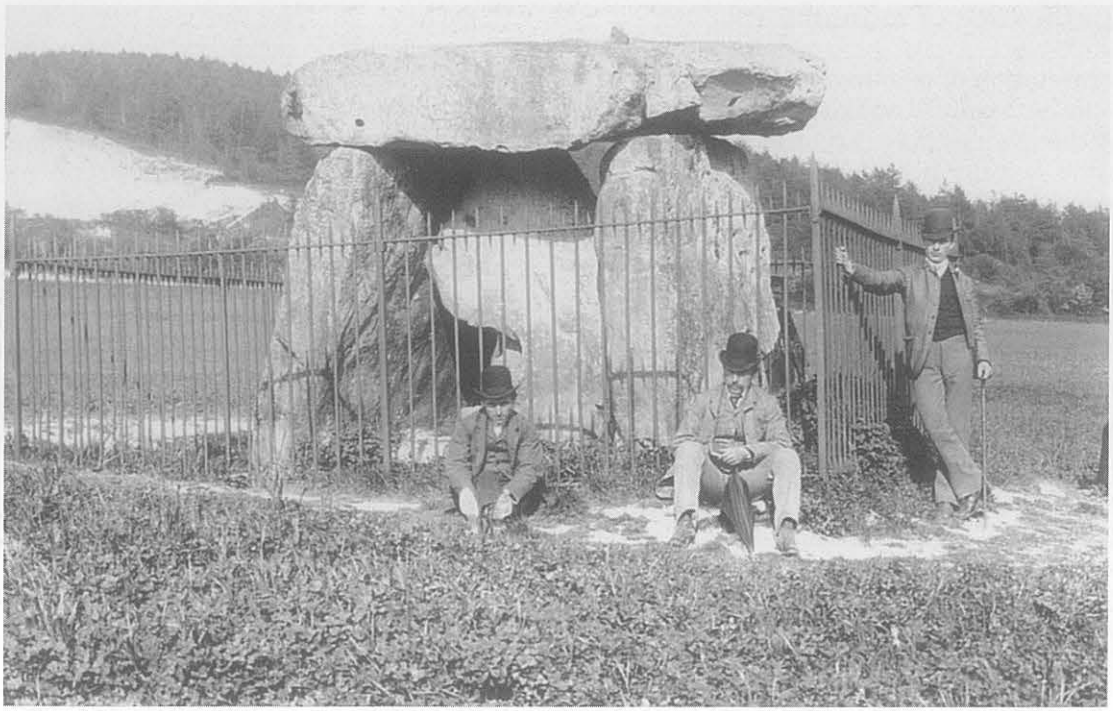

Figure 1.1 Kits Coty House, Kent circa 1901 (© National Monuments Record) One of the best-known of the South East's Neolithic monuments, and one of England's first Scheduled Ancient Monuments. Protected in 1885 under the terms of the Ancient Monuments Protection Act of 1882, the iron railings followed a few years later at the recommendation of Lt General Pitt Rivers. The monument's striking form and landscape setting have ensured constant attention since at least the 16th century (see Ashbee 1993; 1994). Although archaeological discussion has, until relatively recently, tended to focus rather narrowly on the architecture and presumed cultural origins of the Medway megaliths, discussion of their physical surroundings is a far from new development. In 1852, the antiquary Thomas Wright remarked that 'it would be difficult to select... a finer position than that occupied by Kits-Cotty House... This large cromlech stands on the summit of a lofty knoll, a little in advance of the chalk-hill which rises behind. Below, the Medway winds its course from Maidstone to Rochester' (Wright 1852, 64).The landscape setting has not escaped the attention of non-archaeologists. In 1911, when the land containing the monument was offered for sale, the auctioneers Hampton and Sons of London also noted the 'magnificent views over the valley of the Medway'. As well as highlighting 'choice sites for the erection of Week-End Villas', they suggested that 'The whole, owing to its exceedingly healthy and convenient position, would prove an ideal site for a convalescent home or other institution'. Intriguingly, although they noted the site's scheduled status, the land was described as being 'absolutely free from restrictions'. (Photograph no AA 69/1610)

the 20th century there was a marked reluctance to assign surface lithics to the Bronze Age rather than the Neolithic, while the existence of a Mesolithic phase between the Palaeolithic and Neolithic only gained widespread acceptance from the early 1930s (Ellaby 1987). Nonetheless some useful analyses were undertaken, Field and Cotton (1987) noting in particular Lasham's (1893) 'perceptive ... recognition of a division between the roughly chipped core implements, celts and scrapers from the Chalk downs, and the generally finer artefacts to be had from the sandy Greensand ridges'. Ultimately, however, this material came to represent solely a means of mapping the distribution of (presumed) Neolithic activity, as constrained by physical and environmental factors. By the 1930s, for the Neolithic, the monuments had become established as being of central importance to understanding the period (see for example Kendrick and Hawkes 1932).

Discoveries and personalities

In the later 19th century, the pioneering phase of Neolithic studies, one south-eastern site was of particular significance. The flint mines at Cissbury in West Sussex, alongside those at Grime's Graves in Norfolk, represented almost the sole non-funerary monument of Neolithic date recognised prior to the 1920s (though see

Figure 1.2 Lower Kit's Coty House (or The Countless Stones), Kent, circa 1901 (© National Monuments Record). Given the current state of the site and the lack of modern excavation, ideas of the original form of this particular monument are, not surprisingly, highly speculative. By the time William Stukeley visited in 1722, the site was already in ruins, although he was able to obtain some information regarding its appearance in the late 17th century: 'I have been informed by some who remember it standing that the stones which composed the wall did all of them joyn close together so as to touch each other, and the dore was on the west side thereof, next the road'. See Ashbee 1993a and b for a full discussion of antiquarian description and depiction of the Medway megaliths. (Photograph no AA 69/1609)

Oswald *et al* 2001, 9–34). Cissbury was the scene of excavations in 1856 (Irving 1857), 1867 (Lane Fox 1869), 1868 (by Lane Fox and Greenwell: Lane Fox 1869), 1873 (Willett 1875), 1874 (by Tindall: Willett 1875) and 1875–78 (by Lane Fox and Harrison: Lane Fox 1876; Harrison 1877; 1878). Nearly all of these episodes of digging were focused on the clearing out of mineshafts. However, Lane Fox's first excavations at Cissbury had another purpose. He had been intrigued by the quantity of struck flint on the surface in and around several hillforts on the South Downs, and chose to excavate at Cissbury in order to test the possibility that the surface flint, which he considered 'Stone Age', and the hillfort there were contemporary. At this stage, there was little problem among archaeologists with the idea that such defensive structures might be of Neolithic date. In fact, contemporary understanding of the rather savage nature of life in early farming societies of the late Stone Age positively demanded the construction of protective enclosures. It was only later, in 1875, that Lane Fox's excavations showed the flint mines to be earlier than the hillfort, allowing him to think in terms of the hillfort postdating the Neolithic (see Barber *et al* 1999 for a discussion of flint mines in late 19th and early 20th-century archaeology).

Although Cissbury, along with Grime's Graves (excavated by Greenwell in 1868–70: Greenwell 1870), was a key site in early discussions of the Neolithic, when the dating of flint mining was questioned by Reginald Smith of the British Museum (Smith 1912), it was to Grime's Graves that the Prehistoric Society of East Anglia inevitably turned to test his thesis and its implications for the Neolithic. This sparked off around a quarter of a century of excavation, helping via reasonably prompt publication in major journals to turn Grime's Graves into the best known of Britain's flint mines. Coincidentally, of course, much excavation occurred at the same time at various Sussex flint mines, notably between 1922 and 1955 by John Pull (Pull 1932; Barber *et al* 1999). However, the difficulties he encountered with local and national figures led to a lack of contemporary publicity for his work in anything other than

local publications such as the Worthing Herald (especially its Saturday magazine). This is particularly unfortunate for several reasons, not least the fact that the mines he excavated differed from Grime's Graves in several important respects, notably the fact that they belong primarily to the early Neolithic and Grime's Graves to the late Neolithic.

Sussex is also, of course, well known for its causewayed enclosures, and a key figure in Sussex archaeology also had a part to play here (as well as having a part to play in John Pull's treatment by the archaeological 'establishment'). The first published overview of the so-called 'causewayed camps' in the British Isles was written by E C Curwen (1930), who had already excavated at The Trundle and Whitehawk causewayed enclosures in West and East Sussex respectively, both published some decades before Windmill Hill (eg Williamson 1930; Curwen 1929b; 1931; 1934; 1936). Curwen's article, first published in O G S Crawford's then recently founded journal *Antiquity*, was originally to have been written by Alexander Keiller, based largely on information gathered by Crawford and Keiller over the previous few years. Keiller was ultimately unable to get to work on the paper, and Crawford asked Curwen to take over (Oswald *et al* 2001). Curwen was perhaps the natural choice given his experience of such sites as well as being well known to Crawford. Curwen's attention had originally been drawn to the Neolithic earthworks at The Trundle by Crawford, who had observed them on an air photograph.

E C Curwen and his father were leading figures in Sussex archaeology, and particularly prehistory, from the early 1920s until the Second World War, concentrating their efforts mainly on the numerous earthworks still extant on the South Downs. In his publications, Curwen tended to play down the significance of his work, mentioning for example that his research was conducted largely 'during caravanning holidays and Saturday afternoon rambles' (Curwen 1929a). He also claimed that 'there are few more exhilarating open-air hobbies than field archaeology, requiring as it does comparatively little technical knowledge' (*ibid*). Like many of the Sussex field archaeologists of the early- to- mid-20th century, Curwen and his father were intriguing characters. C W Phillips, who along with the young Stuart Piggott and Grahame Clark took part in the excavations at The Trundle, described how E C Curwen, although a pioneer in both aerial survey and field archaeology, had:

> ...one serious obstacle to his thinking. The Curwen family were Evangelicals of the strictest sort and as a firm believer in the creation of the world in 4004 BC, Curwen had no great use for Palaeolithic man ... His mother was totally preoccupied with religion, and it was this trait in the family which led him eventually to give up archaeology and pursue, what were for him, less uneasy hobbies ... But nothing can alter the fact that he was a prime mover behind the great flowering of the archaeology of the chalk country between the two World Wars (Phillips 1987, 30).

However, the Curwens' religion had one interesting side effect as far as British prehistory is concerned. By the late 1920s, the young Leslie Grinsell was living with his parents in Brighton, and had begun to spend some of his spare time walking around the neighbouring downland. He later recounted how E C Curwen:

> ...has avoided the barrows because his mother was very religious and had scruples about her son disturbing the graves of the prehistoric dead. I therefore began to visit the barrows on the Sussex Downs. Having neither the skill nor the desire to dig into them, I limited my fieldwork to measuring them, classifying them according to their outward forms, and assembling the available early references and excavation records. That has been the pattern of my fieldwork ever since (Grinsell 1989, 4).

The history of Neolithic studies in the South East is not solely one of lithic scatters and earthworks, although these undoubtedly dominate. The earliest causewayed enclosure (if that is indeed what it is) to undergo excavation is the site at Maiden Bower in Bedfordshire (Fig. 1.3); see Barber and Topping 1994 for a detailed account of the site). W G Smith was a notably active antiquarian and collector, whose research has been described as representing 'a pinnacle of Victorian antiquarian endeavour' (White 1997, 913). Though best known today for his Palaeolithic researches, he did not restrict himself to collecting Palaeoliths. A 'confirmed trespasser' in his searches of the countryside for antiquities, in later life he attributed his energy in pursuit of his goals to 'total abstinence from both strong drink and nicotine' (Dyer 1959, 5).

Smith initially appears to have been attracted to Maiden Bower by the large quantities of lithic material to be found on the surface. Later, he wrote that 'the surface of the land is ... strewn, especially within the camp, with worked flakes of white flint' (Smith 1915). He did not provide any quantification of these finds, but the main types listed are hammerstones, ground axe fragments, scrapers, arrowheads, knives, and fabricators. He also mentions finding human and animal remains. The earthworks at the site represent a fort or enclosure of probable Iron Age date, but by the 1890s Smith's attention had been drawn to a series of features exposed during quarrying close to the western side of the ramparts. He referred to 'numerous discoveries of shallow pits, filled with

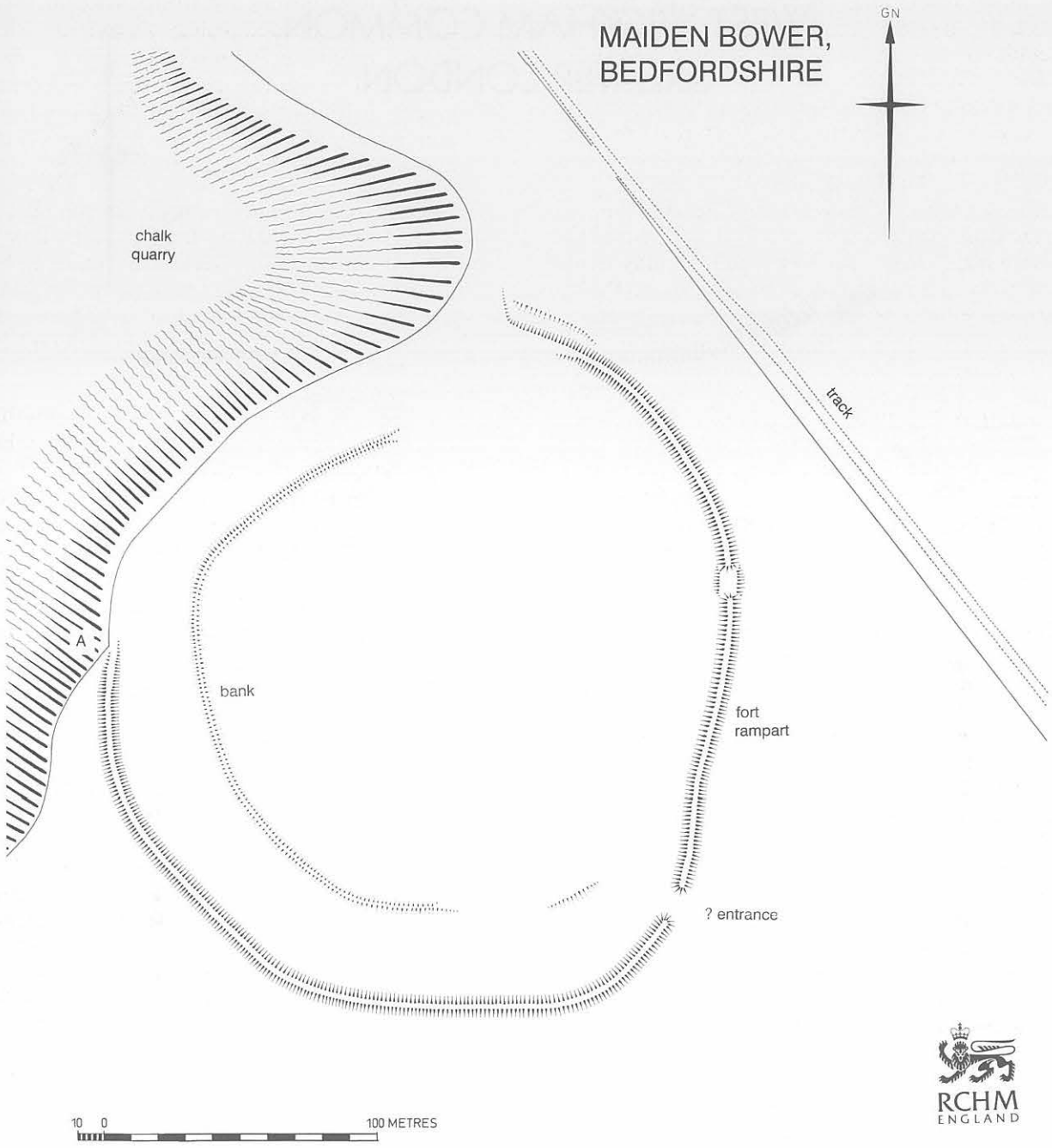

Figure 1.3 RCHME's 1994 survey of the earthworks at Maiden Bower near Dunstable, Bedfordshire. (© National Monuments Record). The principal surviving earthwork defines a sub-circular enclosure generally presumed to be of Iron Age date. The slight inner bank was detected for the first time during the RCHME survey (Barber and Topping 1994). It may be a headland formed by the ploughing regime in the interior, though it is worth noting that a circular anomaly picked up by geophysical survey (Pollard and Hamilton 1994) and lying outside this bank was interpreted as a possible ditch. The Neolithic features described by Smith and others were located to the north west of the main enclosure, in the area destroyed by quarrying. In 1897–99, Smith examined five 'ancient excavations' revealed by quarrying. It is these 'ancient excavations', the largest being 43 feet long, 10 feet wide and 3 feet deep (c 13 × 3 × 1m), that have been suggested to represent part of a Neolithic causewayed enclosure. The identification is by no means certain and other possibilities have been put forward on occasion. However, a Neolithic date seems certain. The probable Neolithic ditch can today be seen most clearly in section in the quarry face at 'A' on the plan, where it can clearly be seen to pass beneath the earthworks of the later enclosure. The alignment of this ditch and the location of the features recorded by Smith suggest that if a causewayed enclosure does lurk beneath the later enclosure, it is not directly overlain by it, but is instead partially overlapped.

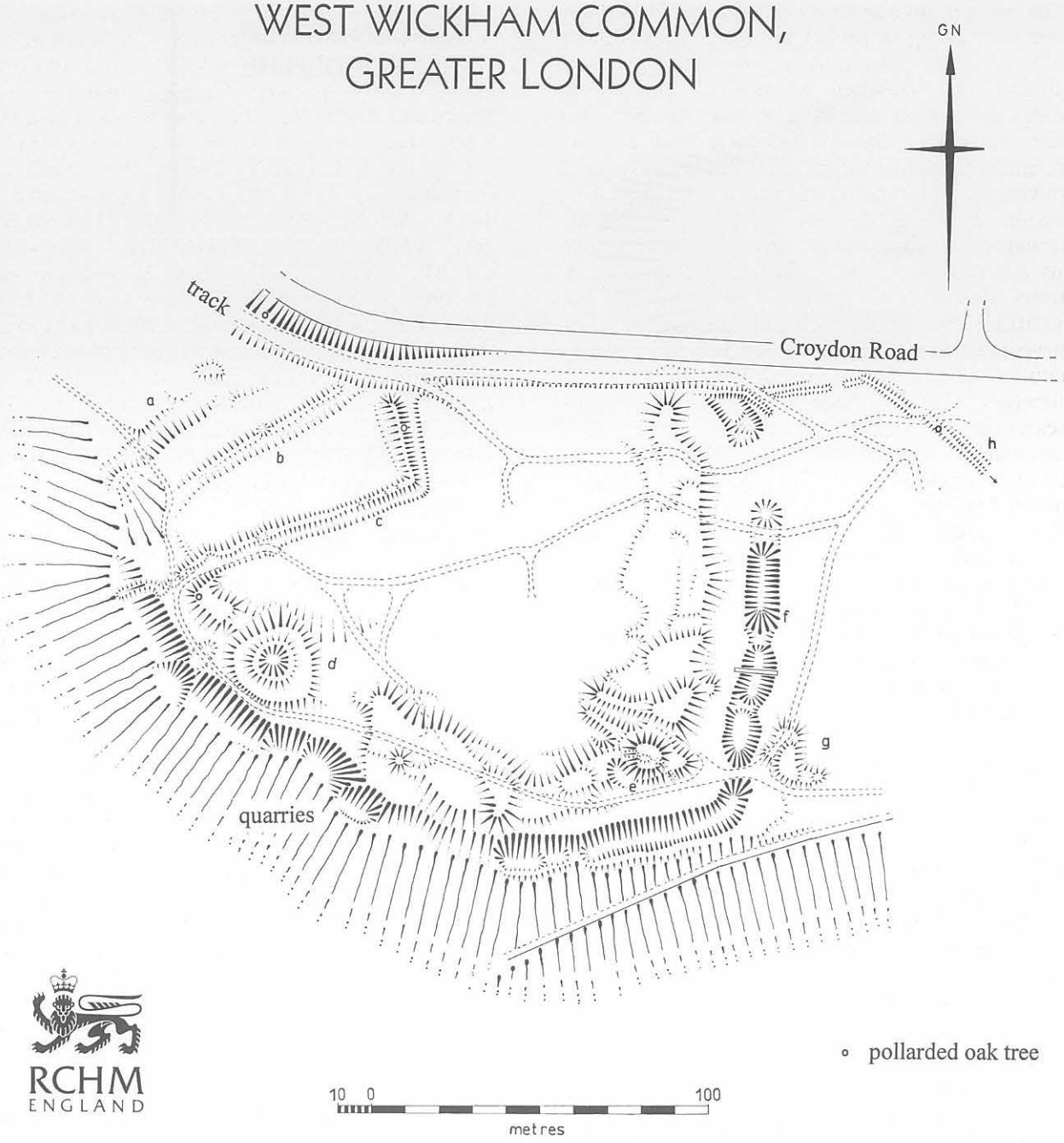

Figure 1.4 RCHME's 1995 survey of earthworks on West Wickham Common (© National Monuments Record). The date and function of the various earthwork features have been the subject of much debate since the late 19th century. The first accurate plan was made by Flinders Petrie in c 1878, but it was A H A Hogg's survey of the late 1930s that led to the main earthwork circuit being regarded as a possible Neolithic causewayed enclosure. At the time, this was a class of monument both newly-recognised and imprecisely characterised. The existence of causeways was regarded by Hogg as strictly diagnostic of a Neolithic date, although the presumption that some of the mounds were Bronze Age barrows also played a part in his interpretation. A single trench dug by Hogg failed to recover any useful information. Confusion has also been caused by a reference in Camden's Britannia *(1610 edition, 326) that a 'small intrenchment' at West Wickham had been 'cast in fresh memorie', Philp (1973, 37–8) for instance suggesting a date of 1570–80 for the earthwork enclosure as a result. Neither interpretation seems likely to be correct. A full discussion can be found in RCHME 1995 but briefly, the main enclosure has little in common with known Neolithic causewayed enclosures in terms of shape, morphology, and relationship to topography. Hogg's ditch section is also unlike any known from a proven causewayed enclosure. The date and function of the enclosure remains uncertain, but it most closely resembles unfinished Iron Age hillforts such as Ladle Hill in Hampshire. If the main enclosure is not Neolithic, then the mounds,*

chalk rubble, broken and cut antlers of red deer, flints etc' being revealed by quarrying (Smith 1915). Smith's plan and description appear to indicate the presence of several lengths of causewayed ditch which salvage excavation and recording in the 20th century have confirmed as continuing beneath the later earthworks (a recent drawing of the exposed section is reproduced in Oswald *et al* 2001, 26). From these Smith recovered a collection of artefacts whose date was not recognised until the early 1930s, when Stuart Piggott identified the pottery as being Neolithic. Even then, their precise context went unrecognised – Maiden Bower was mistakenly included as a possible causewayed enclosure in Curwen's (1930) paper on Neolithic camps because of the suggestive nature of the Iron Age earthworks, which feature several recent breaches in their circuit. Only in 1954 did Piggott amend his account, noting Smith's discovery of 'what appears to have been segments of a causewayed ditch [which] yielded Western Neolithic sherds, and a typical antler comb of Windmill Hill type' (Piggott 1954, 21).

Piggott also had a central role in one of the few excavations to have been undertaken of a Neolithic monument in Surrey. The site of the Badshot Lea long barrow was discovered by W F Rankine during observations at a quarry. The site was presumed at first to be a causewayed enclosure, and initial excavations appeared to confirm this: 'The site has now been proved to be that of a neolithic "causewayed camp" of the Windmill Hill type, and having at least 2 concentric rings of ditches' (Lowther 1936, 155). Alexander Keiller and Stuart Piggott had been asked to undertake the excavations on behalf of the Surrey Archaeological Society, and it quickly became clear that the site was something else entirely:

> The presence in the longitudinal section of what appeared to be causeways of unexcavated chalk and the fact that arrowheads of Neolithic type had been found in the silt, originally raised the presumption that the site represented a causewayed camp having at least two parallel ditches. During the progress of the excavation, however, and on completion of the survey showing the plan of ditches exposed by the various cuttings, it was seen that these could only be interpreted as ditches flanking a now completely destroyed long barrow ... (Keiller and Piggott 1939, 135).

Finds were few, and no human bone was recovered. Primary silts towards the western end of the northern ditch included sherds of probable early Neolithic pottery, some leaf-shaped arrowheads and a quantity of animal bones. The latter have subsequently been used to obtain two radiocarbon dates. Originally published in Field and Cotton 1987, these have since been revised to 4860 ± 180 BP (BM-2274R; 4050–3100 cal BC) and 4740 ± 20 BP (BM-2273N; 3640–3380 cal BC). Secondary silts in both northern and southern ditches included sherds of Mortlake Ware and animal bones, the latter producing a date of 4640 ± 130 BP (BM-2272R; 3700–2900 cal BC) again revised since Field and Cotton 1987. At least the site retained its Neolithic date, unlike the claimed causewayed enclosure at West Wickham Common (formerly in Kent, now in the London Borough of Bromley). Despite the repeated claims of Hogg (Hogg and O'Neil 1937; Hogg 1981), a Neolithic date for any of the earthworks at this site has always been regarded as unlikely, something confirmed by recent RCHME (1995) survey (Fig 1.4).

West Wickham is far from being the only suggested Neolithic site in the South East to fail the test of time. Like other parts of the country, the region produced its fair share of 'pit dwellings' in the later 19th and early 20th century, many representing an unfortunate coincidence of prehistoric lithics and later or natural features. Hayes Common, close to the aforementioned West Wickham earthworks, is a case in point, and one which underlines the abilities of some writers to weave remarkable narratives from a few rather loose threads. Thus for Henderson (1927), who contrasted the Neolithic populace with the 'tusky folk of Piltdown' (*ibid*, 125.):

> The pit village on Hayes Common is ... a good example of its kind, each pit with its own cooking recess where, as soon as the evening meal is likely to be wanted, the girls put the duck or sucking pig, or whatever it may be, on to the large, smooth stones with which they have previously covered the red embers. The top and the front of the cooking recesses are then blocked up so as to form an oven; and all who have eaten food cooked in this manner declare it to be the most succulent. Neither the Hayes Common girls nor any other girls or men in our wild islands have learned how to weave yet, probably. At any rate woven

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which post-date it, are most unlikely to be Bronze Age round barrows (which in any case they do not resemble). Other earthworks relate to a field system that may date anywhere from the Iron Age to the medieval period, a possible beacon site, and artificial rabbit warrens (the Common was named 'The Conyg' in a rental of 1485). While the main enclosure cannot be equated with the 'small intrenchment' of the 16th century, it remains a possibility that some of the smaller features may be associated with this episode.

> garments are not conspicuous. When it's cold, furs seem to be the usual wear, and when it's warm, nothing – a little red ochre, perhaps. The Hayes Common pits are deep. But the pit of the future is not going to be so deep. Any tendency to excavate less can only mean that as the floor rises, the walls and the roof must rise too – obviously, to give head room – until in time the whole thing emerges above ground as a hut (*ibid* 1927, 132–3).

More successful south-eastern contributions to Neolithic studies focus on discoveries of pottery. Pre-Beaker ceramics in Britain were poorly understood prior to Keiller's excavations at Windmill Hill. Examination of the assemblage from that site provided a springboard to the wider classification and understanding of the Neolithic ceramic sequence in southern Britain at least, and of its relationship with continental material. The difficulties encountered by earlier generations are typified by the comments of Beaumont and Gould (1903, 264), who noted that: 'Of neolithic pottery Essex has few or no recorded examples, though doubtless in the recent dark ages of archaeology many an urn may have been smashed by the plough or the spade', though in a footnote they referred to two tumuli near Birdbrook where an agricultural labourer had reported that 'some rubbishy pots were found instead of gold'.

In the early decades of the 20th century, S H Warren and others conducted investigations on the Essex foreshore at Clacton, Walton-on-the-Naze, and Dovercourt, work which was brought to a wider audience when a committee prepared a report for the second volume of the Prehistoric Society's *Proceedings* (Warren *et al* 1936). Referred to by some as the 'Lyonesse' surface, a name resonant of mythical drowned landscapes, Warren had discovered on it a general scatter of prehistoric remains, among which he identified four types of site: surface occupation or camp sites; pit dwellings; cooking-holes; and hearth sites. Today, this work represents an important and early contribution to the archaeology of the Essex foreshore, work that has been put into perspective by the more recent survey and excavations on Essex estuaries (eg Wilkinson and Murphy 1995). In the 1930s, one of the sites in particular was of considerable significance, mainly because of its pottery. The site at Lion Point, Clacton, yielded 'the most important pottery from the submerged surface ... [belonging] to a class which has not hitherto been recognised in this country' (Piggott in Warren *et al* 1936, 191). At first, Piggott chose to call it Grooved Ware, and this is the name by which it is still known, but for a while, once its widespread occurrence on Neolithic sites had been recognised, it became the central element of the Rinyo-Clacton Culture, the geographical distribution of the pottery style emphasised by the linkage of two sites at opposite ends of the British Isles (well, nearly). Initially, Piggott argued that: 'There is no evidence to suggest that this grooved ware had either a long or very important life ... At the most we can consider the grooved ware episode as a minor cultural individuality' (in Warren *et al* 1936, 197). By 1954, once the presence of Grooved Ware had been noted on other sites, including Woodhenge and Skara Brae, it was at the centre of a fully fledged 'culture' represented in two distinct 'provinces', one in Scotland, the other in lowland England, the latter with its emphasis firmly placed on the Wessex monuments.

Briefly, the 'Lyonesse' surface performed a subsidiary role in helping to explain the variable evidence for presumed links between Britain and the continent during the Neolithic. Thus according to Christopher Hawkes:

> In the middle of the 3rd millennium BC, the earlier Atlantic subsidence had left South East Britain still much easier of access than at present from the Continental coast-line stretching from Denmark to the mouth of the Rhine. The links between our Neolithic B people and their Baltic relatives must now be largely submerged, and on the Essex coast at Dovercourt, Walton, and above all Clacton, Neolithic occupation, both A and B, has been found on a land-surface now sunk below high-tide mark ... With the Neolithic remains are those of later comers who made grooved and beaker pottery ... [showing] that the submergence of this 'Lyonesse' surface was delayed for a good few centuries after the first Neolithic arrivals. (Hawkes 1940, 141)

Today, the name of Clacton is retained as the name of a distinct sub-style of Grooved Ware (though see comments in Cleal and MacSween 1999), the type-site's role in the recognition of Grooved Ware now largely irrelevant to current concerns. A similar situation exists for two of the three sub-styles of Peterborough Ware, highlighting the process by which type-sites can quickly be reduced in importance as new discoveries are made. Thus Ebbsfleet and Mortlake can be commonly found in discussions of the British Neolithic, with no real concern for their precise geographical location. Mortlake Ware is named after a 'thick and heavy bowl of blackish pottery that was recently found in the bed of the Thames at Mortlake' (Smith 1910, 340), while Ebbsfleet Ware takes its name from sherds recovered from the bed of the Ebbsfleet, then in Kent and now in Greater London, in 1938 (Burchell and Piggott 1939).

However, while the South East as a whole contains sites, monuments and artefacts which are representative of the Neolithic as a whole, there are some problems and absences which highlight the need to consider more localised

areas in their own right rather than import a generalised view of the Neolithic from elsewhere. The discovery of as many as four causewayed enclosures in Kent (Oswald *et al* 2001; contra Barber 1997, 80–3) has plugged one obvious gap in the evidence, but difficulties remain. Henges are a case in point. For the South East as a whole, Waulud's Bank is perhaps the most frequently cited in the literature, but the evidence for a late Neolithic date for the earthworks is circumstantial at best, and unlike most sites identified as henges, the ditch is outside the bank (RCHME 1994). However, the problem with interpreting the site as a henge stems at least partly from a persistent failure to come to terms with what we mean by a henge. Thus the South East contains numerous circular or sub-circular enclosures potentially of late Neolithic or early Bronze Age date (see for example Russell 1996), and possibly of ceremonial rather than funerary or domestic purpose, yet they fail to conform to the established but rather simplistic criteria used to define henges.

Overall, the south-east corner of England comprises an incredibly diverse landscape, containing a remarkable variety of archaeological remains. Furthermore, the history of archaeological investigation varies markedly across the whole region. In these respects, the South East is no different to the rest of the British Isles. Nonetheless, while the nature of its remains and investigations have contributed to the relative (in)visibility of the South East in more general accounts of the Neolithic in Britain, the decline of the sort of culture history and environmental determinism represented by Piggott and Fox has only belatedly been replaced by an increasing emphasis on more localised studies of Neolithic sites and landscapes, within an interpretative framework no longer constrained by a perceived need to conform to a more generalised view of the period. The presence in the literature of type-sites such as Clacton, Mortlake, and Ebbsfleet, and the early significance of some of the sites described above, highlights the fact that the South East has contributed to the overall development of Neolithic studies. However its idiosyncrasies became subsumed beneath the more generalised view of Neolithic culture, constrained by national boundaries, that had become established by the middle years of the 20th century. It seems somewhat ironic that only with the demise of the notion of a fully imported Neolithic should the part of Britain closest to the continent begin to receive the sort of attention its archaeology deserves.

Acknowledgements

The survey of Maiden Bower was carried out by Pete Topping and David Field, while West Wickham Common was surveyed by Alastair Oswald and Trevor Pearson. Information on RCHME/English Heritage surveys can be obtained from the National Monuments Record, Enquiry and Research Services, National Monuments Record Centre, Great Western Village, Kemble Drive, Swindon, Wiltshire, SN2 2GZ, England. Details of the revised radiocarbon dates for the Badshot long barrow were provided by David Field.

2 Food for thought: a late Mesolithic site at Charlwood, Surrey *by Roger Ellaby*

'...it resembled nothing so much as a pudding stuck with almond! the flakes were so thickly embedded'. Zara Frith, 1977 (pers comm)

Introduction

An 'enclosure' of Mesolithic pits dug into Weald Clay subsoil has yielded a microlith inventory of a type not previously recognised. Radiocarbon dates from one of the pit features suggest occupation of the site well into the fifth millennium cal BC. If these dates are broadly correct, then a long time-span currently envisaged between the end of the Mesolithic in south-east England and the appearance of a developed farmer-period technology seems no longer tenable.

The site (Fig 2.1, Site 1), Grid Reference TQ 232414, was discovered in 1939 by the late Mrs Zara Frith together with further nearby sites at TQ 236415 (Site 2) and TQ 238418 (Site 3).

The sites were given a passing reference by Rankine (1952, 3) and in 1964 were visited, with Mrs Frith, by Mr S G Beckensall who subsequently presented a typescript report, together with Mrs Frith's flint collection from the sites, to the then Mid-Sussex Archaeological Society. It was through this report that the writer, in 1972, became aware of the exact positions of the sites. Correspondence with Mr Beckensall and others assisted in tracing the flints to Mr T K Green, in whose custody they were held and who kindly donated them to Guildford Museum in 1976.

A short report was submitted by the writer to Surrey Archaeological Society (Ellaby 1977) stressing the importance of these sites in the Low Weald but remarking that their individual chronology and other potential data were marred by the mixed nature of the flint collection.

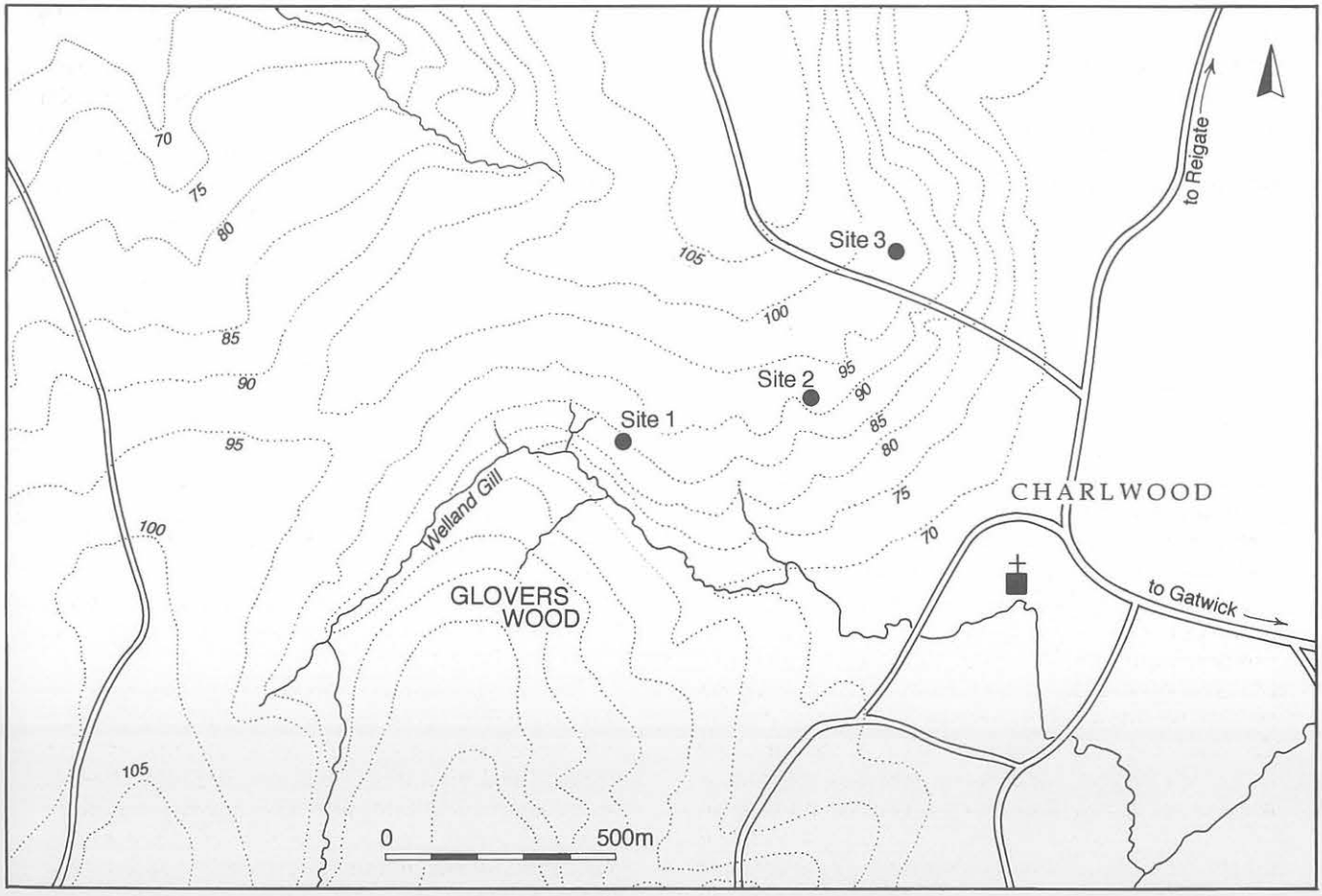

Figure 2.1 Charlwood: Mesolithic sites

In 1979 Mrs Jean Shelley of Charlwood informed the writer that the landowner, Mr W Westnedge, intended to remove the strip of possibly ancient woodland which crossed part of Site 1. Permission to investigate this woodland was kindly granted and trial test pits were opened in September 1979.

Topography

The site is located 0.9km west-north-west of Charlwood parish church and lies, in woodland and pasture, on Weald Clay in the catchment of the Upper Mole (Fig 2.1). Like many Wealden sites it is positioned just below a break of slope, here straddling the 85m contour on a ridge that rises to the west of a low-lying plain now occupied by the sprawl of Gatwick Airport and the town of Horley. This ridge, rising locally to 110m OD, is due to resistant seams within the clay of a hard *Paludina* limestone, a blue-grey crystalline rock composed of the fossil shells of small *Viviparus*, a freshwater snail of the Cretaceous period (Dines and Edmunds 1933, 32–5).

The presence of these seams has restricted lateral erosion by a stream flowing north-east then south-east causing it to cut a deep gorge-like feature, Welland Gill, the lower end of which lies approximately 100m below and south-west of the site. Secondary ravines are being cut by rills running down the slopes of the gill, with that immediately west of the site being the most well developed. Welland Gill is part of Glovers Wood, a large area of old woodland listed as a Site of Special Scientific Interest (SSSI).

The site

From a drawing supplied by Mrs Frith (pers comm 1977) the concentration of flints occupies a roughly circular area about 50m in diameter with the densest portion lying 'just below the footpath' as reported by Mr Beckensall (Fig 2.2). The site is on gently sloping ground immediately below a plateau to the north and above land which slopes ever more steeply into Welland Gill.

At the time of discovery the flints were exposed by ploughing on the edges of two fields separated by a 10m wide strip of woodland, or shaw. The common boundary of these fields is, however, a mature lynchet developed from a bank with its long-silted ditch on the southern, woodland side. The shaw consists mainly of oak and old coppiced hornbeam and in springtime sports a somewhat thin carpet of bluebell. Such a ground flora is an indicator of at least some antiquity for woodland but the presence of the lynchet would suggest that it originated on an old eroded ploughsoil possibly as an extension to the neighbouring coppices of Glovers and Greenings Woods.

The southern part of the site is now, and was at the time of excavation, largely covered by scrub which, from examination of some sawn birch stumps, commenced its growth immediately after the ploughing of 1939. It is of interest that the bluebell has not apparently begun to colonise this new woodland from the old after a period of 60 years, the boundary between the two still marked by the edge of the springtime carpet.

Excavation

In September 1979 square 24in (0.61m) test trenches were opened in the old woodland (Fig 2.3). The trenches, A–G, were placed 20ft (6.1m) apart and 20ft (6.1m) south of a baseline approximating to the foot of the lynchet. The 24in (0.61m) unit was judged as being the optimum for complete excavation, by one person, in one working day.

As expected, the trenches revealed that the ground had almost certainly been used in the past for agriculture. The excavated flints exhibited the typical wear and damage of long exposure to ploughing while subsequent downslope erosion was indicated by the shallow soil which, with an average depth of 6in (0.15m), rested on largely undisturbed stiff, yellow clay. (By contrast the modern ploughsoil below the scrub and pasture had an average depth of *c* 10in (0.25m).)

With this knowledge it is unlikely that excavation would have proceeded beyond the trial stage as all flints recovered represented, in effect, no more than a surface collection. Serendipity, however, played its part when, in the south-east corner of trench C, the edge of a pit was encountered cutting into the natural clay. The fill contained burnt bone, charcoal, and flintwork which, in contrast with that from the ploughsoil, was as fresh and sharp as the day it was struck.

The discovery of this pit (Pit 1: Table 2.1; Figs 2.4, 2.5) and its subsequent excavation dictated the strategy for further exploration of the site in the hope of defining a clearer picture of occupation. Using the original baseline and a second at a right-angle across the site, a grid of 24in (0.61m) square trenches was laid out where vegetation permitted. Excavation took place during the winter months, on one day per week, from 1979 to 1986 by a small team of no more than three persons at any one time.

Work in the summer proved impossible due to the extreme hardness of the ground but in winter the woodland soil was ideal, remaining well drained and tractable, a feature no doubt afforded by its organic content, fine root structure, and the action of worms and other soil fauna. Excavation was carried out using a triangular shave-hook honed to razor sharpness. This proved to be the ideal tool, allowing very fine shaving of the clay with the recovery of even the tiniest of flint pieces.

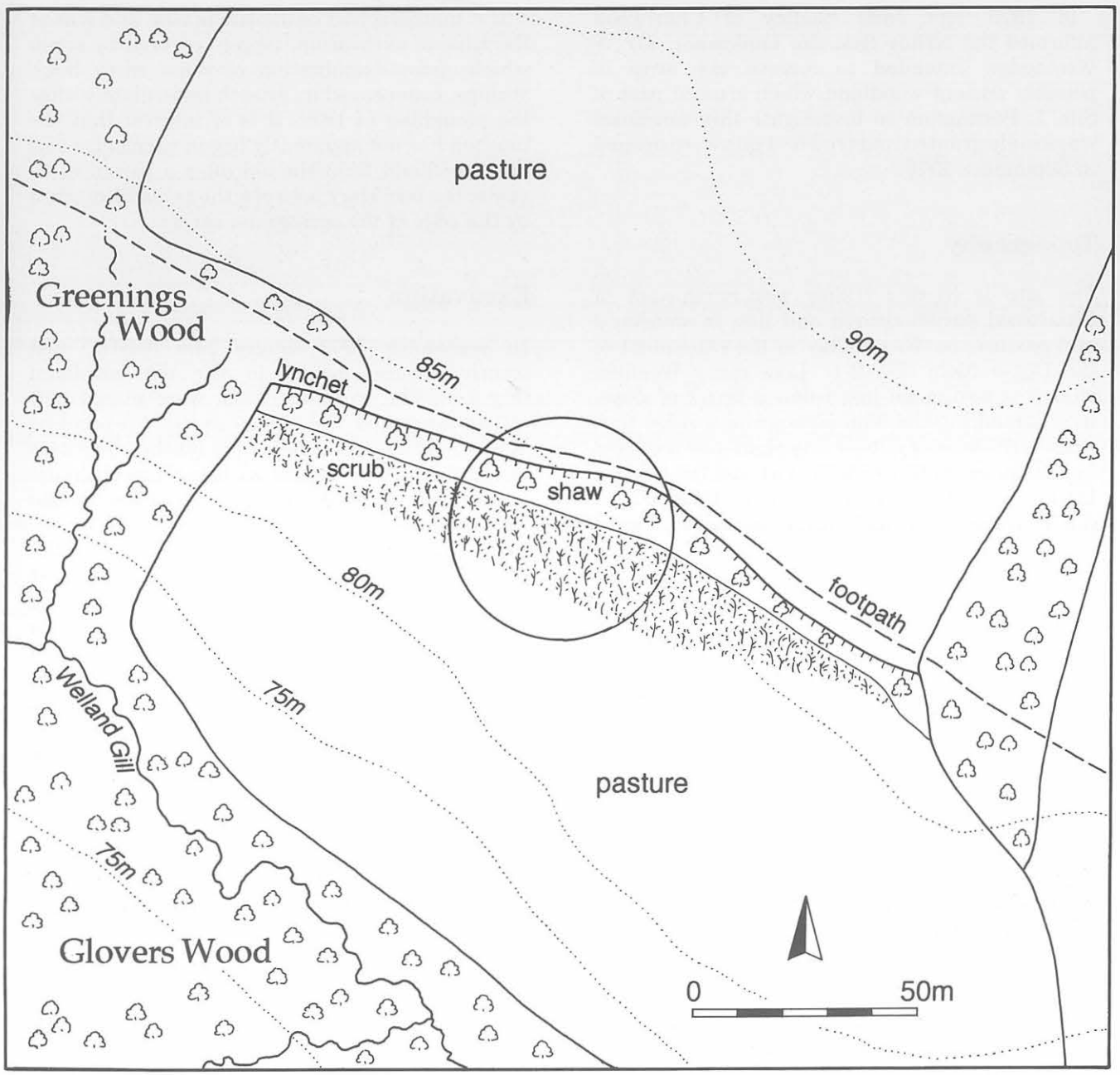

Figure 2.2 Charlwood: Site 1

In all, 210 trenches were excavated, yielding over 21,000 pieces of struck flint of Mesolithic character. Counts from individual squares revealed a distribution pattern entirely consistent with Mrs Frith's original plan but with the added observation that a large proportion of the flints had apparently moved in the direction of the slope to form a fan-like scatter. This scatter had seemingly emanated from a zone which produced, together with Pit 1, a series of truncated pits (Pits 2–7; Fig 2.4) enclosing an oval space approximately 50ft (15m) by 30ft (9m). This arrangement may be argued to be fortuitous, a result of the sampling method employed and the possibility that very shallow pits have been lost to ploughing and erosion. It was noticed, however, that the topsoil squares immediately above and around the excavated pits yielded a far greater flint count than the average for the site, thus, had there been further pits the sample trenches were probably sufficient in number and placement to have detected their whereabouts. The relatively high counts from the few squares cut down through the lynchet are probably due to protection from ploughing, and colluviation against the original bank.

From the evidence of a number of pottery sherds, which probably arrived on the site from distant middens, ploughing appears to have begun around the 12th century AD. There were

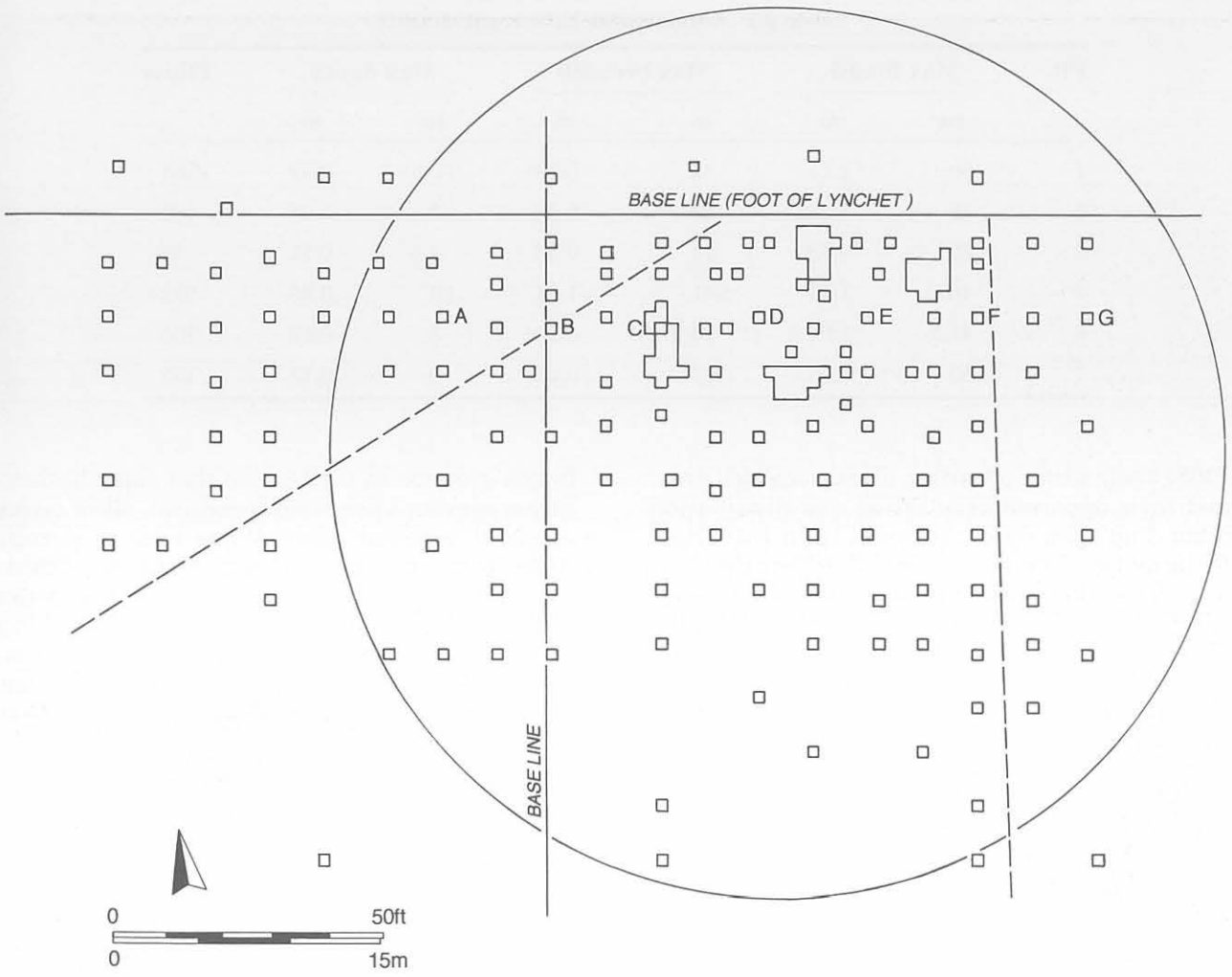

Figure 2.3 Charlwood Site 1: excavated area. Circle approximates to Mrs Frith's original plan of main flint concentration. Area between broken lines has yielded >70 flints per 24in sq (0.6m sq). Flints diminished beyond these lines.

none later than the 16th century in the soil of the old woodland but elsewhere, as well as medieval pottery, there occurred sherds from the 16th century to modern together with many chalk lumps, presumably added as a soil conditioner at some time during this later phase. On this slight evidence the old woodland, or shaw, originated in about the 16th century.

The pits

All the pits appeared severely truncated and only Pits 1 and 4 were 10in (0.25m) or more in depth, the remainder being no more than shallow scoops (Table 2.1; Figs 2.4, 2.5). All were recognised in the yellow clay by the slight difference in colour and texture of their fills and the presence of fresh, sharp flints. Due to considerable disturbance by tree roots no coherent plan and section for Pit 5 was possible, while its flints were classed as being from ploughsoil. A layer of pale grey clay (?gley) at the base of Pit 1 may possibly be attributed to ponding of water in the pit's early history. Pits 4 and 6 contained a few tiny fragments of burnt bone, while Pit 1 yielded considerably larger quantities, in the most part disintegrated to an amorphous white powder. The few sizeable fragments from this pit are tentatively ascribed to roe deer (Mrs G Done pers comm).

Arguments have been presented that many of the pits discovered by excavation on hunter-gatherer sites are, in reality, the holes left by the upturned rootplates of storm-felled trees (Kooi 1974). If such a possibility exists for the Charlwood pits then the presence within them of extremely fragile burnt bone and pristine flintwork would suggest that these items were deposited by human agency rather than weathered into the hollows over a period of time. Arguments for these pits having been purposefully dug are reinforced by the observation that they do not betray the characteristic D-shaped outline of a rootplate hole (Kooi 1974; Crombé

Table 2.1 Charlwood Site 1: pit details

Pit	Max length		Max breadth		Max depth		Flints
	in	m	in	m	in	m	
1	88	2.24	33	0.84	12.5	0.32	1088
2	48	1.22	22	0.56	3	0.08	105
3	20	0.53	13	0.33	4.5	0.11	22
4	46	1.17	>41	>1.04	10	0.25	882
6	41.5	1.05	23.5	0.60	5	0.13	108
7	53	1.35	27	0.69	5	0.13	183

1993), their situation within a very localised area, and their apparent orientation and distribution around an open space. It would seem that these features together are a sign of deliberate planning. That they were dug, if not simultaneously, within a discrete timeframe is indicated by the identical flint styles within them (see below).

If we are to exclude the possibility that this arrangement of pits is fortuitous, then there is no parallel with a British hunter-gatherer site. Any interpretations can thus only be tentative. Soffer (1989) has suggested that pits dug around Upper Palaeolithic mammoth-bone shelters on the East European Plain were used for meat storage in the frozen ground; an implication that some hunter-gatherer groups practised sedentism, albeit on an assumed seasonal basis. While such a storage strategy can hardly be visualised for the Charlwood pits it does however seem likely they were similarly dug around the perimeter of a working and living area containing one or more shelters, evidence for which has probably been lost through ploughing and erosion. The surviving contents of the pits give no clue to their original use and only the usual guesses of storage, rubbish disposal, or 'ritualistic' activity may be offered as possibilities, the former two perhaps suggesting more than a transient occupation.

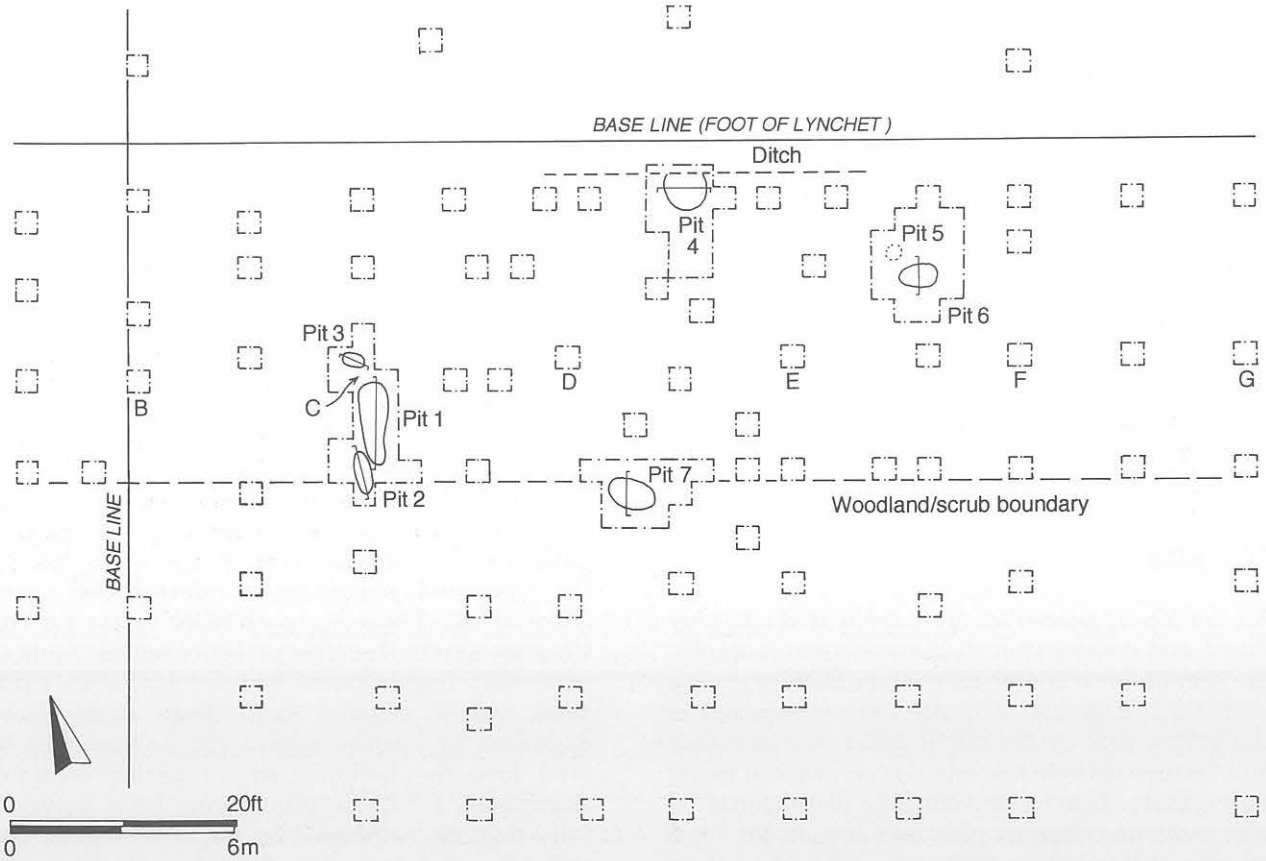

Figure 2.4 Charlwood Site 1: pit zone

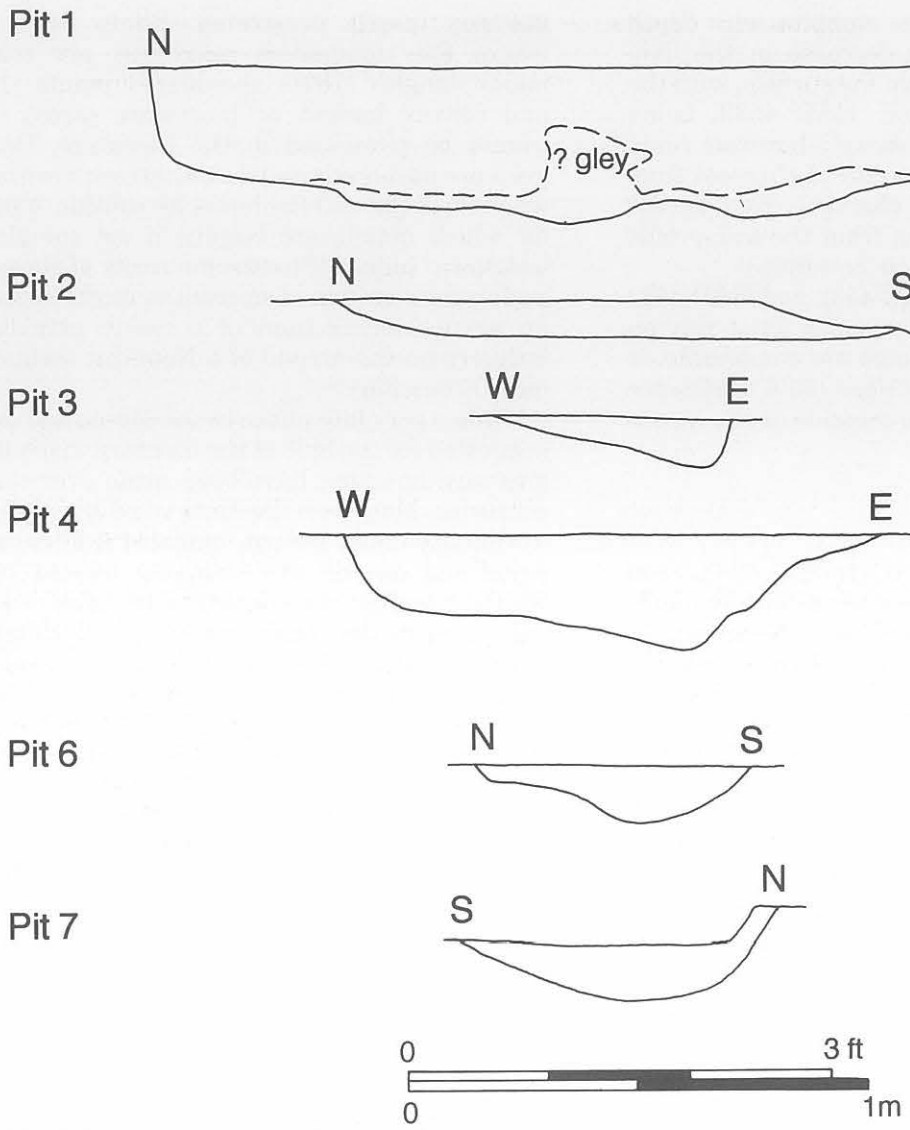

Figure 2.5 Charlwood Site 1: pits

Radiocarbon dating

Charcoal samples were taken from arbitrary 2in (0.05m) spits from Pit 1 and those from the lowest three submitted to the Harwell Laboratory for radiocarbon dating. The results are shown in Table 2.2.

In the absence of any evidence that the pit was dug and filled in the late Neolithic, HAR 4531 is clearly anomalous. This may be due to faulty sampling, or contamination by later charcoal finding its way into the pit-fill through soil cracks, root holes, or faunal activity although there were no visible signs of these during excavation. Also, the possibility for laboratory error cannot be ruled out, the assay being carried out some months after the consecutive runs of HAR 4532 and HAR 4533.

Table 2.2 Radiocarbon dates from Pit 1

Lab No	Distance of spit from surface		Date BP	Cal BC
	in	m		
HAR 4531	12–14	0.30–0.36	4340 ± 100	3350–2650
HAR 4532	14–16	0.36–0.41	5270 ± 90	4350–3900
HAR 4533	16–18	0.41–0.46	5640 ± 90	4710–4330

The increasing age of the samples with depth could be interpreted as a decrease in the likelihood of contamination from the surface, with the oldest sample at the base, HAR 4533, being nearest a true date. This sample however could have contained a small amount of charcoal from aged timber or included charcoal from earlier activity on the site, falling from the soil profile into the base of the pit when first dug.

That a mean date for HAR 4532 and HAR 4533 is as justifiable as their extremes must rely on agreement that the two dates are compatible, ie that at two standard deviations (95% confidence level), they only just fail to coincide at the mean.

The flints

With an abundance of microliths (283) and microburins (311), and the absence of any pieces attributable to the Palaeolithic, Neolithic, or Bronze Age periods, the whole of the excavated sample may be considered to be of Mesolithic age.

The bulk of the microlith component is dominated by small scalene microtriangles and belongs with the local later Mesolithic, ie after *c* 7000 cal BC. The near absence (one example) of rods or straight-backed pieces would seem, however, to preclude occupation in the earliest part of this phase (Ellaby 1987, 63–4). A number of inversely retouched shouldered points indicate that the main period of visits occurred late in the Mesolithic, as examples of these do not appear among the many microliths at High Hurstwood, E Sussex (Jacobi and Tebbutt 1981) with dates either side of 5800 cal BC or from any site in south-east England earlier than this threshold. In support of a late occupation are the dates from Pit 1 itself and a single assay of 6079 ± 113 BP (BM-826; 5300–4700 cal BC) from Wawcott Site XXIII in Berkshire whose microlith component is similar to that of Charlwood (R Froom pers comm; Froom 1972). Like Wawcott, the Charlwood industry (partly illustrated – Ellaby 1987, 65), where the commonest microliths are scalene microtriangles (78%), shouldered points (12%), and convex backed or lanceolate pieces (6%), cannot be paralleled in the literature. On the evidence outlined it may be tentatively ascribed to what we might call the latest Mesolithic, a period for which details are largely, if not completely, unknown. Indeed the extreme rarity of sites with such a combination of microliths might argue for an abrupt termination of a newly extablished industry on the arrival of a Neolithic technology (see Discussion).

While a very late phase in the Mesolithic can be suggested for the bulk of the industry, visits to the site may, however, have been made over several centuries. Moreover, the flints were sampled over a wide area and, indeed, included a bitruncated point and one or two obliquely backed pieces which, together, are suggestive of visits or hunting losses in the considerably earlier 'Horsham' period *c* 8200–7000 cal BC. It is considered, therefore, that the only meaningful analysis of flintwork is that carried out on material from the pits, which appear to have been dug within a discrete timeframe and include the radiocarbon dates from Pit 1. For this analysis the flints from the pits were combined as an 'assemblage' of 2388 pieces and compared, where necessary, with the Charlwood Site 1 industry as a whole (Table 2.3).

Microliths

Eight pieces (nos 1–8) are complete or fragmentary shouldered points (Fig 2.6). These are made on portions of flakes or blades and, while often difficult to determine, the tips are fashioned towards either the distal or proximal end. The thick right-hand side is steeply blunted and the leading edge either unworked or trimmed with flat retouch. The base and/or tip is inversely pressure-retouched while two examples (nos 2, 4)

Table 2.3 Analysis of 'assemblage' from pits

Tools	Microliths	25
	Burins	4
	Scrapers	1
	Piercers	1
	Truncated pieces	9
	Miscellaneous	24
Debitage	Microburins	34
	Cores	12
	Flakes, trimmings, spalls, burnt fragments etc	1981
Other	Blades and blade fragments	297
Total		2388

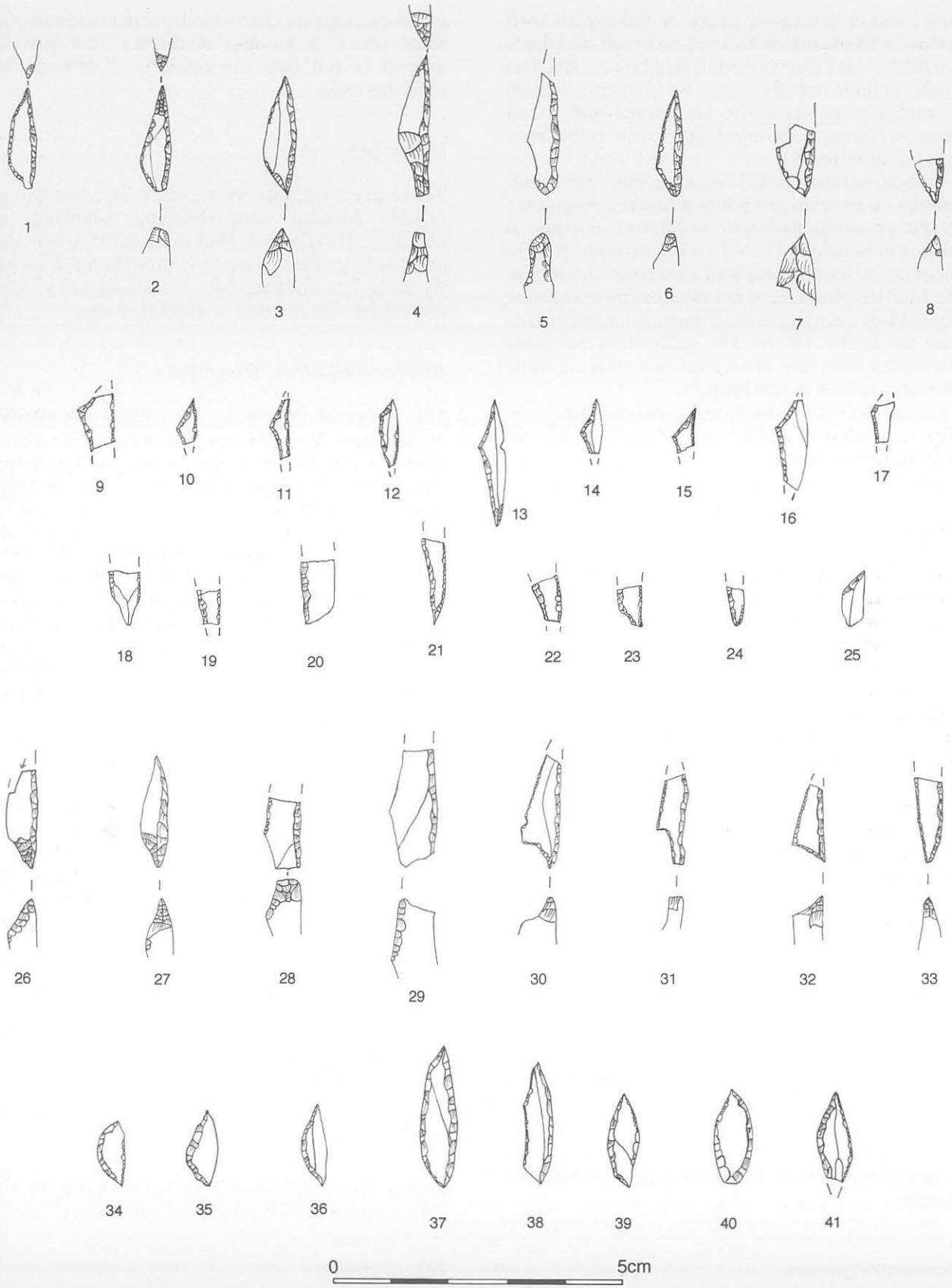

Figure 2.6 Charlwood Site 1: microliths (1:1). 1–25 from pits; 26–33 inversely retouched points from ploughsoil; 34–41 convex-backed and lanceolate points from ploughsoil

may be said to exhibit pressure flaking on both ventral and dorsal surfaces. The resultant pieces are robust and may alternatively be described as small oblique arrow tips. A further thirteen examples came from the ploughsoil and in all cases are steeply blunted down the right-hand side (eg nos 26–33).

Nine pieces (nos 9–17) are complete, or parts of, scalene microtriangles while a further seven (nos 18–24) are probably fragments of the same type. A minute oblique point (no 25) is again more likely to be an unfinished example of a scalene microtriangle. Like the shouldered points these pieces may be argued to be components of hunting arrows, in this case the barbs. Of the 181 sufficiently complete microliths from the excavation as a whole, some 78% are scalene microtriangles.

Except for Pit 3, which contained only 22 flints, all pits yielded examples of both shouldered and microscalene pieces.

Burins

The four examples are developed on a core trimming (no 1), a quartered nodule (no 2), a flake (no 3), and a blade (no 4) (Fig 2.7). There were a further nineteen examples from the ploughsoil but general damage may have resulted in misidentity in some cases and, at the same time, excluded other possible examples from the count.

Piercers

A single example (no 5) was made on a blade with steep trimming on the upper right-hand side to form a strong point at the distal end (Fig 2.7). A further ten examples of boring and piercing implements were recovered from the ploughsoil.

Scrapers

There is only one poorly characterised example (no 6) and only ten from the ploughsoil, again poorly made (Fig 2.7). If it is assumed that scrapers were mainly used in the processing of hides for winter clothing then their rarity here suggests occupation of the site during the summer months.

Truncated pieces

Apart from the microliths these are the most common 'standard' tools (Fig 2.7). The seven pieces are developed on the distal ends of either flakes or blades with lateralisation to the left (no 7), right (no 8), or transverse (no 9). About 80 examples were derived from the ploughsoil, but again damage may have resulted in misidentity in some cases. A number of these pieces may be argued to fall into the category of boring and piercing tools.

Miscellaneous

There are 24 pieces which show signs of use or exhibit random edge-trimming, blunting, or notching. It is possible that some of these features are due to general damage rather than deliberate working. Not unexpectedly, the ploughsoil yielded a considerable number of similar pieces.

Blades and blade fragments

The figure of 297 pieces is a purely subjective assessment. Very few may be described as true blades while the vast majority are small and misshaped. It would seem therefore that the production of fine blades, as is generally assumed for the Mesolithic, was not the prime object of core reduction and, given a late date, supports Pitts' and Jacobi's conclusions (1979, 175) that controlled blade production became less important with time during the period. The Charlwood blades and fragments, at 12.4% of the total flints from the pits, compares with up to 35% from local early Mesolithic and Horsham assemblages where blade production is both deliberate and of superior quality, arguably a requirement of the types of microliths being produced.

Cores

The twelve cores, average weight 42.5g, reflect the general pattern of flintworking, ie flake rather than blade production. None can be described as a true blade core and they are either shapeless and angular, or at best crudely globular, multiplatform types. The 118 cores from the ploughsoil show a similar pattern but there are one or two true blade cores of cylindrical or conical shape, which may be exceptions to the rule, or a further indication of earlier activity on the site.

Microburins

Except for a single double-ended form (no 10), the 34 examples call for no special comment (Fig 2.7).

Burnt pieces

The number of flints showing signs of contact with fire varies from 22.7% in Pit 3 to 53.7% in Pit 6. In total, 38.6% of flints from all pits are burnt and this compares with a remarkably similar figure of 38.1% from the ploughsoil testifying, perhaps, to a very thorough mixing of the surface material.

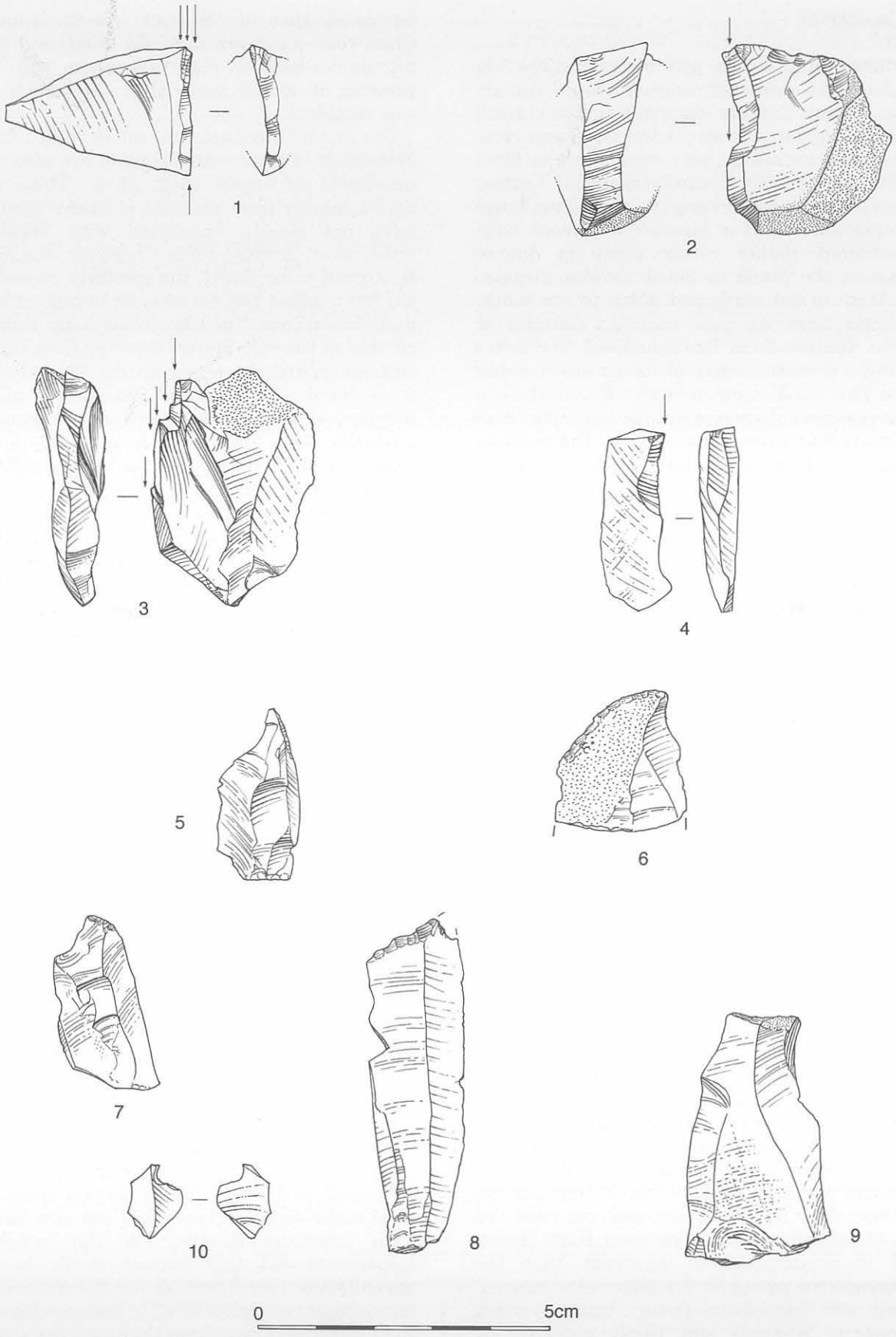

Figure 2.7 Charlwood Site 1: artefacts from pits (1:1)

Raw material

The stone contents of the pits are derived entirely from flint. The restricted range of colours, mainly shades of grey, and the observation that several pieces were apparently struck from the same core, suggest that individual pits were dug and filled quickly with recently discarded material. Cortex, where present, indicates origin mainly from ?local river gravels while a number of pieces with unweathered chalky cortex point to quarry sources on the North or South Downs, respectively 11km to the north and 30km to the south. The flints from the pits stand in contrast to random samples from the ploughsoil, the latter showing a greater variety of colour, texture and cortex. This would seem to imply visits to the site over a considerable period of time and with them supplies of flint from many sources. The remarkable uniformity in appearance of these samples demonstrates, as for the burnt pieces, a very thorough mixing by the plough, harrow, and hillwash.

Discussion

Visually and statistically the stone contents of the pits appear to have been deposited within a discrete time frame. It was in this frame that the local flint arrow tips were dominated by small, robust, shouldered points, blunted down the right-hand side and inversely pressure retouched. These tips were associated with barbs in the shape of scalene microtriangles.

That this combination of microliths was not of extremely local occurrence but perhaps appeared towards the end of the Mesolithic over the whole of south-east England and peripheral areas is indicated by its presence on the site of Wawcott XXIII in Berkshire. There, however, the pieces were associated with other types of microlith suggesting, as with the Charlwood site as a whole, that visits were made to the site over perhaps several centuries. The single radiocarbon date of 6079 ± 113 BP (BM-826; 5300–4700 cal BC) probably represents only one of these visits and cannot be used to assess any particular combination of microliths precisely at this time. If, however, we take this date at face value and compare the suite of microliths with that from High Hurstwood it is immediately apparent that the commonest tip pieces at the latter site (convex-backed and lanceolate forms) became much reduced at Wawcott and partly replaced by shouldered points (ratio *c* 2:1). With an even further reduction on the Charlwood site (Fig 7, 34–41) and with a corresponding rise in shouldered points (ratio *c* 1:2) it may be suggested that the later Mesolithic occupation postdated that at Wawcott. At the time the Charlwood pits were dug and filled, and where no convex-backed and lanceolate tips were present, it would seem that the substitution was complete.

The few fifth millennium cal BC dates for the Mesolithic of south-east England are considered unreliable (cf Jacobi 1982, 21–2). These dates derive mainly from samples of burnt wood that were not clearly associated with Mesolithic material or, in those cases where association can be argued to be direct, the artefacts present are too few to allow any assessment of contemporary material culture. The Charlwood dates therefore remain as the only figures deriving from samples with an apparently secure context. These samples were found with sufficient material to allow a glimpse, at least, of the flintwork of the middle centuries of the fifth millennium cal BC, in other words the flintwork of the last hunter-gatherers of south-east England.

It is this general lack of secure radiocarbon dates for the fifth millennium cal BC that has led a number of authors (eg Jacobi 1982; Zvelebil and Rowley-Conwy 1986) to imply that hunter-gatherers may have been replaced by farmers as early as *c* 4900 cal BC, even though there is no real evidence for a Neolithic technology before *c* 4200 cal BC. This long time gap, however, seemed to support earlier theories (Case 1969; Smith 1974) that it would have taken considerable time for farmers to establish trade networks and to create new landscape before building their monuments to the dead and digging deep mines into the chalk, both of which are sources for the earliest Neolithic dates. It must be said, however, that while all this was supposedly going on these farmers must have lived somewhere and discarded their rubbish for future archaeologists to find and date. Archaeologists have yet to find it.

The Charlwood dates support a second school of thought (eg Thomas 1988) that the Neolithic arrived in Britain suddenly and as a package, consequent upon a massive expansion of the agrarian lifestyle into the higher latitudes of Europe towards the end of the fifth millennium cal BC.

Common to both these theories must be the question of the ultimate fate of the aboriginal population in the change from hunting and gathering to farming. Some contact must have been made with the bearers of the new lifestyle from mainland Europe. For the indigenous inhabitants did this contact result in their annihilation, acculturation, or the autonomous development of agriculture? In seeking clues from the Charlwood excavation there are three points of interest which perhaps favour acculturation: an 'enclosure', pressure-flaked arrowtips and quarried flint from the chalk. These points are all novel features for the local later Mesolithic and all are associated with the very late dates

obtained. They are also, although in highly developed forms, items of the earliest Neolithic in south-east England.

The author makes no claim that these novel features are the result of contact with newcomers, rather that newcomers were to share and augment certain aspects of the existing technology in a new land. Indeed it may also be suggested that hunter-gatherers were initially useful as guides to the landscape, possibly an important factor in the apparently sudden and rapid spread of agriculture across Britain.

All this of course is highly speculative thus, surely, it must be one of the aims of the early years of the 21st century to locate and excavate further sites of the Charlwood type. Hopefully, such sites will provide some answers to the vexed questions of the hunter/farmer transition in south-east England.

Acknowledgements

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3 Managing change: the Mesolithic-Neolithic transition in south-east England *by Robin Holgate*

Introduction

The replacement of the Mesolithic economy, material culture, social organisation, and beliefs by the new Neolithic way of life has been the subject of considerable debate in recent years. It has been equated with the introduction of novel items, notably pottery, ground stone axes, and leaf-shaped projectile points, and with the construction of monuments. In subsistence terms, Mesolithic people are often portrayed as mobile communities, exploiting successively migratory species, notably fish and mammals, and seasonally available resources, for example edible plants and shell fish. Conversely, Neolithic communities are perceived to herd animals and cultivate land, thereby possessing and exploiting landed property; they demarcated their territories with ceremonial monuments, and used pottery vessels and stone axes as symbolic expressions of economic and social change. Until the 1980s, the Neolithic 'package' of novel items, new foodstuffs and monuments was considered to have been introduced by continental immigrants. As Whittle (1999, 63) stated in the latest published overview of the Neolithic period:

> ...the consensus is now that the indigenous Mesolithic population became Neolithic by adopting new material culture, incorporating new subsistence staples, and developing a new world view. One favoured model proposes that the motivation was economic, demographic or both, leading to a recasting of lifestyle to alleviate pressure on resources. Another model focuses on social competition as the spur to changes in lifestyle.

One reason frequently cited for the difficulty in elucidating the nature of the Mesolithic-Neolithic transition is the lack of sites with stratigraphic sequences that span this period (cf Whittle 1999, 63). Previous research has looked at possible continental antecedents for British Neolithic traits, areas of continuity as exemplified by the reuse of Mesolithic woodland clearings in the Neolithic period, and the new artefacts and monuments introduced in the Neolithic period. This review takes a different approach by focusing on the two strands of information common to both the Mesolithic and Neolithic periods that span the transition period, ie the sixth – fourth millennia cal BC. The first is the palynological, sedimentological, and vegetational sequence that has been outlined by palaeoenvironmental studies; reviewing the sequence enables the impact of human exploitation of the environment in both the later Mesolithic and earlier Neolithic periods to be assessed. The second is the analysis of flint assemblages that have been recovered by methodical excavation; this throws light on the fundamental technological and typological changes that took place during the transition. The enquiry will focus on Sussex, where recent palaeoenvironmental and archaeological research has provided much new information. The results of this evaluation provide a framework in which to review the changes that took place in south-east England at the time of the Mesolithic-Neolithic transition.

The palaeoenvironmental sequence

A number of palynological and sedimentological studies of alluvial and peat deposits in Wealden valleys and in the lower stretches of valleys draining into the English Channel has been undertaken in recent years. Molluscan analysis of both dry valley colluvial deposits and the fills of features at earlier Neolithic sites in selected areas on the South Downs has also taken place. The results show the effects of eustatic changes and human activity on the environment in the sixth – fourth millennia cal BC.

Pannel Bridge, near Pett Level, with peat deposits which have been sampled carefully for both palynological analysis and radiocarbon dating (Waller 1994), provides the most complete Holocene sequence so far obtained from south-east England. The adjoining valleys on the edge of Romney Marsh have also yielded good palynological sequences (Long *et al* 1998a; 1998b). Alder occurred on the valley floor soon after 10,000 BP (see Note below). In dry areas, pine and birch became established, with the expansion of hazel at 9500 BP, followed by oak and elm between *c* 9100 and *c* 8400 BP, and lime after *c* 7000 BP (Waller 1994, 365–6). There is no palynological evidence that Mesolithic communities had a major influence on vegetational development in the valley. However, human activity might have been responsible for the persistence of openings in the dry land canopy after the arrival of deciduous trees that are associated with the occurrence, albeit at low frequencies and irregularly, of pollen from what were probably dryland herbs. This is consistent with the archaeological presence of

Mesolithic flint scatters in the Pannel Valley (Holgate and Woodcock 1989; Waller 1994, 366), although other processes could have been influential in creating these openings, for example fires started by natural means and the grazing of indigenous herbivores (Waller 1994, 366).

The replacement of pine and birch woodland by mixed deciduous woodland in the eighth–seventh millennia cal BC with lime becoming the dominant tree species is evident from all sites in the Brede, Pannel, Ouse, and Rother Valleys investigated in recent years. This similarity in woodland cover and succession during the Mesolithic period suggests that the soils of south-east England at this time were very different to those present today, with a cover of loess probably providing uniformity (cf Waller and Hamilton 1998, 120). By 5300 BP, peat was forming and alder-dominated fen carr developing in the valleys adjoining the Walland Marsh, initially in the protected valleys of the Brede and the Pannel and on Pett Level, and then gradually spreading along the northern edge of Romney Marsh (Long *et al* 1998b, 60–1). Radiocarbon dating of the submerged forest on the foreshore of Pett Level produced two dates on wood and peat of 5205 ± 105 BP (IGS/C14/55; 4350–3750 cal BC) and 5300 ± 100 BP (IGS/C14/56; 4350–3900 cal BC) respectively, suggesting that this area was also inundated by the sea in the fifth millennium cal BC (sixth millennium BP) (Welin *et al* 1972). This marine incursion may have resulted from the changing pattern of shingle barriers along the coast in response to eustatic rises.

Investigation of the deposits in the Combe Haven Valley, west of Hastings, indicated that sediments consisting mainly of interbedded peat and clay began to form *c* 4900 cal BC. Palynological analysis indicates that alder was dominant on the valley bottom, with a close canopy of predominantly lime, along with oak, elm, and hazel on the valley sides (Smyth and Jennings 1988, 7). Soon after, silty clay deposits formed and the woodland was replaced by grasses and sedges, suggesting the establishment of a salt marsh community and estuarine conditions following flooding of the valley by the sea (Smyth and Jennings 1988, 10). There is little evidence of human intervention on the vegetation at this stage although later, after the mixed deciduous woodland began to become reestablished, there is evidence for several temporary clearances, including the 'elm decline', at an estimated date of *c* 3800 cal BC.

The elm decline, dated to 5040 ± 80 BP (SRR 2888; 3980–3660 cal BC) at Pannel Bridge, is recorded at most sites in the Brede, Pannel, Ouse, and Rother Valleys but widespread clearance is not apparent at this time. It is not until the lime decline, which occurs at 3700 ± 90 BP (SRR 2887; 2450–1750 cal BC) at Pannel Bridge, that extensive forest clearance took place which, along with the appearance of cereal-type pollen in association with other herbs and ruderal pollen types, is indicative of local farming activity in the area (Long and Innes 1995, 47–9).

In the Ouse Valley over 6m of colluvial deposits were encountered, 2m of which represented sediments that accumulated after the removal of vegetation cover in the upper stretches of the Ouse Valley in the Mesolithic period (Scaife and Burrin 1983). Palynological analysis of palaeosols preserved beneath early Bronze Age barrows on the Lower Greensand at West Heath and Iping Common suggest that, in the ninth–eighth millennia BP, the woodland cover dominated by pine and hazel was giving way in places to heathland dominated by heather with post-clearance hazel scrub and lime (Scaife 1985, 21). This was in response to burning and the general opening up of the forest canopy. Some areas of the Lower Greensand, though, retained a forest cover until the later Neolithic period (Dimbleby and Bradley 1975).

Palynological analysis of bog sediments in the Arun Valley at Amberley Wild Brooks (Waton 1982) and of the Ouse and Glynde Valley sediments in the vicinity of the Vale of the Brooks (Waller and Hamilton 1998) indicates that much of the South Downs was under woodland cover throughout the Mesolithic period. Molluscan analysis of deposits in both dry valleys and features associated with earlier Neolithic sites suggest that the Downs were still wooded when the first monuments were being constructed (Thomas 1982; Bell 1983). There were localised, small-scale clearings but the nature and extent of these clearings is unclear. For example, at Itford Bottom post-Mesolithic colluvial deposits sealed eight subsoil features, at least one of which was a tree hole created by a tree fall. The tree fall was followed almost immediately by burning. Pine charcoal recovered from the base of the feature produced a radiocarbon date of 8770 ± 85 BP (BM-1544; 8250–7600 cal BC). The associated molluscan assemblage suggests that the effects of this fire were very localised and short-lived, and the result of either a lightning strike or human activity (Bell 1993, 132–42).

This review of palaeoenvironmental studies suggests that eustatic rises in the fifth millennium cal BC led to the submergence of the lower stretches and estuaries of the valleys draining into the English Channel. In some places, this flooding may have been sudden and dramatic. Environmental change of this nature could have contributed to the development of animal husbandry and horticulture as an alternative to procuring seasonally available, wild resources, the supply of which may have diminished or fluctuated, albeit temporarily, to such an extent that dependable sources of food that had previously been exploited were no longer capable of being sustained throughout the year to feed

the native population. However, despite some evidence for small-scale, temporary clearances in some parts of Sussex, both within valleys and on higher ground, it is clear that the Mesolithic-Neolithic transition is not marked by widespread forest clearance or cultivation of newly cleared areas. Those clearings which appear in the palynological record in the sixth-fourth millennia cal BC may have been created to provide browse for mammals and to increase plant diversity (cf Zvelebil 1994), although natural causes as exemplified by lightning strikes and beaver activity (cf Coles 1992) cannot be ruled out.

Flintwork analysis

Fieldwork in the last three decades has resulted in the discovery of a range of relatively undisturbed sites with closed contexts dating to the sixth-fourth millennia cal BC. The flintwork recovered from these sites provides information on raw material procurement, flintworking techniques and the style and function of implements produced in the later Mesolithic and earlier Neolithic periods.

Concerning the raw material used for flintworking, nodules from a variety of sources were used. The flint from the rock shelter sites in the High Weald occupied in the sixth-fifth millennia cal BC at High Rocks (Money 1960), Rocks Wood (Harding and Ostoja-Zagorski 1987), and Hermitage Rocks (Jacobi and Tebbutt 1981) came from both relatively local river gravels and the Clay-with-flints and Chalk deposits of either the North or the South Downs. Flint from similar deposits was also used at the later Mesolithic site of Charlwood, Surrey (Ellaby this volume). At Streat (Butler 1998), on the Lower Greensand, pits were dug to locate and exploit a local deposit of flint. Whilst much of the flint from Selmeston (Clark 1934) and Pannel Bridge (Holgate and Woodcock 1989) was from local river gravels, flint derived from beach deposits was also used. Sites on the South Downs, for example Red Hill (Butler and Holgate 2001) and West Hill (Butler 1995), exploited nodules from the Clay-with-flints and Chalk deposits outcropping at these sites. All the recently excavated earlier Neolithic sites, which include domestic sites (eg Bishopstone and Red Hill), flint mines (eg Long Down and Harrow Hill), and causewayed enclosures (eg Offham and Whitehawk), are situated on the South Downs and used nodules from the underlying Clay-with-flints and Chalk deposits or from beach deposits as a source of raw material for flintworking. Mesolithic tranchet axes and Neolithic axes, including both preforms and ground and polished axes, were mostly manufactured using flint occurring on the South Downs. Thus whilst there is considerable movement of flint from its source to other sites in the Mesolithic period, the sources of flint exploited in the earlier Neolithic period were both known about and exploited during the Mesolithic period.

The techniques used to flake flint in the later Mesolithic period were remarkably similar to those used in the ensuing earlier Neolithic period, not only in Sussex but also in the rest of southern and eastern England (Holgate 1988). Good quality flint nodules were selected and, whilst stone hammers were used to shape nodules for use as cores and probably to 'test' the quality of nodules, soft hammers were used predominantly for flaking cores to produce 'removals', a selection of which could then become blanks for manufacturing implements. Considerable care was taken to remove either blades (as was the case in both the later Mesolithic and earlier Neolithic periods) or bladelets (as occurred in the later Mesolithic period) that travelled the full length of the flaked surface of cores. In between detaching blades or bladelets, the edges of platforms were abraded to remove any overhangs. Much of the debitage produced in both the later Mesolithic and the earlier Neolithic periods is virtually indistinguishable: predominantly soft hammer-struck blades and flakes. The main characteristic feature, which differs between the two industries, is the way a new platform is prepared after the angle between the flaked surface and the platform has reached a right angle. In the case of later Mesolithic cores, a core tablet is detached and flaking then resumes in the same direction along the same flaked surface as before. However, in the earlier Neolithic period, the core is simply rotated until a new platform is located, and flaking continues in a new direction. Exhausted later Mesolithic cores are often single or two opposing-platform bladelet cores, whilst their earlier Neolithic counterparts are cube-shaped two or three-platform blade or flake cores. This difference is related to the cessation in microlithic production and the manufacture of leaf-shaped projectile points in the earlier Neolithic period.

Core tools, notably axes, were also produced in both the later Mesolithic and earlier Neolithic periods using similar initial flaking techniques. Good quality flint nodules were selected and trimmed roughly into the broad shape of an axe using stone hammers. Soft hammers were then used to refine the shape of the 'roughout' into a 'preform', resulting in the production of axe-sharpening flakes. Later Mesolithic axes were usually sharpened by a single tranchet blow to the intended cutting edge, resulting in the creation of tranchet axe-sharpening flakes. Earlier Neolithic axes, though, were usually ground and polished to produce not only a keen cutting edge but also an aesthetically pleasing end product.

The basic range of flint implements produced in the later Mesolithic and earlier Neolithic periods

is broadly comparable: end scrapers, piercing tools, fabricators, and a variety of cutting tools and knives, a large proportion of which were produced on soft hammer-struck blades. The main differences are the replacement of microliths by leaf-shaped arrowheads, the disappearance of burins that occur in Mesolithic assemblages, and the appearance of ovates and, very occasionally, single-piece sickles in earlier Neolithic assemblages. The main reasons for this are not clear and could be associated with changes in either style or function; these changes, in turn, could be linked with other developments, for example in craft practice and in hunting or warfare.

A significant change in flint technology did not occur until the later Neolithic period. From this time onwards, flint nodules of varying degrees of quality were used as raw material, and stone hammers were in widespread use for detaching flakes from cores. Little or no care was taken to prepare striking platforms on cores. A limited range of cutting, scraping, and piercing tools was produced, along with 'combination tools', which were probably used to perform more than one function. In addition, transverse arrowheads replaced leaf-shaped forms. This simple method of flaking flint, though, does not result from a decline in flintworking skills, as demonstrated by the presence of transverse arrowheads and pressure-flaked knives which were manufactured with a high degree of care and precision. Thus factors other than raw material availability and personal ability influenced the choice of techniques used to work flint in the later Neolithic period.

To sum up this section, there are similarities in both the source and quality of raw material used for flaking flint and the main techniques used to produce both flake and core tools during the later Mesolithic and earlier Neolithic periods. Blades continued to be produced, as did a comparable range of retouched implements. The main difference in flint assemblages between the two periods is the appearance in the earlier Neolithic period of three new types of implements, namely leaf-shaped arrowheads, ovates, and ground axes, which do not have antecedents in the later Mesolithic period. The continuation in use of cutting, scraping and piercing tools, fabricators, projectile points and axes, albeit with different forms of projectile points and axes, suggests that food procurement and other subsistence activities prevalent in the later Mesolithic period were also practised in the earlier Neolithic period. In looking for the time when farming and animal husbandry began replacing hunting and gathering as the dominant means of food procurement, the technological changes in working flint that became widespread in the later Neolithic period are more likely to relate to an increasingly sedentary and agrarian-based lifestyle than the comparatively modest developments in flint technology that took place in the earlier Neolithic period.

The Mesolithic-Neolithic transition in south-east England

The production and circulation of ground axes and the introduction of leaf-shaped arrowheads are two key indicators used to define earlier Neolithic material remains. The earliest known date for Neolithic axes in Britain comes from the Sweet Track in the Somerset Levels. Excavation of this wooden 'catwalk' structure, which has been dated by dendrochronology to 3807/3806 BC (Hillam *et al* 1990, 218), recovered a ground and polished jadeite axe and a flint preform axe. Apart from the two axeheads, other items had been deposited deliberately immediately alongside this structure either at the same time that it was built or slightly later, including leaf-shaped arrowheads and shattered pottery vessels; in one instance, fragments of one vessel occurred, some distance apart, on both sides of the trackway (Coles *et al* 1973). These items undoubtedly represent votive deposits. The jadeite axe probably originated from a source in the Alpine foothills, whilst the preform axe is made using flint that was possibly mined or quarried from the Chalk in central southern England (Coles *et al* 1973, 289). Radiocarbon dating of antler picks from the fill of flint mines in Hampshire and Sussex demonstrates that mining and flint axe production were taking place on the South Downs during the first half of the fifth millennium cal BC (Barber *et al.* 1999, 68). The axe roughouts and preforms originating from these mining sites occur throughout southern and eastern England. From the outset of the Neolithic period, axes, notably jadeite axes, found their way to Britain from the continent, providing evidence of cross-channel contact and the movement of goods. At a time when marine transgressions and the associated rise in water table in the lower reaches of valleys draining into the coastal waters around southern Britain were reaching their zenith, axes and the other artefacts equated with the start of the Neolithic period – round-based, carinated pottery vessels (Herne 1988) and leaf-shaped arrowheads – were being deposited deliberately in the ground, often in or alongside watery contexts. The Sweet Track is the classic example of this practice, but others can be found elsewhere in southern England (cf Holgate 1988), the most notable in Sussex being the hoard of flint preform axes from Seaford (Andrew Woodcock pers comm).

Axes, in common with carinated pottery bowls (cf Herne 1988), served both utilitarian and symbolic functions. In certain situations, as displayed at the Sweet Track, axes were symbols of wealth, used in transactions where gifts were

offered to the gods at an early stage in the Neolithic period. One of the main outputs from the Sussex flint mines was the supply of axes for use in the exchange networks operating during the earlier Neolithic period. Axes in the Mesolithic period were manufactured using good quality flint from the South Downs. The Neolithic flintmining sites, which appear on the basis of radiocarbon dating of mining tools to be the earliest of the monuments in Sussex, were established on the blocks of downland overlooking the coastal plain near Worthing and Chichester. In addition, the remains of the carinated pottery vessel from the fill of a flint mine at Cissbury links the Sussex mining sites with the start of the Neolithic period. Mining to extract flint for axe production was, like Mesolithic flint exploitation, a seasonal activity undertaken by a small group of individuals returning to a specific locality on a regular basis (Holgate 1995). When considered from this perspective, the indigenous development from exploiting superficial deposits to excavating mines for flint of a suitable quality to make axes similar in style to those fashionable on the continent is conceivable.

The results of recent palaeoenvironmental studies and an analysis of later Mesolithic and earlier Neolithic flint assemblages suggest that there was minimal change in subsistence practice at the start of the earlier Neolithic period. If animal husbandry and cereal cultivation were present at this time, they were undoubtedly assimilated within the existing hunter-gatherer way of life. Although sea level was rising, marine transgressions were not of an order of magnitude in themselves to precipitate an economic catastrophe or herald a dramatic change in lifestyle. There was contact between individuals on either side of the English Channel, as manifested by the appearance of exotic axes in Britain. Through these contacts, there was a flow of ideas and material goods, which were subsequently adopted in Britain; this included, not necessarily simultaneously and to varying degrees of intensity, the production of axes and pottery vessels for votive purposes and the cultivation of cereals and maintenance of domesticated animals. Hunter-gathering, and its concomitant lifestyle, persisted initially but the changing use of material goods and localised control of resources, for example mined flint for producing axes, resulted in evolving patterns of land use and monument construction. Certain individuals would have articulated a vision for deploying the material goods characterising the earlier Neolithic period and motivated later Mesolithic communities to adopt these traits, thereby managing the changes that took place during the transition from the later Mesolithic to the earlier Neolithic period. Social competition is thus a more appropriate model than either economic or demographic determinism (cf Whittle 1999, 63) to explain the changes in material culture and lifestyle that occurred in south-east England in the late fourth millennium BC.

4 Neolithic land use in south-east England: a brief review of the soil evidence *by Richard I Macphail and Johan Linderholm*

Introduction and database

This brief review examines the archaeological soil database for the Neolithic of south-east England, with many of the detailed examples being recent work of the authors. Many of the arguments are speculative, but if the study of Neolithic soils is to advance, models based upon our limited database must be put forward for testing. We allude to forest clearance, agriculture, and the opening up of the landscape, but these subjects have been equally dealt with through other environmental disciplines (eg Evans 1975; Robinson 1991; Scaife and Burrin 1992; Whittle *et al* 1999).

In an earlier review Macphail (1987) listed 21 Neolithic sites that contain soil information, but none of these is located in the South East *sensu stricto* (eg Evans 1975). Although the number of Neolithic sites studied using soil science or archaeo-pedological techniques, has continued to increase in the Wessex region, this has not been the case for the South East (Limbrey 1992; Whittle *et al* 1993; Whittle 1994; 1999). It is therefore important that this present review, whilst concentrating upon sites within south-east England also includes studies from the southern east Midlands (eg Raunds) and the Essex and Thames coastline, so that our understanding of Neolithic soils does not become skewed (Macphail 1994; Macphail 1999b). We can also note that very few modern systematic studies of Neolithic soils have been carried out across the country as a whole, let alone for the South East of England (French 1998; 2001). It also must be a concern that we are still reliant on, and indebted to, the large numbers of observations carried out by non-specialists such as Professors G J Dimbleby and J G Evans in the 1960s and '70s, and soil micromorphological studies undertaken by Dr I Cornwall carried out in the 1950s and '60s (Macphail 1987). In order to maximise and, if possible, update this last resource, Macphail, with Dr Cornwall's blessing reviewed his thin section collection housed at the Institute of Archaeology, University College of London, during the 1980s (eg Macphail 1987). This review in the 1980s was conducted at the same time that the first 'modern' study of an English Neolithic buried soil was undertaken at Hazleton long cairn, Gloucestershire. Bulk sample and soil micromorphological findings from Hazelton were compared with Dr Cornwall's results and the review of his thin section collection (eg Ascot-under-Wychwood, Oxfordshire: Macphail 1990a). It should also be noted that in Scotland J Romans and L Robertson had been examining their Neolithic soils with soil micromorphology and systematic numerical analysis since the mid-1970s. Their results included, for example, the likely slash and burn clearance site of Daladies, Angus, and the suggested cultivation soils at Strathallan, Perthshire (Romans and Robertson 1975; 1983a; 1983b). More recently Simpson (Dockrill and Simpson 1994; Simpson 1998) has argued the case for Neolithic/EBA cultivation of soils that have been improved by additions of ash and organic matter ('middening') at Tofts Ness, Sanday, Orkney.

As a result of the above circumstances, this review will cite information on Neolithic soils outside the region, non-Neolithic analogues, and experiments, as a means of contributing meaningfully to environmental and cultural debates on the soils of the Neolithic period in south-east England. It is also crucial to Neolithic archaeology to encompass soils of different soil landscapes, environments, and land use (see Table 4.1). Thus, for example, difficult comparisons are made of Neolithic soils and landuse on the diverse parent materials and topography of the chalk downlands and river terrace soils of the alluvial valleys (see also Fenland sites: French, 1998; 2001). The reader should also be made aware of the methodologies currently employed to improve our understanding of Neolithic soils.

Thus this paper aims to increase awareness of the soil science contribution to current improvements in our understanding of the Neolithic of south-east England. In order to do this, the paper briefly reviews some soil science methods, experimental studies, some of the European regional background, and such on-site study themes as: Neolithic forest soils, herding soils, cultivated soils, and occupation (midden) soils, and the broad landscape effects of Neolithic clearance and cultivation.

Soil science methods

A number of Neolithic sites have been studied recently across Europe, employing grain size, organic matter, phosphate, and magnetic susceptibility analyses (cf Dockrill *et al* 1994; Crowther *et al* 1996; Mikkelsen and Langohr 1996). In addition to total phosphate measurements by strong acids (eg nitric acid), attempts have been

Table 4.1 Neolithic soil sites of south-east England and other sites mentioned in the text

Site	County/reference	Parent Material; Soil Type	Theme(s)	Data
Soils of south-east England				
A41	Hertfordshire (McDonald, 1995)	Drift over chalk; Argillic Brown Earth	Field systems and colluvium	Soil assessment
Belle Tout	Sussex (Macphail *et al*, 1998)	Chalk; Rendzina	Enclosure, grazing?	Soil assessment
Bury Farm	Bedfordshire (Unpub)	Loamy alluvium; Argillic Brown Earth	Barrow, grazing?	Soil assessment
Drayton Cursus	Oxfordshire (Barclay *et al*, In press)	Loamy alluvium; Argillic Brown Earth	Cursus/Forest soil (tree-throw holes)	SM
Eton Rowing Lake	Oxfordshire (Macphail, 1999a)	Loamy alluvium; Argillic Brown Earth	Forest subsoil/Midden topsoil (animal stocking?)	SM; P; MS (Full environmental analysis)
Pegwell Bay	Kent (Weir *et al*, 1971)	Loess over Chalk; Argillic Brown Earth	Soil erosion and colluvium	SM (C14 and mineralogy)
Raunds	Northamptonshire (Macphail and Goldberg, 1990; Macphail, 1999b)	Loamy alluvium; Argillic Brown Earth	Forest soil (tree-throw holes)/Animal stocking	SM; P; MS (Full environmental analysis)
Experimental and Analogue Sites				
Hengistbury Head	Dorset (Macphail, 1992)	Eocene sands; Gley podzol with argillic history	Undisturbed Forest soil (LBA/EIA analogue)	SM; P; MS (Full environmental analysis)
Overton Down	Wiltshire (Crowther *et al*, 1996)	Chalk; Rendzina	Experimental Earthwork	SM; P; MS (Full environmental analysis)
Umeå	N. Sweden	Drift; Podzol	Experimental 'Slash and Burn' of pine woodland	SM; P (Full environmental analysis)
Other sites of southern England				
Easton Down	Wiltshire (Crowther *et al*, 1996; Whittle *et al*, 1993)	Chalk; Rendzina	Barrow/Occupation	SM; P; MS (Full environmental analysis)
Hazleton	Gloucestershire (Macphail, 1990)	Oolitic limestone and marl; Argillic Brown Earth	Forest subsoil. Midden topsoil (animals?)	SM; P; MS (Full environmental analysis)
Maiden Castle	Dorset (Macphail, 1991)	Superficial drift over Chalk; Argillic Brown Earth	Forest soil (clearance)	SM; C (Full environmental analysis)
Purfleet	London, Essex (Macphail. 1994)	Thames estuarine alluvium; Immature Alluvial Brown Soil	Forest topsoil	SM (Full environmental analysis)
Windmill Hill	Wiltshire (Whittle *et al*, 1999)	Chalk; Rendzina	Causewayed Camp/Occupation	SM (Full environmental analysis)

C: chemistry; P: phosphate chemistry; MS: magnetic susceptibility; SM: soil micromorphology.

made to infer the ratios ('P ratios') of inorganic phosphate (eg bone, weathered ash) and organic phosphate (eg organic matter and dung) by employing weaker citric acid as a phosphate extractant on non-calcareous soils (Engelmark and Linderholm 1996; Macphail *et al* 2000). As discussed below, phosphate chemistry is different for natural forest soils compared to occupation soils. Natural forest soils have very high P ratios, but total amounts of phosphate are low, whereas occupation soils display lower P ratios, but total amounts of P are high (Figs 4.1 and 4.2).

Soil micromorphological analyses of Neolithic soils have been enhanced by numerical analysis, and the graphical illustration of soil microfabrics, inclusions (eg bone), and pedofeatures, techniques that have been traditionally employed in soil science and in archaeo-pedology (Jongerius and Jager 1964; Romans and Robertson 1983b; Simpson 1998). The accuracy of such data can be equivalent to that achieved by image analysis and can be safely employed for such statistical testing as multivariate analysis of soils (Acott *et al* 1997; Ponge 1999). The recently studied Neolithic sites of Eton Rowing Lake, Oxfordshire, and Raunds, Northamptonshire, have been studied by a combination of counted soil micromorphology and chemical approaches (Macphail 1999a; 1999b). In addition, the important soil study of Neolithic Hazleton, Gloucestershire, was updated by additional chemical data (see Table 4.2).

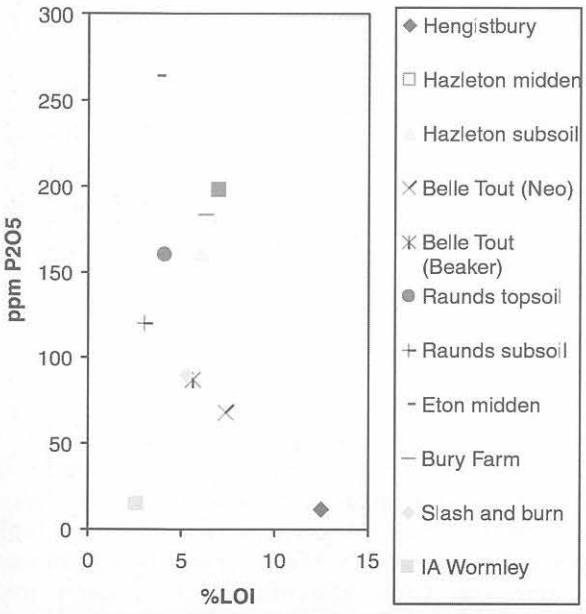

Figure 4.1 Neolithic soils; LOI and phosphate. This illustrates the low amounts of phosphate found in 'natural soils' (Hengistbury Head and Wormley Wood) and low intensity pastures (Belle Tout), compared to herding areas (Bury Farm and Raunds), whilst midden sites display the highest amounts (Eton and Hazleton); subsoils contain less phosphate than topsoils. The highest organic content is preserved at Hengistbury Head because of site wetness

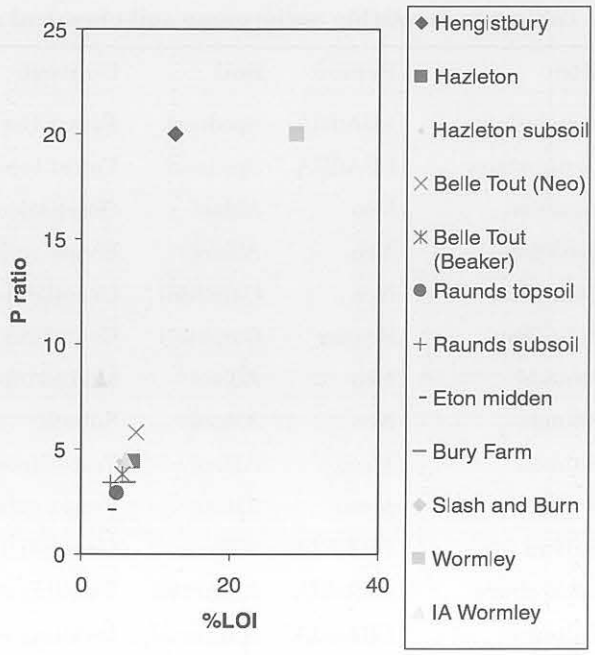

Figure 4.2 Neolithic soils; LOI and P ratio. All these sites show enhanced (>1.0) P ratios (i.e. high amounts of organic phosphate), with the highest P ratios occurring in the organic 'natural' humus-rich topsoils of Hengistbury Head and Wormley Wood. Eton shows the lowest P ratio for these 'herding' sites, probably because here the midden soils also contain inorganic phosphate in the form of bone. Statistical analysis at Raunds (Spearman's Rank Correlation Coefficient) showed a strongly significant correlation (99.9% confidence level) between P and LOI, clay and organic carbon, and clay and phosphate (see Figure 4), and correlation (95% level) between organic carbon and P ratios

Experimental studies

Although there has been little specific experimental work concerning Neolithic soils (and much yet needs to be done) our understanding of natural soils, Neolithic landuse effects, and transformations of old land surfaces after burial by monuments, for example, has benefited from empirical and experimental investigations. We have acquired soil data on the following:

a) natural forest soils (eg Duchaufour 1982: Fedoroff *et al* 1990);
b) the effects of experimental Neolithic ard ploughing on light loessic loamy forest soils in Germany, and experimental slash and burn of the Swedish boreal forest

Table 4.2 Neolithic soils: mean soil chemical and magnetic signatures in comparison to other sites

Site	Period	Soil	Context	%LOI	MS	Pcitric	Pcitric OI	Pratio	*N*
Hengistbury	LBA/EIA	Spodosol	Forest Humus	21.2	0	20	330	>20	1
Hengistbury	LBA/EIA	Spodosol	Forest topsoil	3.1	1	3	100	>20	1
Hazleton	Neo	Alfisol	Occupation soil	7	63	200	860	4.4	4
Hazleton	Neo	Alfisol	Forest subsoil	6	85	160	730	4.5	1
Belle Tout	Neo	Cambisol	Grassland topsoil	7.4	20	70	390	5.8	7
Belle Tout	Beaker	Cambisol	Grassland topsoil	5.6	21	90	330	3.8	2
Raunds	Neo	Alfisol	Mound/topsoil	4.1	91	160	360	2.6	5
Raunds	Neo	Alfisol	Subsoil	3	42	150	300	2.6	7
Raunds	Meso	Alfisol	Tree-Throw hole	5.7	39	120	290	2.4	4
Raunds	Meso	Alfisol	Forest subsoil	2.1	5	50	160	3.2	1
Salford	LBA/EIA	Alfisol	Occupation soil	3.5	72	210	300	1.4	4
Chisenbury	LBA/EIA	Anthrosol	Dwelling Area	8.8	35	3750	3080	0.9	4
Potterne	LBA/EIA	Anthrosol	Dwelling Area	4.7	35	3560	2920	0.8	6
Slash and Burn	Modern	Spodosol	Experiment	5.3	-	90	420	4.4	*n*
Eton	Neo	Cambisol	Occupation soil	3.7	32	260	610	2.1	8
Eton	Neo	Cambisol	Subsoil	2.6	12	60	390	7.2	3
Bury Farm	Neo	Cambisol	Topsoil	6.3	146	180	610	3.4	1

NB: MS 10^{-8} SI Kg^{-1}
Pcitric and Pcitric OI ppm
Slash and Burn, Umeå University
Chisenbury and Potterne are calcareous sites where citric acid has not extracted total phosphate (eq. phosphatised soil at Potterne analysed by microprobe to contain 1.3% P or 29,800 ppm P_2O_5)

(Umeå University) (Gebhardt 1992: Macphail 1998: Macphail *et al* 2000); and

c) transformations of soils by burial on base rich chalk rendzinas (Overton Down Experimental Earthwork, Wiltshire) and acid sandy podzols (Wareham Experimental Earthwork, Dorset) (Crowther *et al* 1996; Macphail *et al* 2003).

This database was essential for identifying soils that had been disturbed by clearance, because natural horizonation (and associated subsoil argillic Bt horizon development) had become mixed, and anomalous soil microfabrics had formed (see below; Macphail *et al* 1990, table 1; Macphail 1992b, table 18.2). Equally, the Neolithic long barrow at Easton Down, Wiltshire, is the archaeological analogue of the Experimental Earthwork at Overton Down, and the buried rendzina had likely suffered the same effects of organic matter loss, transformation of structure and overall compaction (Whittle *et al* 1993).

European background

Studies in Europe have contributed to our understanding of Neolithic soil and human interactions. These include the modelling of Neolithic archaeology and tree throw, especially on the loess of Belgium, where a relationship between patterns of Neolithic villages and soil types was found (Langohr 1993; Ampe and Langohr 1996). This region has yielded some links between animal activity, soil phosphate, and cultivation (Mikkelsen and Langohr 1996). Similarly in Scotland some cultivation is possibly associated with early manuring ('middening') practices (Dockrill and Simpson 1994; Simpson 1998). In southern France, northern Italy, and Switzerland, both caves and lakes have been found to contain evidence (herbivore dung) of Neolithic stabling and pastoralism, with both sheep/goat and cattle being foddered on leaf hay from both broad-leaved and coniferous trees (Robinson and Rasmussen 1989; Boschian 1997; Akeret and Rentzel 2001; Macphail and Wattez, forthcoming). Moreover, well-protected cave environments can allow the rare preservation of Neolithic living floors and insights into use of space and materials employed for floor coverings, when more commonly only postholes indicate the earlier presence of domestic Neolithic structures in south-east England; an example of the last is currently under study from White Horse Stone, Kent (Macphail *et al* 1997; Macphail and Crowther 2000). Studies of buried Neolithic soils on the granite of Brittany demonstrated how quickly brown soils on such

substrates could acidify and begin to podzolise through clearance and the maintenance of cleared land by fire, a finding clearly mirrored at Carn Brea, Cornwall (Macphail 1990b; Gebhardt 1993).

The forest soils of the Neolithic and Mesolithic-Neolithic transition

Examples of 'natural' forest soils can be cited from a number of examples from a variety of sites and environments. For example, Murphy (unpublished) found an ephemeral, immature forest, soil on early Holocene Thames alluvium at Purfleet, London (Table 4.1) associated with drowned forest, land snail faunas (Macphail 1994). Unfortunately, no data on the Neolithic soils at The Stumble, Blackwater Estuary, Essex, could be recovered because of the total transformation of the soil profile following inundation of the site by saline water.

At Maiden Castle, Dorset pre-bank barrow clearance of a mature woodland cover as indicated by land snails, disturbed the subsoil junction of the chalk and superficial deposits, creating an anomalous mixture of A, Eb, and Bt horizon material (Macphail 1991, fig 104a - e). It seems likely that soils became revegetated prior to burial, and this was possibly associated with cultivation. A number of tree-throw/forest clearance sites have been investigated. These include natural 'Atlantic' tree throw at Hazleton, and the Neolithic occupation-associated sites of Drayton Cursus, Oxfordshire, and Raunds, Northamptonshire (Macphail and Goldberg 1990; Lambrick 1992; Barclay *et al* forthcoming). At Raunds, soil micromorphological, magnetic susceptibility, organic matter, and phosphate evidence of forest topsoil and subsoil formation, before and after tree throw, and the *in situ* burning of the tree was elucidated (Macphail 1999b). Again, tree-throw disturbed natural soil horizonation, and the resulting turbated soils are typically rich in textural pedofeatures that have resulted from soil slaking. It was this specific soil material that became preserved by the *in situ* burning of fallen trees. Outside the tree-throw pits the analysis of control samples (Fig 4.3) found undisturbed soil horizonation and far fewer textural pedofeatures and these were mainly of fine clay type, concomitant with a relatively undisturbed forest soil.

Examples of undisturbed forest soils are extremely rare in the archaeological record, but their investigation is vital to any reconstruction of the past Neolithic forest soil cover. Hengistbury Head, Dorset, has a well-documented Upper Palaeolithic, Mesolithic, and Iron Age history, and the remarkably well-preserved pre-clearance soil here provides a useful undisturbed forest soil analogue (Barton 1992). The bank-buried soil has retained its 20mm thick humus (H) horizon. This yielded a radiocarbon date of 3350 ± 90 BP (HAR-6186; 1880 - 1430 cal BC), and although humus horizons accumulate 'old' carbon during their development, this 'date' is consistent with pollen and soil analyses demonstrating it to be an undisturbed Bronze Age oak forest gley podzol, having developed from an argillic brown sand (Macphail 1992a; Scaife 1992). This soil thus provides rare and crucial chemical and soil micromorphological information on pre-clearance topsoils (see below).

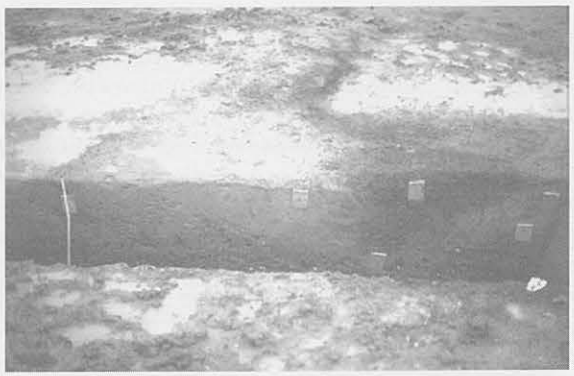

Figure 4.3 'Tree-throw hole 3', Raunds, Northamptonshire. This alluvially sealed tree-throw hole is morphologically similar to juxtaposed 2.5-3m wide 'tree-throw hole 2' (4350-3990 cal BC. OxA-3057; 5370 ± 80 BP) and 'tree-throw-hole 4' (3700-3100 cal BC. OxA-3059; 4700 ± 80 BP), and like these was studied through a series of thin section (×6) and bulk chemical (×6) samples (see Table 2). Soil micromorphological description and semi-numerical analysis of these argillic brown earth soils formed in river terrace sandy loams, indicates little deep weathering, bioturbation and clay illuviation in these 'Mesolithic' soils, prior to tree-throw (two control Kubiena box samples on far right outside the tree-throw hole). The tree-throw pit became slowly infilled with humus and was a centre of biological activity (centre right samples). The centre of the tree-throw hole has an 'argillic' microfabric that records, to a large extent soil disruption induced by tree-throw (Macphail and Goldberg 1990; Macphail 1999b; see Langohr 1993)

These Neolithic examples, and the well-studied Hengistbury Head forest soil analogue, help us characterise early Holocene forest soil development and the nature of forest soils during the Mesolithic-Neolithic period, and the soil types utilised during Neolithic landscape changes.

Chemistry of forest soils

Forest topsoils and subsoils typically have very low magnetic susceptibility values (Raunds:

χ 8-44 $\times$ 10^{-8} SI kg^{-1}), except when burned (Raunds: χ 894 10^{-8} SI kg^{-1}). In addition, although it must be remembered that non-waterlogged archaeological soils suffer from organic matter decomposition, forest topsoils and subsoils may retain moderately high amounts of relic organic matter (eg Raunds: 2.1-5.7% LOI) as also indicated by iron and manganese concentrations that are likely to be replacing humus (Table 4.2). Total phosphate is, on the other hand, likely to be low (Raunds: 160-299ppm P_2O_5). However, forest topsoils and subsoils exhibit high ratios of organic to inorganic phosphate (Raunds: P ratio of 2.4-3.2). At Hengistbury Head, preserved raw humus (H horizon) attained a P ratio of >20, the C:N ratio of 23.4 indicating little decomposition of this organic matter. This is consistent with a modern example of an ancient woodland topsoil (P ratio >20) at Wormley Wood, Hertfordshire, and its bank-buried prehistoric equivalent that had been likely cleared by slash and burn (P ratio 8.3) (Macphail *et al* 1999 unpublished). These trends are illustrated (Figs 4.1 and 4.2) from Eton, Raunds, Hazleton, and Hengistbury Head, and are consistent with Swedish experimental findings (Engelmark and Linderholm 1996).

Soil micromorphology of forest soils

Soils formed under forest cover are typically forest (argillic) brown earths. In chalk substrates (Maiden Castle) and base rich to neutral alluvium (Eton Rowing Lake, Raunds), the subsoils are characterised by earthworm burrowing, rooting, weathering, and decalcification. In addition, they display translocation of fine clay down-profile into the Bt subsoil horizon, which is enriched in total clay in the form of limpid to finely dusty clay textural pedofeatures (eg ferri-argillans) that coat soil structures and line and infill soil pores.

Topsoils and soil infills of tree-throw hollows exhibit concentrated biological activity. Furthermore, organic matter is commonly mixed by mesofauna, such as earthworms, Enchytraeids, and Collembola. At Drayton Cursus and Raunds thrown trees were burned *in situ*, markedly raising magnetic susceptibility values (Macphail and Goldberg 1990; Barclay *et al* forthcoming).

Clearance

Burned tree-throw holes at Drayton Cursus and Raunds (Fig 4.3) cannot be ascribed unequivocally to intentional clearance activities. On the other hand, the suggestion by Romans and Roberston (1975) that coarse (oak) charcoal in buried surface soils at Daladies implied slash and burn clearance, is consistent with results from slash and burn experiments at Umeå, north Sweden. Here, large (pine) charcoal continued to characterise surface soil horizons of boreal podzols some years after clearance and attempts to cultivate barley using this so-called traditional land-use practice (Macphail 1998, Tables I and II: Engelmark and Linderholm pers comm).

At Raunds it seems likely that tree-throw holes remained open and slowly became infilled with humic soil resulting in iron and manganese concentrations, and moderately high LOI and P ratios. At Drayton Cursus, on the other hand, at least one example of rapid soil infilling predatings the construction of the cursus was found (Macphail 1999b: Barclay *et al* forthcoming).

Herding soils of the Neolithic

Strong circumstantial soil indications exist for inferring stock concentrations on the alluvial (forest argillic brown earth) soils of the Nene Valley at Raunds. This interpretation is consistent with macrobotanical and insect analyses of the sites (Macphail 1999b; Healy pers comm). These indications are:

a) Neolithic topsoil accumulations of phosphate in higher amounts than found in natural forest topsoils,
b) enhanced (>1.0) P ratios, but which are lower than found in natural forest topsoils,
c) anomalous concentrations of textural features (clay coatings, coarse pan-like features) in topsoils that are rich in organic matter and phosphate (dark red-coloured clay coatings) – as shown by chemistry and microprobe studies (Fig 4.4; Macphail and Cruise 2001), and
d) lack of open biological structures and mesofauna excrements typical of natural forest/grassland topsoils.

The above four phenomena are the likely result of animal trampling and inputs into the soil of organic matter-rich dung and liquid waste (Courty *et al* 1994; Macphail *et al* 1998; Macphail 2000). Similar anomalous features are present in the midden soil deposits in the river valley sites of Eton Rowing Lake (River Thames, Oxfordshire), and the barrow-buried soil at Bury Farm (River Ouse, Bedfordshire).

The Neolithic rendzinas studied from Belle Tout, Sussex, have likely formed from a grazing landuse, and can be compared to modern decalcified rendzinas present on old grassland at Overton Down (Bell *et al* 1996; Mike Allen pers comm). They display relatively high % LOI and high P ratios (Table 4.2), and have microfabrics seemingly unaffected by trample damage ('soil poaching') that had universally affected the Neolithic soils studied from Raunds (Ellis and Rawlings 2001, table 10).This is because of the

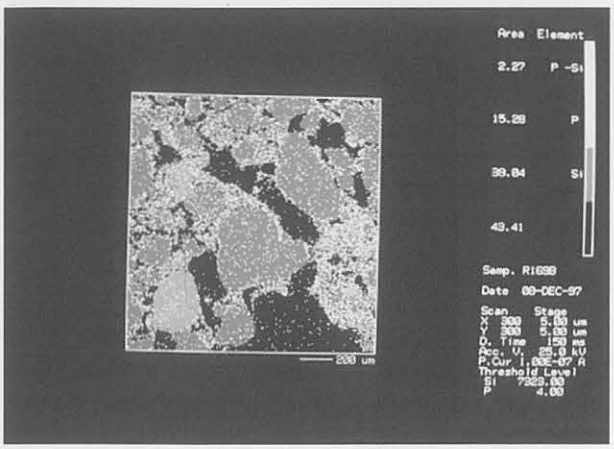

Figure 4.4 Microprobe elemental map of the distribution of Si and P in the Btg horizon of the Neolithic argillic brown earth beneath Barrow 5 at Raunds, Northamptonshire. Dark red clay containing phosphate (P) coats siliceous sand grains (Si). In the Btg horizon analysis of such coatings found them to contain 0.06% P (n = 47). The overlying Neolithic topsoils are characterised by the anomalous presence of dark red clay coatings (mean 0.11 - 0.25% P, n = 28) and pan like features (mean 0.07% P, n = 6). The inferred associated concentration of organic phosphate in these topsoils (Table 2) is also consistent with the suggested concentration of stock at this location (Macphail 1999b)

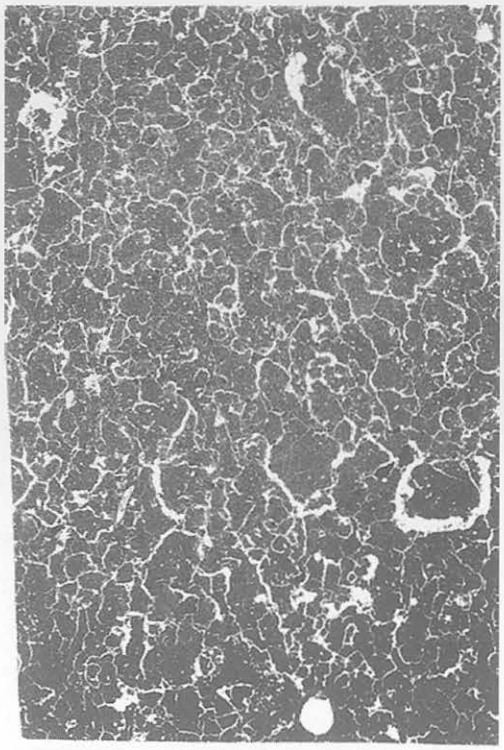

Figure 4.5 Neolithic turf from Belle Tout, Sussex; digital scan of whole thin section (soil section 50 × 65mm). Dense and curved planar cracked soil microstructure is typical of post-burial transformation (loss of excremental crumb and fine subangular structure) that affect decalcified rendzina topsoils when buried by, or within a turf stack (cf Overton Down Experimental Earthwork; Crowther et al 1996). Here chemistry (Table 4.2) and soil micromorphological results infer a grassland pasture landscape at Neolithic Belle Tout

well-structured and stable nature of rendzinas (downland turf) formed under grazing. It can also be noted that long-term burial of the turf rampart at Belle Tout has ensured the preservation of its decalcified state, with likely transformation of the original, open-structured turf into a massive structured soil with low porosity (Fig 4.5). This is exactly consistent with the soil micromorphological findings from the Overton Down Experimental Earthwork and Neolithic Easton Down (Macphail and Cruise 1996). Lastly, it is useful to state that base-rich turf soils formed on chalk are much less subject to a breakdown in structural stability because of their high biological activity and organic content (eg Belle Tout), compared with the more acidic 'forest' soils formed on river terrace sands and loams (eg Raunds) (Grieve 1980; Macphail 1992b).

Occupation soils of the Neolithic

It is quite clear that accumulations of organic remains and burned soil/bone, which enhance levels of organic matter (LOI), phosphate, and magnetic susceptibility, and which are reflected in the soil micromorphology, relate to various intensities of Neolithic 'middening' at the sites of Easton Down, Eton Rowing Lake, Hazleton, and Windmill Hill (Tables 4.1 and 4.2). On the decalcified loams of Eton Rowing Lake and Hazleton, occupation activities may have included animal concentrations and cultivation, respectively. 'Dark' soil accumulations characterise both sites, and in part probably relate to localised colluviation. It can be noted that although inorganic phosphate in the form of bone is present, overall P ratios indicate greater inputs of organic phosphate, one important component probably being dung (Table 4.2) (Engelmark and Linderholm 1996). In order not to overstate the intensity of Neolithic occupation at these midden sites, it is useful to compare the LBA/EIA 'midden' sites of Potterne and Chisenbury, Wiltshire (Table 4.2) (eg Lawson 2000). Total phosphate and amounts of inorganic phosphate are very much higher. At Easton Down occupation seems also to have coincided with cultivation, but this is less well documented at Windmill Hill (Whittle 1994; Crowther *et al* 1996; Macphail 1999c).

Lastly, calcitic spherulites, as indicators of relic herbivore dung (eg from sheep) and generally associated with well-protected sites (caves or thick calcareous accumulations, eg Chisenbury), are unusually present in Neolithic ash midden deposits on Orkney (Dockrill and Simpson 1994; Macphail *et al* 1997).

Clearance, cultivation, field systems, and erosion of slope sites

A number of ditches, tentatively dated to the Neolithic, were identified along the A41 corridor in the Chilterns (McDonald 1995). Local biseq-ual, argillic, brown earth soils (Avery 1964), formed of a silty ('loessic') loam upper soil (Ah and Eb horizons) and a more clay-rich (Clay-with-Flints) lower subsoil (Bt and C horizons), had been possibly affected by Neolithic land use. The more unstable and lighter-textured silty upper soils had become preferentially eroded on sloping sites, infilling these and later ditches and tree-subsoil hollows (Macphail 1995; cf Macphail 1992b). Similarly, at Pegwell Bay, Kent, argillic brown earths formed on loess had been cleared, and erosion had led to both soil truncation and colluviation during the Neolithic period (Weir *et al* 1971). This is consistent with the regional findings of Scaife and Burrin (1992) who identified mineralogenic alluvium associated with short-lived Neolithic clearances in south-east England. (At Raunds, it is more likely that Neolithic management of woodland on the alluvial valley floor induced soil acidification through the opening up of woodland and its replacement at times/in places by grassland.)

In the South East there are no unequivocal soil sites of Neolithic cultivation. At Easton Down, Wiltshire, there are both land snail and soil indications that cultivation was carried out, while a form of localised shifting cultivation was argued for at Hazleton, Gloucestershire, with the last phase(s) of cultivation being focused upon the midden area (Macphail 1990a; Macphail 1993: Saville 1990; cf Simpson 1998). Equally, soil micromorphological indications of Neolithic cultivation have been found on the Yorkshire Wolds (Kilham) and in Scotland (Macphail *et al* 1990; Macphail *et al* 1987: Romans and Roberston, 1975; Romans and Robertson, 1983b: Simpson 1998). It can be noted that localised soil erosion, the likely result of cultivation, is also recorded at both Hazleton and Easton Down (Macphail 1992b).

Discussion

Our database for Neolithic soils of the South East of England is sparse. On the other hand, we can construct a number of models concerning land-use trends, but only if we employ data from outside this region and period. We are also reliant on other archaeological and environmental data (this volume). Briefly, these are:

a) the likely slow opening up of the Atlantic forest canopy, commonly recorded in tree-throw holes where fallen trees have been burned *in situ*. Such sites provide our best records of Neolithic forest soils (eg Drayton Cursus and Raunds),
b) in river valleys (sands and loams) opening up of woodland may have been associated with animal husbandry (cf Runnymede: Robinson 1991; Healy pers comm), which led to the eventual development of grassland pastures, and soil and chemical features consistent with the possible herding of animals in cleared areas, where acid soils of low structural stability developed textural features (eg Bury Farm and Raunds),
c) in river valleys (sands and loams), animal herding may also have been associated with domestic occupation and middening (eg Eton Rowing Lake),
d) on chalk downland areas (light rendzina soils) stable grassland pastures (eg Belle Tout) developed with low-intensity occupations and middening, following clearance, as recorded outside the region (cf Easton Down, Hazleton, Maiden Castle, Windmill Hill),
e) such occupations possibly coincided with locally shifting cultivation (cf Easton Down, Kilham, Hazleton), that led to accelerated soil erosion, as recorded along the A41 and at Pegwell Bay, and
f) lastly, it seems logical that Neolithic farmers were aware of the constraints of subsistence agriculture, and 'midden' areas may have been utilised as fertile cultivation plots (Hazleton) (cf Romans and Robertson 1975; 1983a; 1983b; Simpson 1998).

Conclusions

Based upon a very limited database, a number of speculative models have been forwarded that require investigation. These are:

a) inferred evidence of herding practices, possibly well documented from the Early Neolithic (Bury Farm, Eton Rowing Lake, Raunds). (In Switzerland, France, and Italy, waterlogged deposits and cave sites have preserved the dung of managed animals from the Neolithic: Boschian 1997: Maphail *et al* 1997 Robinson and Rasmussen 1989; Akeret and Rentzel 2001.),

b) inferred evidence of subsistence cultivation (coeval with animal husbandry; see Richards 1998) as Neolithic peoples became more reliant on cereals; did this trigger early soil erosion across southern England (Macphail 1992b)?, and
c) occupation and middening, which have produced complex patterns of soil features (Eton Rowing Lake; cf Hazleton); is there evidence for deliberate Neolithic manuring?

In order to take such models further, there is a need for:

a) more well-studied sites, both in this region and Europe as a whole (intensive and totally integrated soil micromorphological and chemical studies are required alongside full contextual and environmental analysis),
b) the 'mapping' of Neolithic sites in relationship to their soil cover (Ampe and Langohr 1996), and
c) attempts to replicate effects of early cultivation and herding (Gebhardt, 1990; Gebhardt 1992: Macphail 1999b; Macphail *et al* 1990: Lewis 1998).

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5 The central London Thames: Neolithic river development and floodplain archaeology

by Jane Sidell and Keith Wilkinson

Introduction

This paper outlines the evolution of the River Thames and the floodplain ecology of central London in the period 4500–2000 cal BC and examines how the local human community interacted with their floodplain environment. The study area ranges from Westminster and extends downstream to the north-east London wetlands (Fig 5.1), while the data have been largely gathered from archaeological projects undertaken within the commercial sphere over the last decade. The time period approximates to what is traditionally termed the Neolithic and also includes the transition to the Bronze Age (Beaker period). The reason that a few centuries of the Bronze Age are discussed relates to relevant changes in the riverine regime at that point, which are considered to have remodelled the floodplain and appear to have led to a fundamental change in occupation patterns. Conventional chronological divisions are not strictly relevant to changes in the fluvial and ecological processes in London and indeed elsewhere and therefore the time period has been slightly expanded beyond the confines of this volume's remit. Furthermore, cultural advancement of a type considered to be 'Neolithic' does not always occur within the dates conventionally ascribed to the Neolithic either.

Radiocarbon dates used in this paper have been calibrated using the curve of Stuiver *et al* (1998) and OxCal release 3.8 (Bronk Ramsey 2002) and are expressed as calendar years BC with error margins given at two standard deviations.

The river

A brief introduction to the post-glacial Thames is needed in order to put the Neolithic Thames into a broader context.

During the Devensian late Glacial the Thames followed a braided bedform, however, it would appear that many of the channels cut in the Shepperton Gravel were abandoned towards the end of this period (see Wilkinson *et al* 2000) and the Thames gradually lost its braided form, initially to run through fewer, more permanent channels. During the late Devensian and into the early Holocene the abandoned channels filled with organic sediment, of which the site at Silvertown Urban Village, Newham (Wilkinson *et al* 2000) provides a good example, as does Bramcote Grove, Bermondsey (Thomas and Rackham 1996). Some of these abandoned channels appear to have been relatively large, and at Bramcote Grove, distinctive lacustrine sediment accumulated from before 10,000 cal BC until the early Holocene (Thomas and Rackham 1996). Other than these channel fills, little sedimentation from this period has been recorded to date.

The sand eyots or dunes which have left relict features such as Thorney Island and the Bermondsey and Horselydown islands are likely to have started forming in the early Holocene. A fourth millennium cal BC date has been obtained from a small piece of wood found within the laminated sands of Thorney Island, Westminster, (4300 ± 60 BP Beta 122929: 3080–2710 cal BC), whilst an Optically Stimulated Luminescence (OSL) measurement obtained from the surface of the sand of the Horselydown eyot at Three Oak Lane gave a date of 6040 ± 650 BP years (Proctor and Bishop 2003). Where the contact to the Shepperton Gravel has been observed below the sands, a hiatus is indicated, again adding to the difficulties of ascribing a formation date to the overlying sequences.

Towards the end of the Mesolithic, cross and horizontally bedded sands accreted in the Thames as it adopted a meandering course and deposits of this nature have been found from a number of sites where they indicate moderate flow energies in a relatively shallow fresh water river. At Erith, sands have been found associated with a late Mesolithic flint assemblage, and overlain by a fresh-water peat dating from around 4500 cal BC (Taylor 1996; Sidell *et al* 1997). The chronology of sand sequences relating to the late Mesolithic river is less precise, but thick sand deposits have been discovered below Neolithic strata at Palace Chambers South, Thorney Island (Sidell *et al* 2000; Thomas *et al* forthcoming) while at Culling Road, Rotherhithe, a 3.5m deep sequence of parallel and cross-laminated sands was found beneath deposits containing mid-Neolithic Peterborough Ware (Sidell *et al* 2000). Thinner deposits were found at Silvertown underlying peat, which began forming at approximately 3900 cal BC (Wilkinson *et al* 2000). However, sands of this nature are not present in the tributary valleys. Instead, tufas are recovered, presumably as a result of low sediment supply combined with the warming climate and the readily dissolvable chalk bedrock outcropping further upstream.

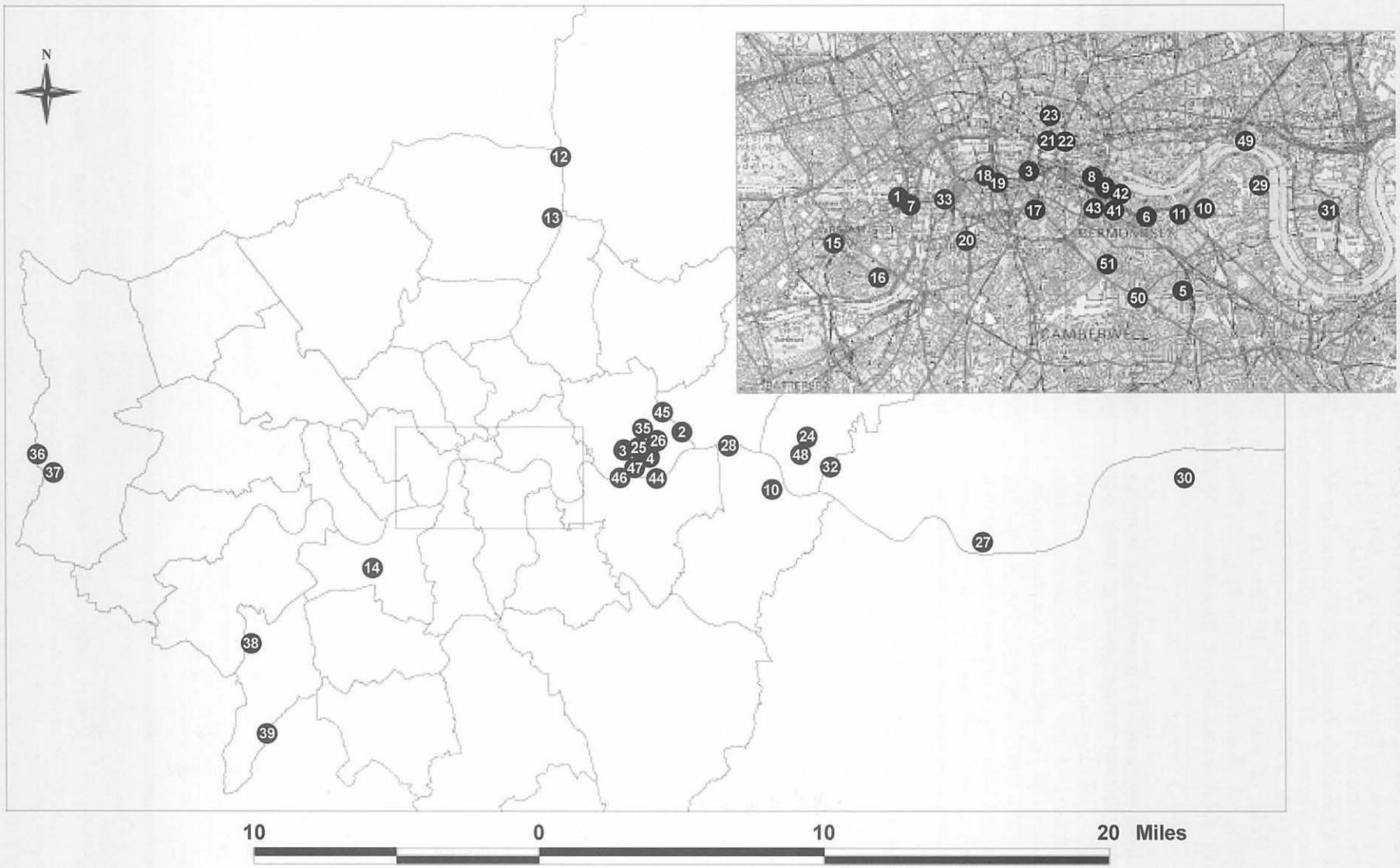
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Figure 5.1 Map of sites mentioned in the text: 1 Westminster; 2 North-east London Wetlands; 3 Silvertown Urban Village; 4 Newham; 5 Bramcote Grove; 6 Bermondsey; 7 Thorney Island; 8 Horselydown; 9 Three Oak Lane; 10 Erith; 11 Culling Road; 12 Enfield; 13 Lea Valley; 14 Wandle Valley; 15 Victoria; 16 Pimlico; 17 North Southwark; 18 Joan Street; 19 Union Street; 20 North Lambeth; 21 Suffolk House; 22 Peninsular House; 23 The City; 24 Rainham; 25 Beckton 3-D; 26 Beckton Nursery; 27 Tilbury; 28 Crossness; 29 Bryan Road; 30 Rotherhithe; 31 Isle Of Dogs; 32 Wennington; 33 Waterloo; 34 Park Street; 35 A13; 36 Packet Boat Lane; 37 West Drayton; 38 Eden Walk; 39 Kingston; 40 Canada Water; 41 Phoenix Wharf; 42 Wolsely Street; 43 Lafone Street; 44 North Woolwich; 45 Barking; 46 Fort Street; Silvertown; 47 Custom House; 48 Rainham Brookway; 49 Narrow Street; Limehouse; 50 B&Q; 51 Bricklayers Arms

Tufas of this type have been investigated from the River Lea at Enfield (Chambers *et al* 1996) and the Wandle (Wilkinson *et al* forthcoming), although dating of the tufaceous deposits has only been possible by molluscan biostratigraphy. To summarise: the Thames at the Mesolithic/ Neolithic transition would appear to have been a broad, shallow, and moderately fast-flowing river running on a course broadly close to that of today, although it appears to have run below the areas now occupied by Victoria, Pimlico, and north Southwark. Investigations at Joan Street and Union Street (both in north Southwark) in advance of the Jubilee Line Extension construction work (Sidell *et al* 2000) confirm the northward migration of the river.

The temporal transition from the Mesolithic to the Neolithic did not see any major change in the river regime, but as the Neolithic unfolded, factors such as rising relative sea level (RSL), in combination with the gradual but continued subsidence of southern Britain began to have an effect upon the fresh water reaches of central London. In the early Neolithic, sand facies continued to develop. Deposits such as those dated at Thorney Island indicate that the sand eyots were still forming within the Neolithic floodplain, which must consequently have been in a state of flux and is unlikely to have been attractive for exploitation or settlement on a permanent basis.

Although it is still difficult to date the onset of in-channel sand accretion, there are some data indicating its cessation, both from sites along the Jubilee Line Extension and others recently investigated. These consist of radiocarbon dates obtained from the point of contact between the organic muds and the underlying sand facies. The dates indicate that the sands continued to develop in the upstream stretches for several thousand years after they stopped forming and had been sealed by these organic muds in the downstream stretches. Erith provides a clear example, where the date for this contact is *c* 4300 cal BC. This sedimentary change is almost certainly associated with the upstream migration of tidal waters replacing the fresh water processes that deposited the sands.

The period 5000–2500 cal BC is one of estuary contraction (Long *et al* 2000), which saw a reduction in the rate of RSL rise (Fig 5.2) and an expansion of the marshland within the floodplain. However, even before tidal waters migrated into central London, there will have been an effect upon the relative altitude of the Thames through a lessening of the gradient the fresh water river cut in order to reach the altitude of estuarine waters (or mean sea level). From this period, peats dominate much of the area on the margins of the sand islands, encircling Thorney Island, across much of north Lambeth, and covering

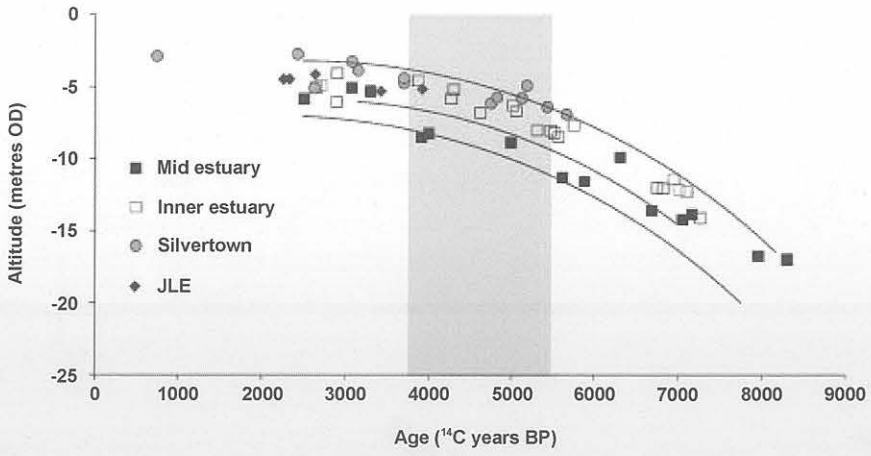


Figure 5.2 Sea level curve for the middle and inner Thames Estuary. All points have been reduced to mean sea level

much of Southwark marginal to the river and between the sand islands. The north bank of the Thames in central London is, on the whole, devoid of peat – this is likely to be a result of the steeply shelving terraces here and the northward migration of the Thames, which will have subsequently removed much of the peat that may once have existed along this bank. Rare Mesolithic and Neolithic organic deposits have only been recorded from Suffolk House and Peninsular House to date. Nevertheless, to the east of the City there are substantial peatlands on the north bank from this date. The area adjacent to the Thames from the modern day Isle of Dogs through Newham to Rainham have swathes of blanket peats and the zone has since been termed the north-east London or Thames Estuary wetlands (Meddens 1996). The sedimentary sequences represent a significant infilling of the floodplain with the onset of formation dating to approximately 4500 cal BC, best recorded from Beckton 3-D and Beckton Nursery (Meddens 1996). The peats in this area were to be submerged by estuarine flood deposits (except at the very back/north of the floodplain) some time around the mid to late Bronze Age in many cases, but peat continues to form in Beckton until well into the Iron Age. These peats appear to have formed under conditions of rising RSL (Haggart 1995), obviously managing to outstrip the rising water levels for a while until they were finally submerged. Previously, these peat horizons have been identified with the 'Tilbury III' or 'Tilbury IV' units of Devoy's (1979; 1980) stratigraphic scheme. On the whole, such identifications have simply been on the basis of peat being found at a particular altitude, rather than by a detailed analysis of the biostratigraphy, dating, and associated sedimentary processes. This has led to some possible misinterpretations in the archaeological literature on the subject, and indeed the model is over-complex in relation to the broad stratigraphy of the area.

The estuary contraction does not appear to have been accompanied by renewed deposition of freshwater facies downstream, as no such deposits characteristic of fresh water fluvial processes have been found within any peat stratigraphy recently investigated. Indeed, estuary contraction would appear to have been just that; a reduction in channel width with no associated downstream movement of the tidal head. This is best exemplified by the data collected by Devoy (1979) at Crossness, where a decrease in channel width from 4.7 to 0.67km is recorded from *c* 3900 cal BC (Long *et al* 2000). Nevertheless, as has already been noted, fresh water sand facies continued to form during the contraction phase upsteam at Westminster.

The earliest deposition of estuarine sediments following cessation of peat growth in central London come from Union Street and Joan Street

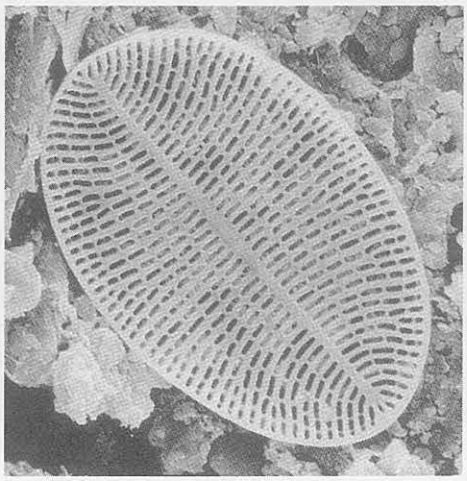


Figure 5.3 The estuarine diatom Cocconeis placentula

(Sidell *et al* 2000), dating to *c* 2800–2550 cal BC. Diatom (unicellular algae) species such as *Paralia sulcata, Cymatosira belgica, Thalassionema nitzschiodes*, *Cyclotella striata*, and *Cocconeis placentula* (Fig 5.3) have been found in these sediments and indicate initially isolated inundations which periodically submerged the southern floodplain margins. As such, this is unlikely to indicate the permanent positioning of the tidal head in this area at this date. Several high RSL events have been recognised, interspersed with sediments indicating a reversion to a fresh water depositional environment. Nevertheless, pulses of high RSL can be seen as the prelude to the development of fully tidal conditions in central London, which had permanently taken place by the middle Bronze Age (Sidell *et al* 2000).

The ecology of the floodplain

The ecology of the floodplain has been rather better studied to date than the regime of the river itself. This, perhaps, can be attributed to a range of factors, not least the fact that the peats mentioned above have tended to be prolific on many sites opened for archaeological reasons, and also that characterization of local vegetation has tended to receive a higher priority from archaeologists than establishing the actual depositional processes of the sedimentary sequences. This is likely to stem from the relatively long tradition of palaeobotanical reconstruction within the archaeological discipline, compared to that of the examination of archaeological site-formation processes.

Palynological data from Neolithic sediments at Bramcote Grove (Thomas and Rackham 1996) show the development of an alder carr, with additional evidence for *Quercus* (oak), *Alnus* (alder), *Tilia* (lime), and *Corylus* (hazel) woodland,

presumably on the drier ground on the gravels to the south. Channels are thought to have migrated across the site for much of the Neolithic. However, at the end of the period there is tentative evidence for the construction of a wooden structure, possibly a trackway, indicating that the area became waterlogged and artificial aid was required to traverse the wet areas between the eyots. This appears to be roughly contemporary with a lime decline between 2190 and 1750 cal BC. It is possible that the final removal of woodlands (following the earlier records of the elm decline) led to the raising of base levels, or increased run-off causing a waterlogging of the alder carr. Alternatively, the increased waterlogging may be associated with the gradual reexpansion of the estuary from the end of the third millennium cal BC. This development was taking place within an infilling lake basin that had formed in one of the Devensian relict channels of the Thames.

Another site, Bryan Road (Sidell *et al* 1995), with good Neolithic ecological evidence is located on the eastern side of Rotherhithe over the river to the west of the Isle of Dogs loop. The radiocarbon measurements obtained from just above the lowest organic horizons are 4910 ± 80 BP and 5040 ± 80 BP (Beta 68576/7, 3940–3510 cal BC and 3970–3700 cal BC). The image here is one of drier land away from the river covered by *Quercus* woodland, including *Ulmus* (elm), *Tilia*, and *Corylus*. *Alnus* was also recovered and is likely to be associated with vegetation peripheral to the Thames. This vegetation community appears to have been rapidly replaced, and it seems likely that this was triggered by the elm decline, which is often taken to reflect the first forest clearance by human communities (Scaife 1988). There does appear to have been a relatively transitory *Landnam* (Iversen 1941) period of land take and cereal cultivation, with a range of typical weed species also found which are generally represented as being in association with cereal cultivation. The *Landnam* phase declined and was subsequently replaced at the end of the third millennium cal BC by woodland regeneration in the area. This could have been because the area itself was abandoned, or less land was required at the time. Final clearance of the vicinity did not take place until the mid Bronze Age.

Detailed palaeoecological sequences were constructed at both Joan Street and Union Street in west Southwark as part of the Jubilee Line Extension project (Sidell *et al* 2000) The early levels indicate that the peats formed subsequent to deforestation and, therefore, this area of Southwark had probably already been opened up by the local inhabitants during the middle and late Neolithic (Fig 5.4). The pollen suggest similarities with the Bryan Road spectra, with decidous oak forest on the drier ground to the south but marshy local floodplain environments containing an alder carr and other species such as *Rhamnus catharticus* (buckthorn), *Salix* (willow), and *Caltha* type (kingcup). This is also the pattern from the sequences studied from Thorney Island (Sidell *et al* 2000). Cereal pollen and *Plantago lanceolata* (ribwort plantain; a plant typically found as a weed growing in association with cereal and broken up ground) were found in the basal zone from Joan Street and it is possible that these reflect agricultural activity in the later Neolithic. This is not matched in the record at Union Street close by (there was no obvious difference in the quality of pollen preservation on both sites), and in fact is extremely rare in central London at this date (see below). This example demonstrates how local the pollen record can be for such events, in theory enabling fine spatial resolution when reconstructing palaeoecology.

Moving downstream to Silvertown, the peats recovered on this site contain a similar record to that from both Rotherhithe and west Southwark with the early Neolithic elm decline (including the other arboreal species such as *Quercus* and also *Tilia* to an extent) dated to 5010 ± 70 BP (Beta 120960, 3960–3660 cal BC) (Wilkinson *et al* 2000). It is followed by a limited reexpansion of *Tilia* and *Ulmus* and the appearance of *Taxus* (yew). There are other records of *Taxus* from the north-east London wetlands, but these are in the form of the tree trunks themselves preserved in the peat rather than the pollen record. There are some problems with isolating yew pollen within ancient sequences (Godwin 1956, 275) and this has almost certainly led to a significant bias in pollen spectra of this type. Nevertheless, *Taxus* seems to have formed a significant component of the arboreal vegetation of east London for a part of the Neolithic, demonstrated particularly well at sites such as Wennington where a trench dug in advance of road-widening along the A13 led to the recovery of approximately twenty late Neolithic yew trees (Fig 5.5), whilst only two oak trees came out of the same excavation. Subsequent vegetation development at Silvertown after the initial depletion of the tree cover indicates the expansion of weeds such as *Plantago lanceolata*, subsequently followed by increases in the levels of arboreal pollen which tend to show regeneration of the woodlands following the elm decline.

These records have shown that the sequences from these central London floodplain sites are broadly similar – initially the woodland component is dominant, probably a result of the relatively low position of the Thames and the fact that the early Neolithic communities do not appear to have significantly manipulated their environment. The elm decline is apparent on several sites; although in fact this event is not well represented in London generally. A record from Hampstead is the only one currently known away from the floodplain (Greig 1989; 1992). Not all the cleared areas appear to have been maintained,

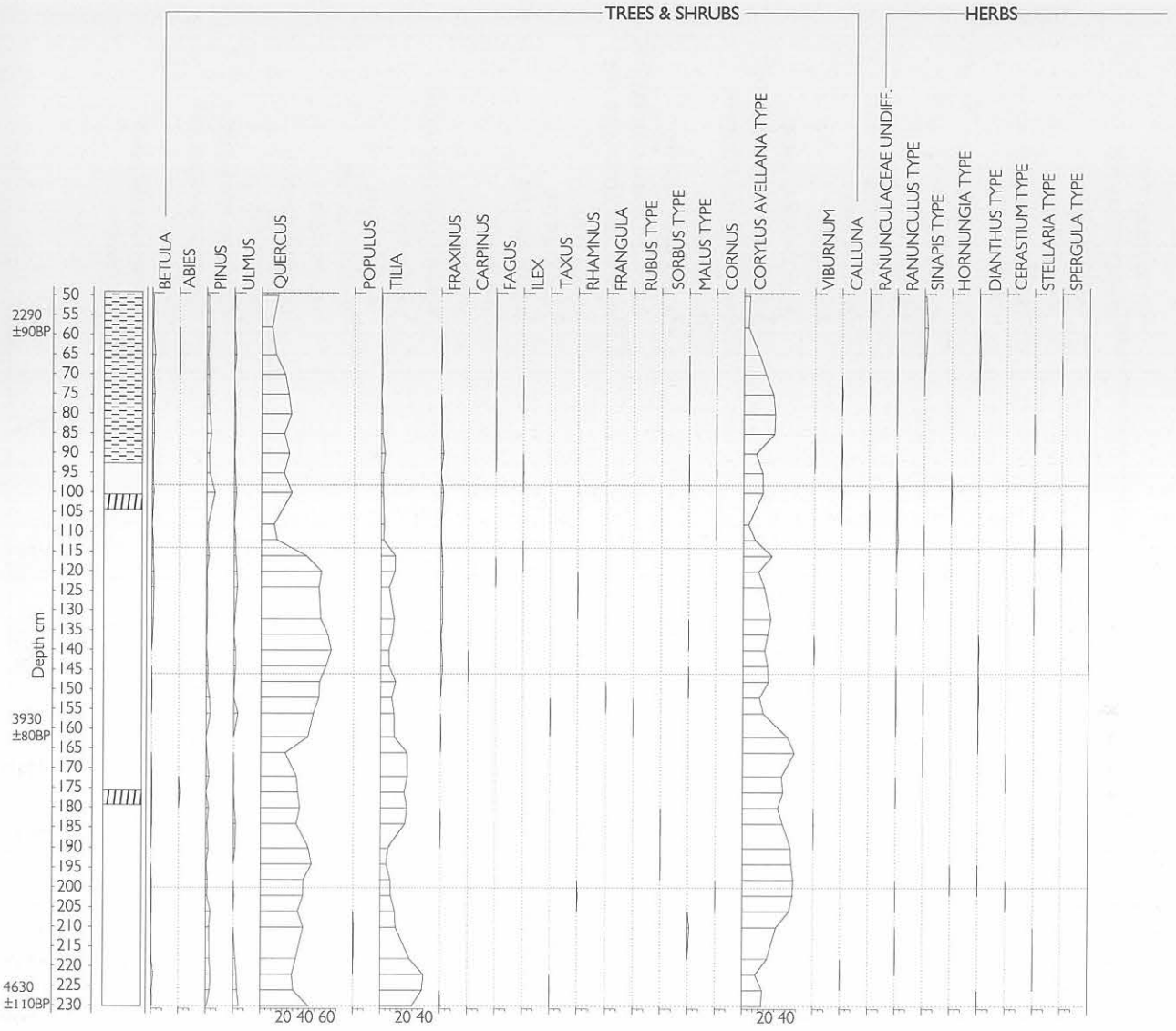


Figure 5.4 Pollen diagram from Union Street, Southwark, from Sidell et al *2000 (courtesy of MoLAS)*

possibly as a result of initial over-clearance or relocation of settlements. It is not until the mid Bronze Age that much larger-scale permanent clearance occurs associated with the appearance of field systems.

The archaeology

A recent survey of the archaeology of Greater London has considered the evidence for occupation during all archaeological periods (MoLAS 2000). What is striking about the Neolithic overview is that it is significantly slimmer than almost all the other prehistoric chapters. This has been noted in other studies carried out on a local basis, such as the recent survey of the prehistory of Southwark and Lambeth (Sidell *et al* 2002) where there is good evidence of prehistoric activity in the Mesolithic and particularly the Bronze Age, but significantly less in the Neolithic (and, incidentally, the Iron Age).

There is some scattered evidence for activity on Thorney Island in the late Neolithic (Thomas *et al* forthcoming), including ceramic assemblages as well as struck flints, axes, and arrowheads. Some ephemeral features identified as gullies and postholes have also been found, but could not be conclusively grouped into readily recognisable structures. Much of the material was found within the water-lain sands discussed above, suggesting that the sand was only gradually accumulating and that occasionally there were sufficiently stable surfaces for people to walk across and work on, unless there has been slight redeposition. It also shows that the sand island was still forming in the late Neolithic, which could go part of the way to explaining why the activity appears so ephemeral.

The picture is similar across the river in Southwark and Lambeth, although there is a slightly higher concentration of material. This is

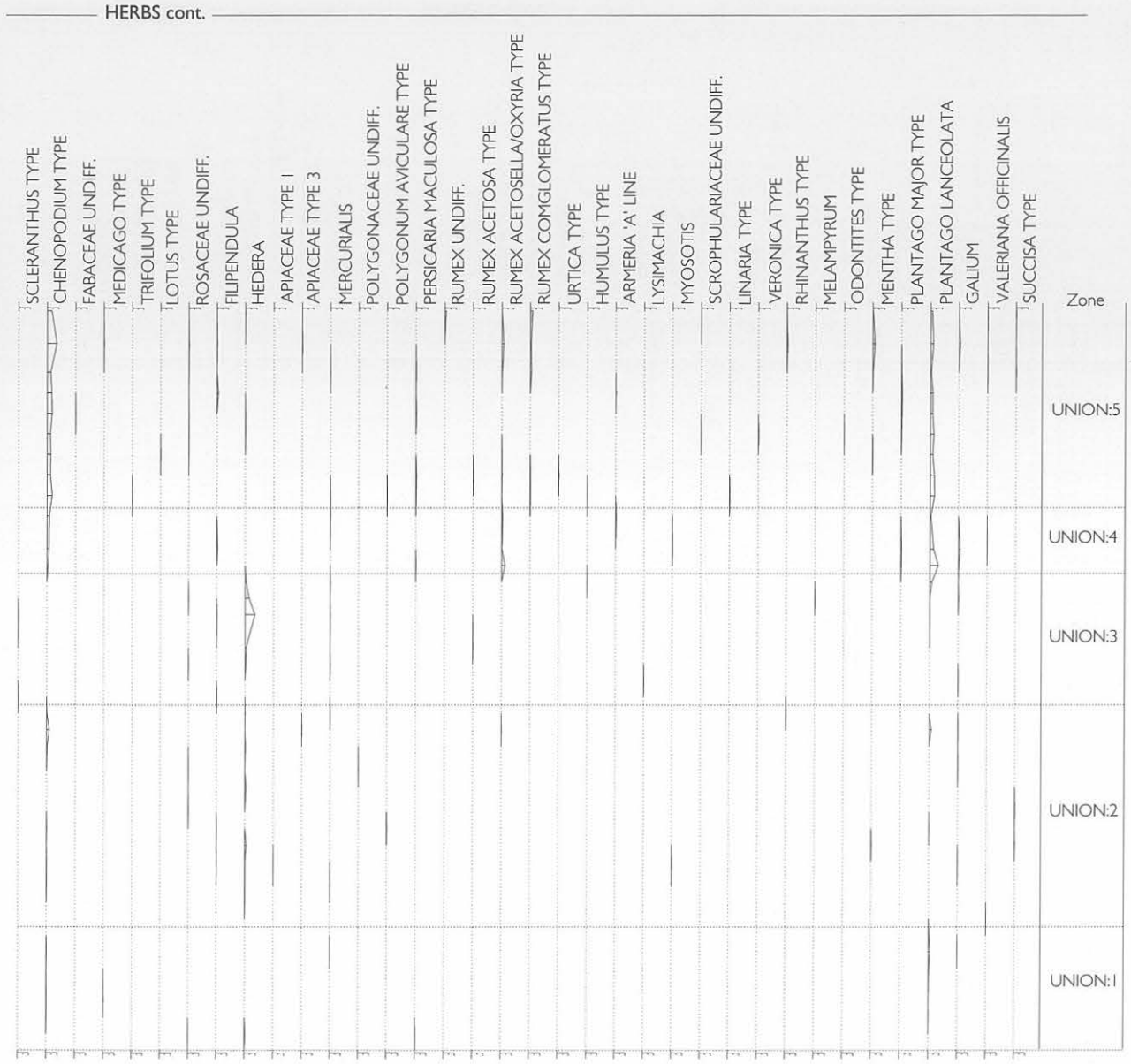


Figure 5.4 Continued

almost certainly due to the fact that the area is larger and has a series of eyots rather than just one, and also includes the gravel terrace to the south. A range of material has been dredged from the Thames in this area, but this is not discussed here as its provenance is too uncertain. There is very little early Neolithic material and indeed this is restricted to a few arrowheads and the odd scrap of pottery (Sidell *et al* 2002). This appears to reflect a genuine absence rather than a bias in the overall record as a great deal of excavation has been undertaken in this area over the last few decades. The majority of pottery found locally which can be ascribed to the Neolithic is Peterborough Ware and where identifiable is predominantly of Mortlake type, now considered to be a middle Neolithic form (Gibson and Kinnes 1997). A number of transverse flint arrowheads have also been dated to the middle Neolithic, which suggests that the floodplain in the area stabilised slightly earlier than Thorney Island. Again, ephemeral features have been found, notably at Waterloo where pits, postholes, and a ditch were investigated. These, and a few features from Park Street (Sidell *et al* 2002), are the only real evidence for settlement and this is far from representing any convincing structures. No firm evidence for settlement has been found at all in central London and the only features which might relate to such activity are those known from the Heathrow area (see Barrett *et al* 2000) and very recently excavated material from the development along the route of the A13. Elsewhere in west London Neolithic evidence is confined to artefacts contained in pits and postholes such as those found at Packet Boat

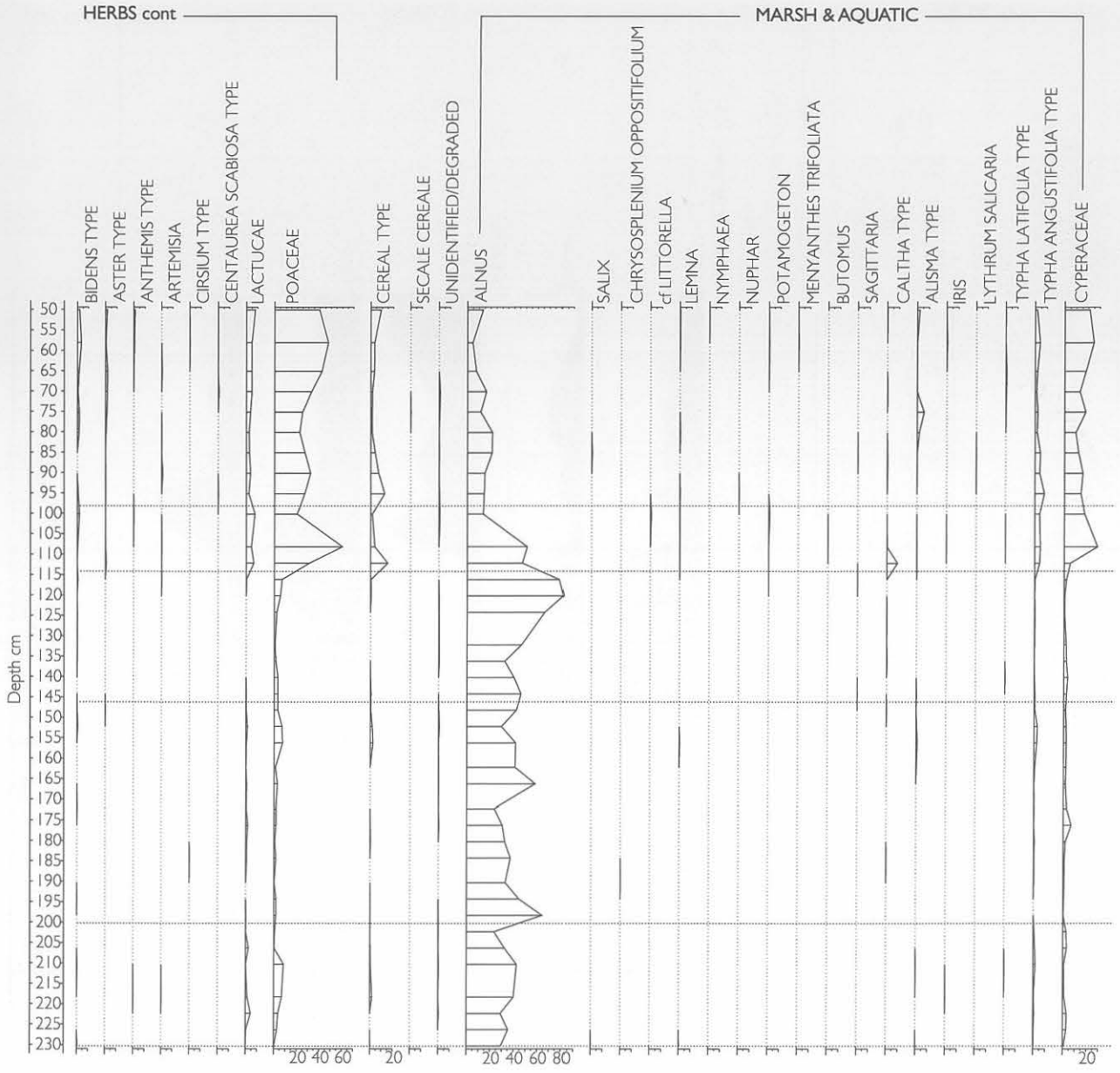


Figure 5.4 Continued

Lane, West Drayton, and Eden Walk, Kingston (Serjeantson *et al* 1991–2).

There are now tantalizing hints of very late Neolithic settled groups in Southwark and Lambeth. The recent work at Hopton Street (Ridgeway 1999) identified a series of marks gouged with an ard into the surface of the sand. The marks are associated with a possible Beaker bowl (Fig 5.6), thought to be 'placed' rather than simply discarded and a large assemblage of struck flint and other pottery types. These groups of material have been ascribed to the late Neolithic/early Bronze Age, but the Beaker bowl is dated to the late Neolithic and it seems possible then that farming did begin, albeit on a very limited scale, at this period in central London. This is borne out in the pollen record at Joan Street where there is a suggestion of very late Neolithic cultivation (Sidell *et al* 2000). Prior to this discovery, it was thought that farming was essentially a Bronze Age introduction to central London. The information from even more recent work at Three Oak Lane (Proctor 2002) suggests that a similarly early phase of activity can be found to the east, where a range of features (ditches, postholes, and a stake-line) and a sherd of Neolithic Grooved Ware were recovered. This is backed up by additional contemporary pollen evidence further to the east from Canada Water (Sidell *et al* 2000). It would appear that the evidence of middle Bronze Age ardmarks on Horselydown at sites such as Phoenix Wharf, Wolsely Street, and Lafone Street represent a later second phase of activity, possibly a response

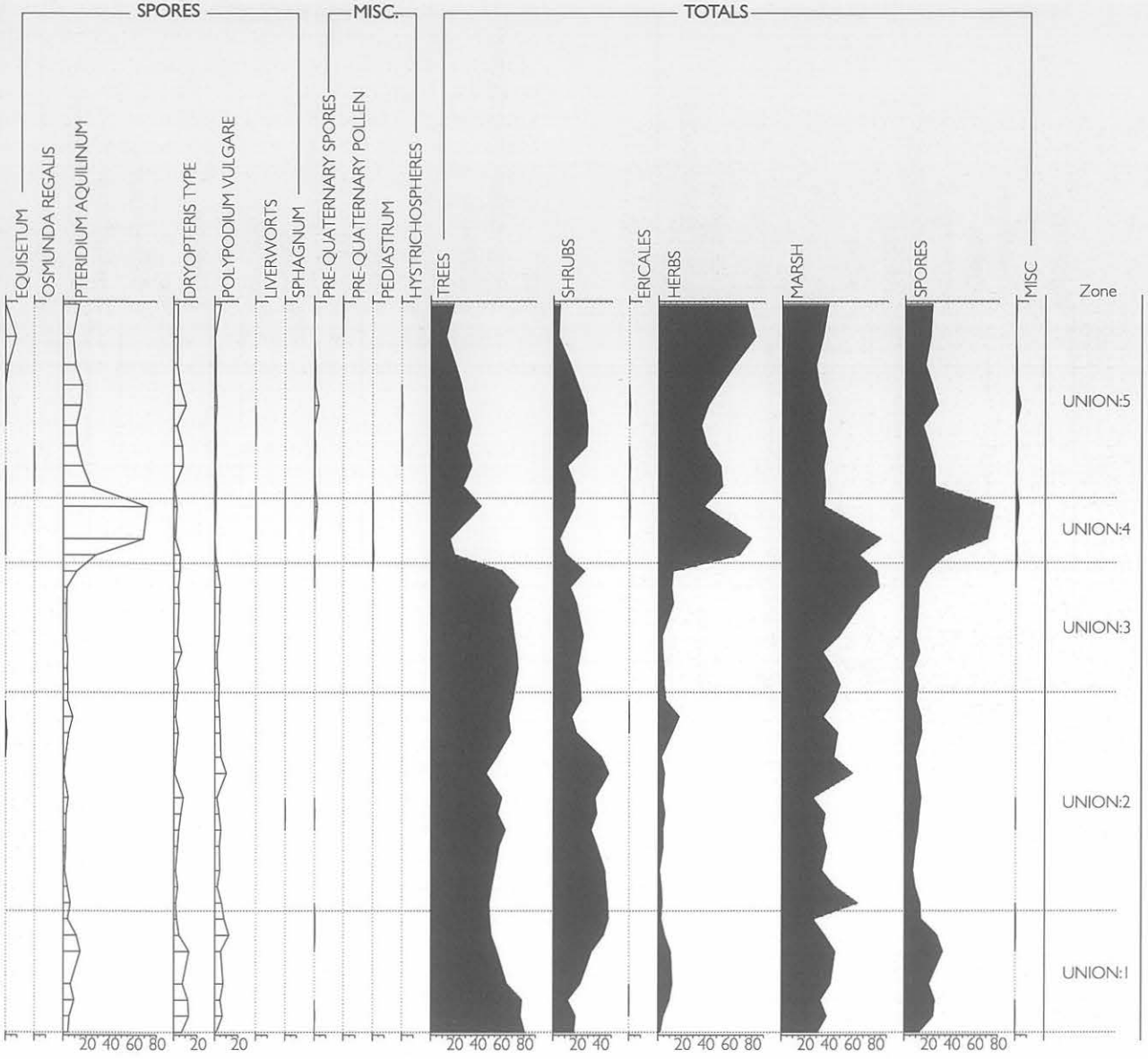


Figure 5.4 Continued

to rising base levels, or exhausted soils (Sidell *et al* 2002).

As yet, work on the prehistoric remains in the City has been limited to the occasional mention of finds in the back of unpublished archive reports or surveys of antiquarian finds (see Merriman 1987 for a detailed discussion of this). This is partially owing to a propensity for archaeologists to have stopped excavating at the Roman levels. Nevertheless, the body of information is slowly growing and, hopefully, a synthetic study can be launched that will draw the disparate remains together and establish whether any patterns can be identified. At this stage it can be stated that, as with Westminster, the image is of ephemeral activity represented by few features and no large fixed settlements.

Moving downstream, again very little evidence had been recovered from east of the City until the recent scheme on the A13 (Bates and Whittaker, this volume) where a range of features, artefacts, and charred cereal remains have been found across a relatively wide area between North Woolwich and Barking. Other Neolithic finds recovered from east London include, most notably, the Fort Street site in Silvertown (Wessex Archaeology 1994, Crockett *et al* 2002). These excavations revealed a late Neolithic timber structure interpreted as a trackway. It is different in construction (and also rather earlier in date) to that at Bramcote Grove being made from split planks held in position with kerb rails. The structure was not excavated in its entirety and there is scope for discussion of other possibilities, for instance that it might be a platform. A few artefacts were recovered from the site (some of which are rather later in date), but again it is not associated with features that could be termed

Figure 5.5 Yew trees from Wennington Marsh

Figure 5.6 Beaker bowl from Hopton Street (courtesy of PCA Ltd)

structural. The trackway is much more substantial than the one from Bramcote Grove and is of a more robust build; more comparable with those from the Somerset Levels (Coles and Coles 1986). On the basis of this it is possible to suggest that rather than simply acting as a small *facine* in a bog between two areas of higher ground as at Bramcote Grove, this structure may have been associated with movement from settlement on the nearby sand bar, identified both at Fort Street and the adjacent Barnwood Court (Wilkinson *et al* 2000). Alternatively, activity considered to be roughly contemporary was taking place on a small sand island at Custom House, slightly to the north-east of Silvertown, and may also be associated with the construction and activity at Fort Street.

The north-east London wetlands have produced significant amounts of Bronze Age archaeology (Meddens 1996), but much less from the Neolithic. However, there is limited settlement evidence from the Brookway site in Rainham, where early pits and postholes were discovered along with a large and important flint assemblage (Newham Museum Service unpublished data). Unfortunately this important site has yet to be published. A recent watching brief along the route of the high speed channel tunnel rail link (CTRL) revealed a Neolithic flint scatter a few hundred metres away from the Brookway site – as yet (January 2003) the assemblage is in the assessment stage but will be published with other material from the second stage of the CTRL project (Mark Turner pers comm). Recent excavations at Narrow Street, Limehouse, have revealed some linear features with associated Beaker Ware (Nick Truckle pers comm) immediately behind the contemporary foreshore. This site could possibly be associated with a crossing point to the Rotherhithe peninsula on the south bank. Canada Water in Rotherhithe is one of the sites with possible late Neolithic cultivation taking place close by.

Yet there is practically no archaeological evidence from the higher ground; even the A13 material is located on the edge of the gravel terrace at the interface with the floodplain. An intrusive Neolithic arrowhead identified in the Mesolithic scatters at the B&Q depot on the Old Kent Road is one find. Similarly a chipped stone axe was recovered from the site at the Bricklayers Arms (Merriman 1992), but it is possible that the focus for activity here was the Bermondsey Lake, rather than the location being selected as a result of the (slight) topographic high on which the site sits.

Discussion

The main themes that can be identified in the development of the River Thames in the central London area are the accretion of sand facies and the formation of the peatlands in the early and late Neolithic respectively. The deposition of sands led to the development of eyots in some areas; isolated topographic highs which should naturally have an attraction for human groups. These have survived in the upstream stretches of the study area; the location which saw the latest accretion of this deposit type. The archaeological

findings suggest that these areas became available for occupation towards the middle Neolithic east of the City and in the late Neolithic at Thorney Island; occupation appears to have been ephemeral and this could be associated with a perception of a relatively unstable environment, but one suitable for transitory occupation. Possibly, this is associated with the knowledge of an environment that had been in a state of flux for generations. However, this interpretation could be open to charges of excessive environmental determinism. Nevertheless, it is not until the transition to the Bronze Age that any more permanent types of activity are noted, when the islands first appear to be cultivated.

The second major theme, that of the development of the peatlands, seems to be associated with the development of both the fresh water river and the tidal estuary. A Neolithic phase of estuary contraction has been proposed for the Thames (Long *et al* 2000) which compares well with similar events in Southampton Water and the Severn, suggesting widespread forcing mechanisms rather than solely local factors. This model works well for the downstream stretches, which would obviously have been affected by the migrating estuarine waters much earlier than the upstream zone. However, the upstream area around Southwark was not influenced by tidal waters until the very end of the Neolithic, and at this date these appear to have been isolated flood events. The peats of Westminster and Southwark appear to have formed as a result of the waterlogging of the floodplain, initially in cut off and abandoned early Holocene channels and then around the margins of the sand islands and adjacent to the main channel. This waterlogging could have been caused by a combination of factors such as rising relative river levels as the gradient necessary to cut down to the sea decreased, and also increased run-off following initial deforestation. Some archaeological remains have been found in these environments, but as with those of the sand islands these have been ephemeral. The late Neolithic structures at Fort Street and Bramcote Grove indicate that the wetlands were sufficiently important or useful to be traversed, and it may be that the arable systems that are suggested for Southwark may have been complemented by a pastoral system in the wetlands during drier/summer periods.

The information that has been gathered to date has demonstrated good reasons that may go part of the way to explaining the limited and oddly distributed Neolithic archaeology found within the central London area when taken in conjunction with the unrepresentative distribution of fieldwork. Nevertheless, the enigma of why central London is poor in evidence for Neolithic activity, particularly in the early period, cannot be answered by understanding the inhospitability of the floodplain. It does not seem to be a problem of geology, topography, or resource availability – central London was popular with the subsequent Bronze Age communities and it is unecessary to discuss the occupation of historic London. Furthermore, it cannot be said that the area was unknown to human groups; Mesolithic artefacts and 'sites' such as the B&Q camp on the Old Kent Road are well known (Sidell *et al* 2002).

This leaves cultural reasons and therein unfortunately demonstrates the impotence of the modern archaeologist faced with a limited dataset trying to ascribe logical reasons to aspects of a society which existed 5000 years ago. It is known that even areas such as Heathrow which show dense activity in the middle and late Neolithic are notably lacking in evidence for the early Neolithic, so perhaps the unprofitability of occupying the floodplain is simply one of a number of reasons for Greater London being sparsely occupied. These could include such simple factors as a very low population density, very small settlements, and continued patterns of mobility from the Mesolithic.

Conclusions

It can be safely concluded that the meeting of the fresh water with the tidal river led to significant changes in the floodplain environment which impinged upon its use by the human population. Throughout most of the Neolithic, the floodplain cannot have been particularly hospitable for occupation; with the development of the wooded peatlands on the one hand, and the deposition of the sand islands on the other, practically nothing in the form of dry land would have been consistently available. This is likely to be a major reason why such limited archaeology is found marginal to the central London Thames at this date.

What is vital is that some of the crucial sites, such as Rainham Brookway and the Custom House site, are rapidly published and available for study. Then, more fieldwork will be needed to further explore some of the points made above. There is some hope for this; during the period of initially writing to finally editing this paper, the finds along the A13 have come to light which are substantial enough to have changed the amount of known Neolithic archaeology in the London area from 'practically nothing' to 'a moderate amount'. It is to be hoped that this will continue in forthcoming years. In addition to this, some existing (but old in modern terms) datasets require reexamination to ensure they have been correctly dated and then the fundamental issue of Neolithic occupation in London will require a detailed synthetic study in order to finally address this enigmatic period within the archaeological record of central London.

Acknowledgements

The authors would like to express their thanks firstly to Jon Cotton for asking them to contribute this paper. Much of the data used have been produced as a result of collaboration with Rob Scaife (University of Southampton) and Nigel Cameron (University College, London) on the Holocene palaeoecology of London. The collaboration between Jon Cotton (Museum of London) and Jane Sidell over the prehistory of Southwark and Lambeth has also provided the framework for a number of the cultural ideas proposed in this paper. We would also like to thank colleagues at the Museum of London Archaeology Service, whose investigations, particularly the Jubilee Line Extension Project, provided us with the opportunities to study environmental change. Further thanks are due to Pre-Construct Archaeology and Gifford and Partners for the information they provided for the project analysing the prehistory of Southwark and the A13, which has been of much interest and assistance in writing this paper. Finally, thanks to Barry Taylor for producing Figure 5.1.

6 Landscape evolution in the Lower Thames Valley: implications for the archaeology of the earlier Holocene period

by Martin R Bates and Kenneth Whittaker

Introduction

Recent investigations of the floodplain of the Lower Thames have begun to reveal the rich archaeological and palaeoenvironmental record of the area. However, in order to understand the distribution and landscape context of the earlier Holocene Mesolithic and Neolithic sites and find spots in the Lower Thames Valley we require an understanding of the bias in the reported record. This bias results from the incomplete nature of the dataset due to a number of factors including the often excessive depth at which earlier prehistoric material is buried; the differing sedimentary facies that are indicative of different ecological niches in the environment; the nature and speed of landscape change during the different phases of human occupation; and past cultural perceptions and reactions to floodplain change.

Traditionally the Holocene evolution of the Lower Thames Valley, downstream of Blackfriars has traditionally been viewed as a result of broad patterns of hydrological change related to variations in sea level (Devoy 1977; 1979; 1982). However much of the earlier work overlooked the equally important influence of the topographic template developed in the late Devensian, which has also influenced the location and nature of the centres of sediment accumulation within the area. Consequently there have been only limited attempts to describe local, site specific, environmental histories and cultural relationships. More recently work has however begun to characterise Holocene stratigraphic diversity within the Thames floodplain and a review of recent archaeological investigations can reveal locally discrete archaeological and palaeoenvironmental signatures that are ascribed to distinct regional phases of landscape evolution. The evidence is summarised in this paper in order to highlight relationships between cultural material and the complex and changing spatial and temporal mosaic of habitats that resulted from the regional process of change. We examine the archaeological and stratigraphic evidence that should provide us with data to examine issues related to the speed of landscape change, the spatial complexity of the contemporary landscape, and the potential relationship between preserved sites and current site distributions for the earlier parts of the Holocene approximating to the Mesolithic and Neolithic phases.

This investigation has been made possible because archaeological investigations within the floodplain area of the Lower Thames (Fig 6.1) have recently benefited from the large-scale reconstruction of much of the former industrial landscape of the Port of London and its associated industries (Rackham 1994). The history of investigation of the floodplain area can be traced back to at least the time of Pepys, who recorded observations in cuttings at Blackwall in 1665 (Whitaker 1889). Since then observations focusing on both the archaeological remains and the associated palaeoenvironmental material have appeared intermittently (Spurrell 1885; 1899; Codrington 1915). However, it was only in the 1970s with the publication of Devoy's scheme for subdividing the sediments beneath the floodplain (Devoy 1977; 1979; 1982) that a stratigraphic framework was introduced that allowed the archaeological remains to be placed within a context reflecting former environments and landscapes.

Since Devoy's work a considerable number of investigations have taken place within the area. These are usually associated with archaeological investigations as part of mitigation requirements in advance of development. Discoveries have revealed a number of Bronze Age trackways beneath the north bank of the Thames in the East London area (Meddens and Beasley 1990; Meddens 1996) and Neolithic sites have been excavated both north and south of the Thames (Wessex Archaeology 1994a; Masefield 1997). Additionally a number of investigations have focused on the evidence for environmental change (Haggart 1995; Long 1995; Sidell *et al* 2000; Wilkinson *et al* 2000; Sidell 2003), and the links between the sedimentary sequences and the archaeology of the floodplain have also been explored (Bates and Barham 1995; Sidell *et al* 2000). Because of the inaccessible nature of much of the archaeology appropriate methodological issues have also been addressed (Bates and Barham 1995; Bates 1998; 2000; Bates and Bates 2000; Bates *et al* 2000).

However, despite the large number of sites investigated in the last ten years relatively few can be ascribed to the earlier parts of the Holocene (ie the Neolithic and Mesolithic periods). A recent

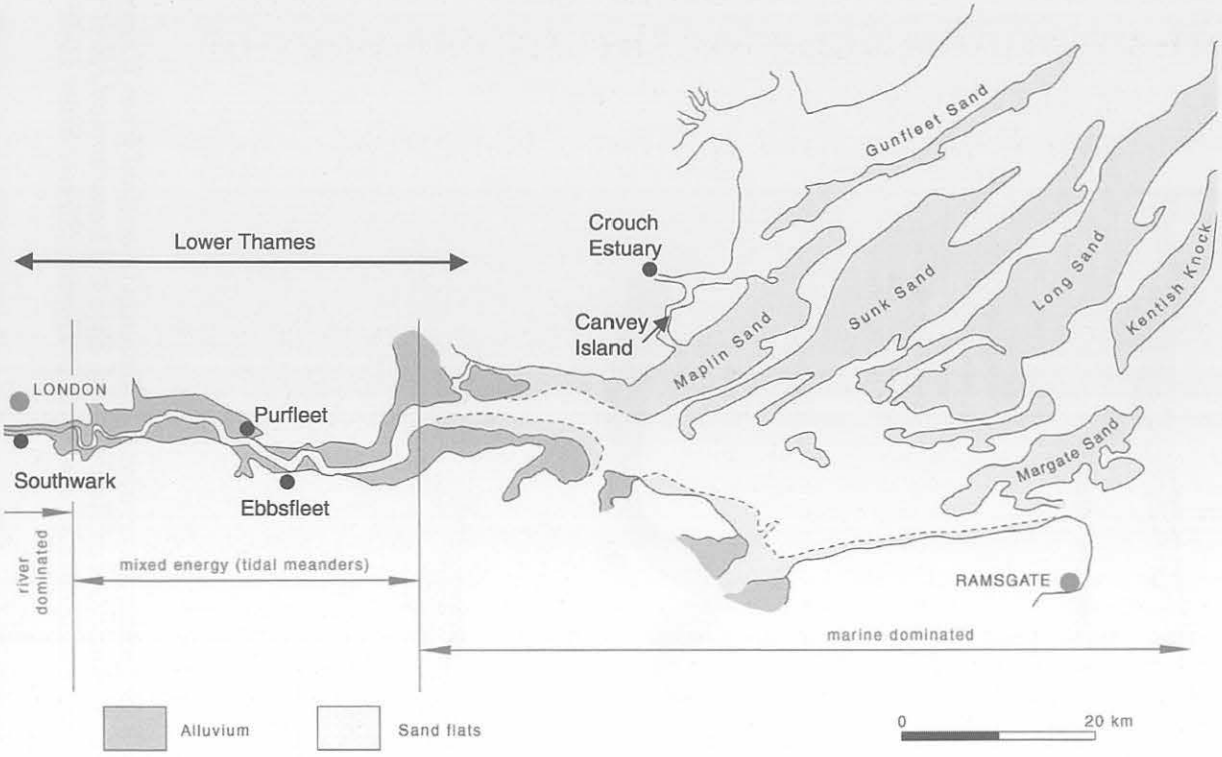


Figure 6.1 Lower Thames / Thames Estuary location plan showing the sub-division of the Thames study are into river-dominated, mixed energy and marine-dominated zones (modified from Union Railways (South) Ltd 1999)

review of the archaeology of the London area (MoLAS 2000) reports a very limited number of sites from the floodplain area. The reasons for this apparent absence of material from the floodplain are complex (Bates and Bates 2000) and remain to be fully addressed. However, a number of pertinent questions can now be articulated and examined against the recently acquired data. Specifically:

1 To what extent does the current distribution of sites in the Sites and Monuments Record (SMR) reflect the distribution of sites actually preserved within the ground and ultimately the original distribution of sites within individual time frames in the past?
2 Can we identify site-specific palaeoenvironmental conditions associated with individual sites and does this provide us with an insight into the range of environments available to past populations?
3 What was the speed of environmental change during the Mesolithic and Neolithic periods?

The answers to these questions may potentially provide us with information on site densities, site-specific environmental locations, and the rates of environmental change that may have impacted on contemporary populations.

Landscape change and sequence development in the Lower Thames area

The Lower Thames extends from Blackfriars to the Shorne Marshes and forms the inner part of the Thames Estuary (Fig 6.1). The Estuary of the Thames is classified as a tide-dominated estuary (as defined by Dalrymple *et al* 1992) containing major sand bars within the outer estuary area (marine-dominated zone) and an inner mixed energy zone with tidal meanders. The floodplain associated with the mixed energy zone of tidal meanders (the focus of this study) is widest between the north-bank Roding and Ingrebourne tributaries where a maximum width of some 4.5km is attained (Fig 6.2). Holocene sediments within this area form a wedge thickening downstream (Fig 6.3) to reach a maximum thickness of 35m east of the study area at Canvey Island (Marsland 1986). Downstream of the Shorne Marshes the estuarine sediments differ considerably from those described here (British Geological Survey 1997). The zones of the estuary as identified in Figure 6.1 should be noted to be transitory and will have migrated up and down valley in response to relative sea-level movement.

The modern River Thames lies within a basin known as the London Basin that is bounded to the north by the Chalk escarpment forming the

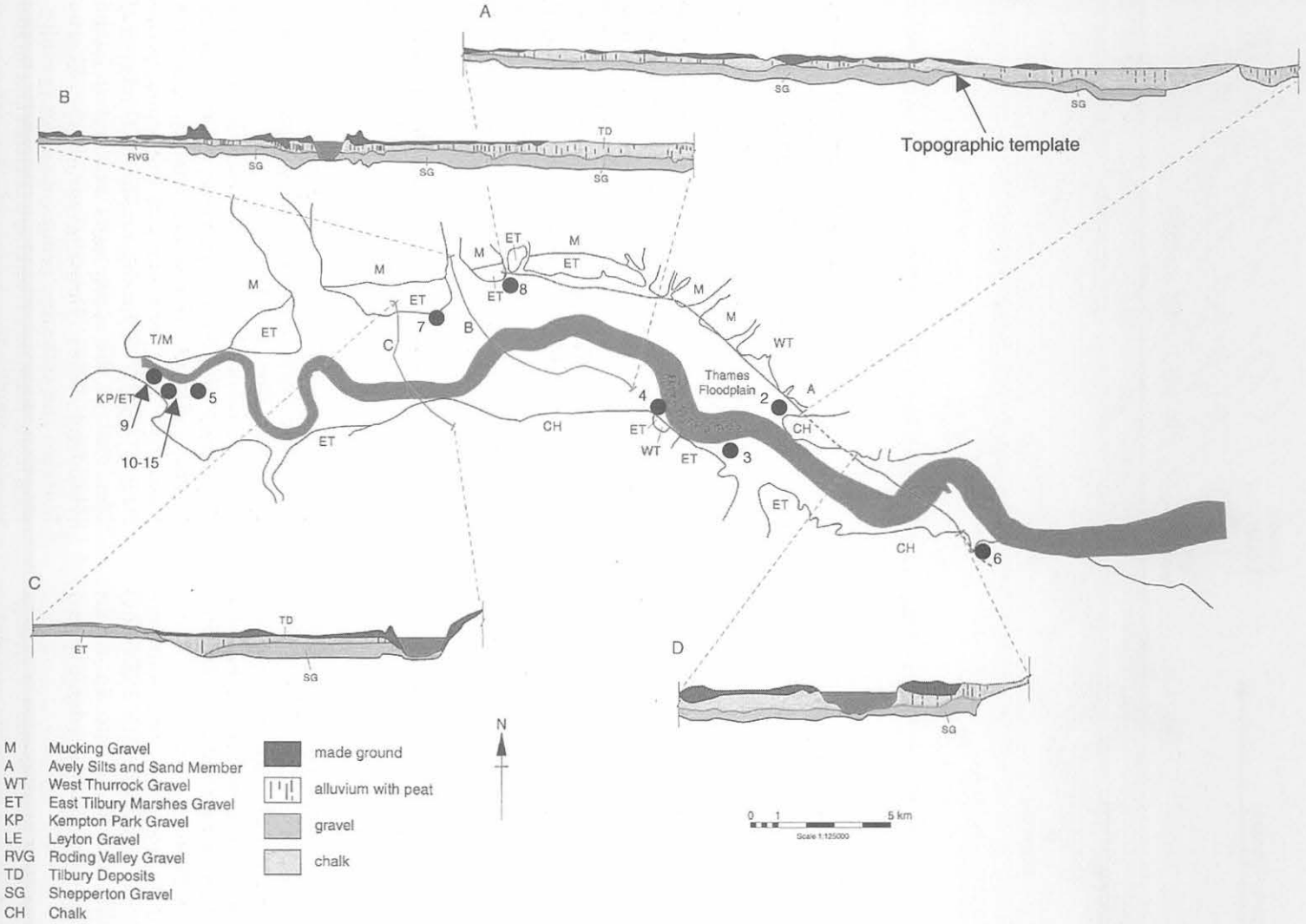


Figure 6.2 Site location plan for Lower Thames area showing selected profiles through Holocene fine grained sediments (modified from Union Railways (South) Ltd 1999). Numbers refer to listing in Appendix I: Site 2: Purfleet; Site 3: Slade Green Relief Road; Site 4: Thamesmead / Erith Spine Road; Site 5: Culling Road; Site 6: Ebbsfleet Valley; Site 7: Woolwich Manor Way; Site 8: Mover's Lane; Site 9: Hopton Street; Sites 10-15: Southwark / Bermondesy sites

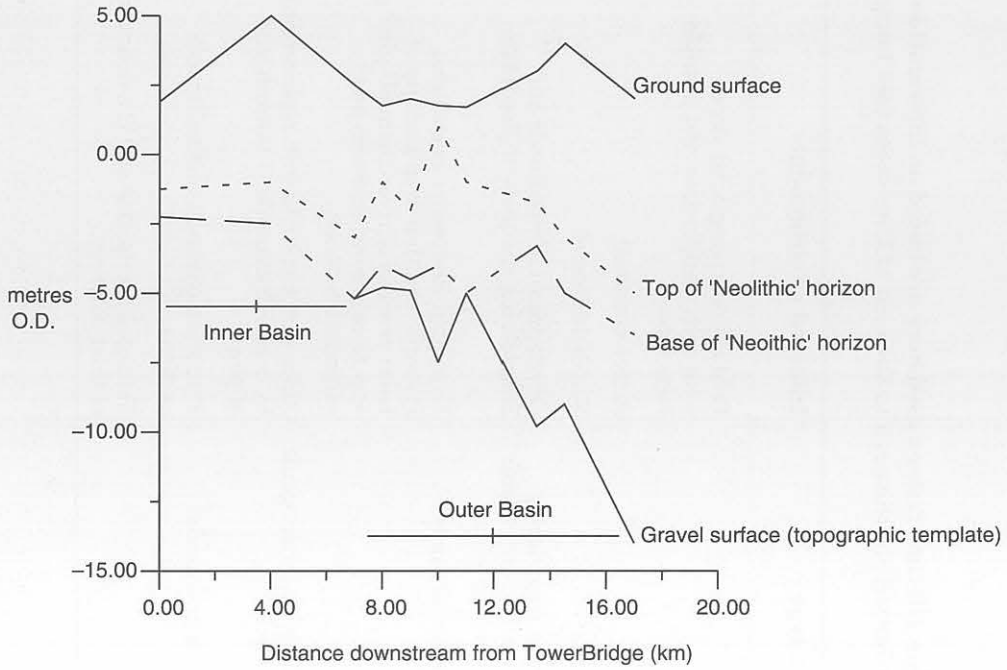


Figure 6.3 Schematic distribution of 'Neolithic' sediments (broadly coincident with the Tilbury III) peat downstream of Tower Bridge. Note the presence of an inner basin area where the 'Neolithic' sediments rest directly on the topographic template of gravels and the outer basin where the 'Neolithic' sediments 'float' within alluvium

Chiltern Hills and to the south by the Chalk of the North Downs. Younger Eocene sediments occur within a synclinal feature between the Chilterns and the North Downs (Sumbler 1996). The modern topography and river positions are a result of major drainage pattern modifications during the Quaternary and in particular events during the last 500,000 years (Gibbard 1977; 1985). These events resulted in the deposition of sands and gravels and the creation of terrace remnants through incision during periods of lowered sea level (Bridgland 2000). The most recent episodes of gravel aggradation, responsible for the deposition of the valley-bottom gravels (or Shepperton Gravels, as defined by Gibbard 1985) form the template onto which Holocene alluvial and estuarine sedimentation occurred (Figs 6.2 and 6.3). This template typically declines in elevation from west to east (Fig 6.3).

Gibbard (1994) and Devoy (1977; 1979) have previously considered the main sediment sequences present within our study area, however the nature of the Holocene sediments resting on bedrock or pre-Holocene sand and gravel deposits has, with few exceptions, only been described superficially. The current basis for subdivision of these deposits is based on work undertaken during the early 1970s by Devoy (1979; 1982) where borehole stratigraphies were integrated with biostratigraphic studies to infer successive phases of marine transgressions (typified by clay-silt deposition) and regressions (typified by peat formation). Devoy's work has resulted in a view of sediment accumulation being controlled within the area by a combination of factors dominated by sea-level change and tectonic depression of southern England. These sediments have recently been ascribed by Gibbard (1999) to the Tilbury Formation. Most recently a regional model for sequence development has been described by Long *et al* (2000) which begins to address the range of factors responsible for sequence accumulation.

These past investigations have suggested that the history of landscape change can be summarised into a number of different stages (Table 6.1):

Stage 1 Late glacial (c 29,000–c 9500 cal BC) (BP)

This phase, during sea-level low stand, is characterised by cold-climate periglacial conditions. Stage 1a (*c* 29,000–14,000 cal BC) is characterised by modification to the older East Tilbury Marshes Gravel (Fig 6.2) by periglacial solifluction activity resulting in reworking of the surface of these older deposits prior to and during downcutting associated with the glacial maximum at 17,000 cal BC. Optically Stimulated Luminescence age estimates from recent work in east London indicates this occurred between 25,000–14,000 cal BC (Gifford and Partners 2001a; 2001b). This episode is followed by valley filling (Stage 1b) associated with a late glacial braided channel system responsible for deposition of the Shepperton Gravel

Table 6.1 Stages in the evolution of the Lower Thames area during the late Pleistocene and Holocene. NB time frames used here are based on information from the area between Crossness and Tower Bridge. The timing/onset of these events would be earlier within the area to the east of Crossness (see Long *et al 2000*)

Model stage	Time frame	Geological events	Dominant sediment type	Inferred environments
1a	*c* 29,000 –14,000 cal BC	Reworking of the East Tilbury Marshes Gravel	Sands and gravels	Cold climate periglacial slopes with active solifluction and possible loess blow
		Downcutting		Active erosional
1b	*c* 14,000 –9500 cal BC	Deposition of the Shepperton Gravel	Sands and gravels	Braided channel
2	*c* 9500 –5000 cal BC	Landscape stability	Some sand deposition in meandering channels, elsewhere weathering of late Devensian sediments to form soils	Development of woodlands and meandering channels on floodplain
3	*c* 5000 –3800 cal BC	Sea-level rise resulting in transgression of marine/estuarine conditions from outer estuary into inner estuary and progressive backing-up of lower reaches of fresh water channels	Fine grained silts, clays and sands	Expanded freshwater marshland systems resulting from back-up of lower reaches of river channels giving way to estuarine channels and saltmarsh systems
4	*c* 3800 –1200 cal BC	Expansion of semi-terrestrial wetlands and marshes giving way to coastal marshlands during phase of apparent relative sea-level fall	Peats and organic silts with minerogenic sedimentation in channels	Alder carr wetlands with replacement by brackish marshland towards end of phase
5	*c* 1200 cal BC –1000 cal AD	Expansion of brackish water conditions due to rising relative sea-level	Fine grained silts, clays and sands	Estuarine channels and saltmarsh systems
6	*c* 1000 cal AD –present	Continued rise in relative sea-level	None	Managed floodplains and construction of tidal defences

(*c* 14,000–9500 cal BC). At this time the floodplain floor would have been flanked by higher ground, capped by older fluvial sediments, and exposed bedrock surfaces may also have existed on the valley sides. Reworking of older sediments resulting in colluvium deposition at the base of slopes may have continued during this time.

The surface of the Shepperton Gravel is well defined throughout the Lower Thames area in archaeological excavations as well as borehole logs and is represented by the lithological transition from sands and gravels to the soft, unconsolidated clay-silts or peats (Figs 6.2 and 6.3). The surface of the gravels represents the early Holocene land surface associated with Stage 2 events.

Stage 2 Early Holocene (c 9500–c 5000 cal BC)

This phase is dominated by a relief defined by the topographic template. The relief would have varied across the floodplain area. Vegetation growth on the surface would have been controlled by topography and hydrological factors and would have produced complex vegetation mosaics. Sediments accumulating at this time appear to have consisted of isolated sand bodies accumulating within the river channels (Sidell *et al* 2000) or areas of localised peat growth in zones of impeded drainage (Devoy 1977; Thomas and Rackham 1996). The majority of Mesolithic and earliest Neolithic occupations (Appendix I) appear to have occurred in association with this stage.

Stage 3 Middle Holocene (c 5000–c 3800 cal BC)

This is a phase of major landscape instability. During this stage sea-level rise begins to influence patterns of sedimentation, fluvial dynamics, and hydrology within the valley floor area. As the sea level rises and river channels back up, channel stability decreases and extensive flooding of the floodplain area begins. The floodplain surface becomes unstable due to widespread flooding and rapid sedimentation. Minerogenic sedimentation probably characterises this phase. Wetland environments begin to expand at the expense of the dry ground areas. Temporary land surfaces may exist within the flooding area but these are likely to be ephemeral and of local significance only. Flooding of this surface begins earlier in the east and later in the west (Union Railways (South) Ltd 1999; Sidell *et al* 2000) as waters rise and flood the higher areas of the gravel surface topographic template. Initial flooding of the topographic template probably begins under fresh water conditions giving way to brackish water conditions later (Gifford and Partners 2000; 2001a; 2001b). This period equates with the period of early Holocene estuary expansion of Long *et al* (2000).

Stage 4 Middle Holocene (c 3800–c 1200 cal BC)

This stage is characterised by organic sedimentation due to apparent sea-level fall (but see Haggart 1995). Temporary emergence of surfaces to or above flooding level stimulate the growth of organic sediments and lead to peat growth under alder carr or brackish marshland. A corresponding reduction of intertidal areas and concentration of flow of tidal water would have occurred. This equates with the mid-Holocene estuary contraction phase of Long *et al* (2000). The time frames for this phase are later in the areas to the west of Crossness than to the east (Long *et al* 2000). Former remnants of dry ground continue to shrink as the boundary between wetland and dryland continues to move inland and topographic variation is lost. During this time of peat accumulation complex boundaries between peat and non-peat wetland ecosystems emerge within the wetland (Fig 6.4). Wetland now dominates in the floodplain area as dry ground zones shrink rapidly.

A wide range of differing environmental niches are likely to develop within the area during this time depending on proximity to the valley edge, the location of Thames tributary channels, locations of gravel islands within the wetlands, exposure to erosion and tides, and sources/rates of sediment supply etc. Predicting the location of temporal surface within the stratigraphic sequence that has accumulated above or adjacent to the former gravel surface is complex. Human exploitation of all environments encompassed by these changing conditions is possible. This phase broadly coincides with the formation of the widespread peat unit defined by Devoy as the Tilbury III peat (1977; 1979) (Fig 6.3). Extensive development of wooden trackways occurs during the later parts of Stage 4 in the inner parts of the Lower Thames area (Meddens and Beasley 1990; Meddens 1996).

Stage 5 Later Holocene (c 1200 cal BC–c 1000 cal AD)

This stage is characterised by the final submergence of the former floodplain topography and the loss of much of the floodplain diversity. Organic sediment accumulation appears to cease during this stage, as the final remnants of the former topography are lost. Minerogenic-dominated sedimentary environments expand as a second phase of estuarine expansion occurs (ie the late Holocene estuary expansion phase of Long *et al* (2000)). This phase is associated with a shift of later prehistoric settlement onto the higher, drier gravel terraces and the successive phases of waterfront construction in Roman urban areas.

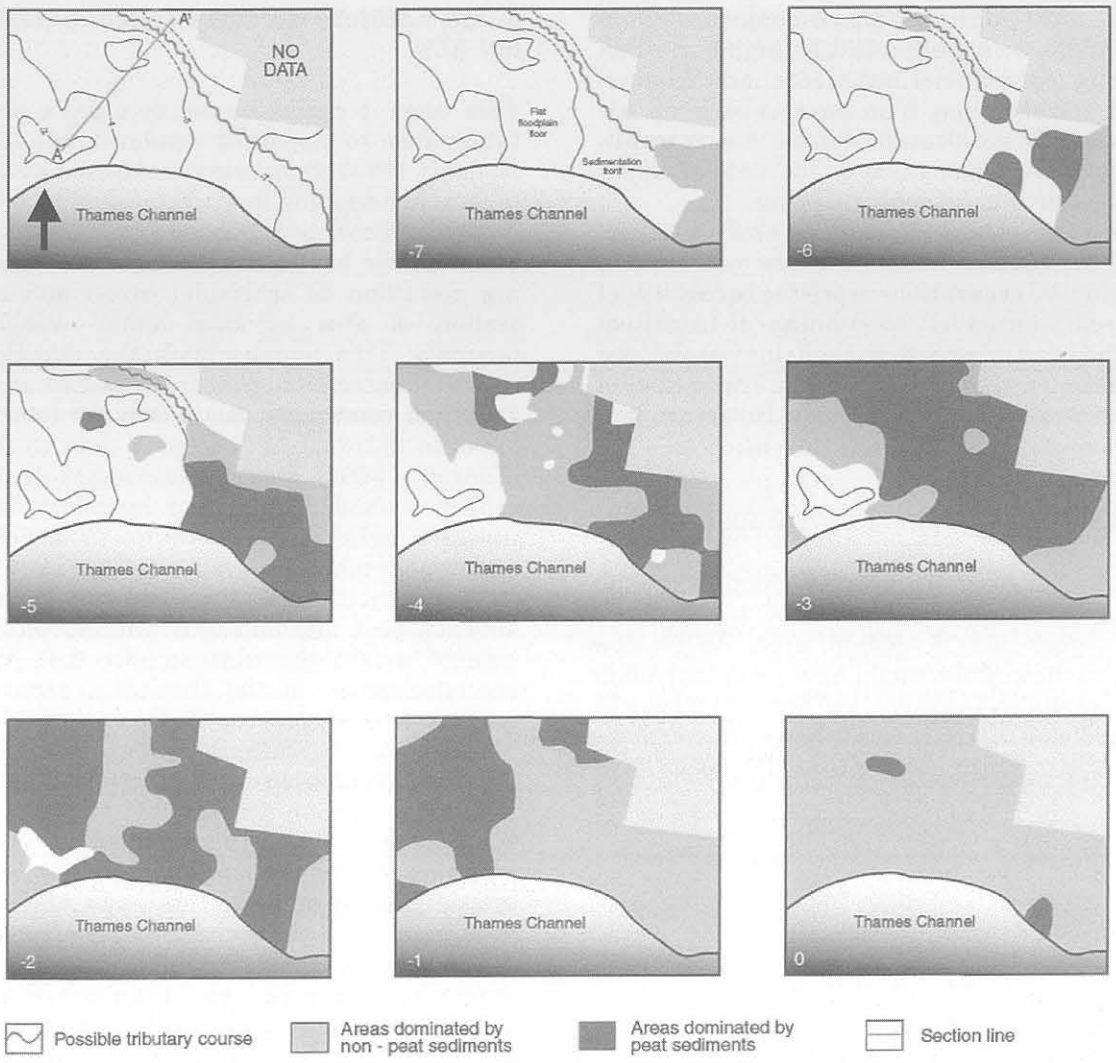


Figure 6.4 Topographic reconstruction, based on borehole lithological data, of the Barking Reach area. Illustrations are to be read from top left to bottom right and show the progressive inundation of a former dry landscape by wetland conditions. The initial map shows the reconstructed topographic template in the early Holocene. This shape of this surface implies the presence of a now lost tributary valley crossing the floodplain from north-west to south-east. The onset and progression of sedimentation associated with sea-level rise can be seen through the sequence of reconstructions at 1m intervals through the stratigraphic stack. Direct contemporaneity between sediments at the sedimentation front and those within the wetland area behind is unlikely due to differential, post-depositional, compaction of the deposits. Note the presence of a topographic high in the south-east area of the floodplain that becomes an 'island' within the wetland area at −4m but disappears beneath wetland sediments between −2m and −1m OD. Radiocarbon age estimates (see Table 6.2 and Fig 6.7) suggest that the following age estimates can be applied to the position of the sedimentation front: −7m OD/6410 BP, −6m OD/6143 BP, −5m OD/5875 BP, −4m OD/5608 BP, −3m OD/5341 BP, −2m OD/4389 BP and −1m OD 3823 BP

Stage 6 Late Holocene (c 1000 cal AD–present)

This is the phase associated with human manipulation of the floodplain resulting in the construction of flood-defence schemes and landscape reclamation projects etc. Modification of the fluvial/estuarine regime reduces flooding frequency and consequently rates of sediment deposition slow.

The distribution of Mesolithic and Neolithic sites in the Lower Thames area

Excavation and investigation of archaeological material within wetland contexts in the Lower Thames has been slow to gather momentum and it is only relatively recently that the importance of these areas has been recognised (Meddens and Beasely 1990; Merriman 1992; Rackham 1994;

Bates and Barham 1995). This is perhaps surprising given the relatively well-known potential of similar areas elsewhere in the UK but may relate, in part, to difficulties of access to sites within a predominantly urban area where the stratigraphies are deeply buried and difficult to access through normal fieldwork procedures (Bates and Barham 1995; Bates 1998; Bates and Bates 2000; Bates *et al* 2000).

There is, however, a surprising quantity of published information pertaining to archaeological material in sediments of the Thames ranging from prehistoric to post-medieval in date (Spurrell 1899). Upstream of the City of London, archaeological material is well documented on the floodplain of the Thames for example at Runnymede Bridge, Surrey (Needham 1991; 1992). Downstream, with the notable exception of the Southwark area (Sidell *et al* 2002), discoveries are less well documented. Current on-going work as part of the Thames Foreshore Project (investigating and cataloguing archaeological sites on the Thames foreshore between Tower Bridge and Richmond) should rectify this in part (Webber 1995; Milne *et al* 1997). Elsewhere examples include the discovery of prehistoric artefacts at Shand Street (Kennard and Warren 1903), trackways at Bramcote Green (Rackham 1994; Thomas and Rackham 1996) and in the Rainham area (Meddens and Beasley 1990; Meddens 1996), flint artefacts at the Courage Brewery site (Dillon *et al* 1991), Phoenix Wharf (Bowsher 1991; Merriman 1992), Whitehall (Andrews and Merriman 1986), and Slade Green (Bates and Williamson 1995). The development of a research strategy for the area has been discussed by Merriman (1992), Rackham (1994), Bates and Barham (1995), and most recently Williams and Brown (1999).

Unfortunately at present there is no published, integrated survey drawing together both archaeological and geological data within the area. No detailed evidence exists to document the precise relationship between sediment types/geomorphological situations and archaeological sites although first attempts to undertake this work have been made by Sidell *et al* (2000). However, based on a limited survey of available data from the area Figure 6.5 shows a range of provenanced archaeological find spots from the Lower Thames (regardless of age/type etc) plotted as percentages of total numbers for a restricted number of sedimentary contexts, where context data exists. The results of this study show that contrary to the generally held expectations, artefacts have been recovered from a wide variety of sedimentary contexts not only peats. Previously many assumptions made during investigation of Thames side sites have assumed archaeological associations are mainly related to the peat stratigraphies. This information (Fig 6.5) clearly shows that only 17% of all find spots occur within peat and that 22% of finds occur resting on peat. Significantly 34% of finds derive from sands and silts (a feature exemplified by recent works on the A13 (Gifford and Partners 2001a; 2001b).

However, it should be noted that this information is restricted in that only for a few, well-investigated sites are the stratigraphic contexts of the finds clear in terms of environments of deposition. The conclusions to be drawn from this information suggest that artefacts should be expected in most of the major sediment types within the area. Consequently the nature of the artefact assemblage, the degree of post-depositional modification, and the preservational status of the artefact associations will vary depending on

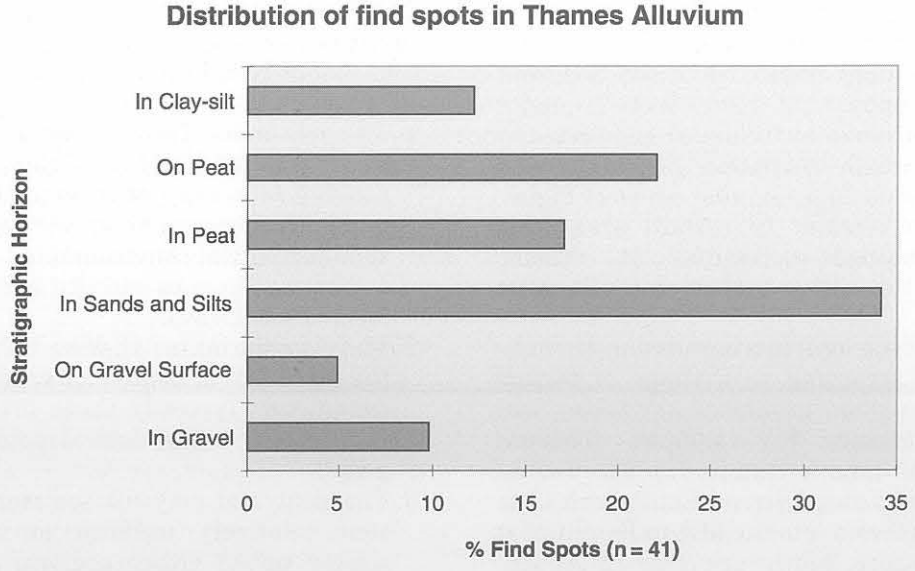


Figure 6.5 Distribution of find spots by geological context in the Lower Thames area

the nature of the sediment matrix from which the artefacts are recovered.

A summary of all site information available to the authors (in early 2001) for Mesolithic and Neolithic sites is provided in Appendix I. This information has been gathered from unpublished excavation reports and evaluations and probably only represents part of the dataset presently available for study. A number of salient points can be drawn from this database:

1 There is a general absence of early Mesolithic sites on the valley floor, except for the B&Q site, Southwark (Site 16, Appendix I), which occurs in a unique topographic context within the Lower Thames. This evidence suggests that floodplain dynamics were still in a state of flux during the early Holocene possibly making colonisation of this area difficult. However, it should be noted that this absence may be more apparent than real and may be a function of site visibility and evaluation locations/strategies.
2 Late Mesolithic and Neolithic sites predominantly occur on stable terrestrial surfaces formed on the late Devensian/early Holocene topographic template. Typically these are on sand bodies on which well-developed palaeosols exist. An exception is the site at Purfleet (Site 2, Appendix I) (Wilkinson and Murphy 1995), which is associated with terrestrial surfaces formed on early Holocene saltmarsh deposits and provides an early indication of marine transgression into the eastern end of the study area.
3 Late Mesolithic and Neolithic sites predominantly occur within closed, mixed, deciduous woodland, suggesting stability of the contemporary floodplain and main channels. Species composition varies according to local topographic and hydrological conditions, but generally dry woodland predominates.
4 The surface of the Shepperton gravels was generally accessible during the Mesolithic until flooding, resulting from marine transgression, within the estuary began 7-6ka BP. Sea-level fluctuations appear to have been a major mechanism driving hydrological changes and inundation, which restricted later, dry-land activity to increasingly smaller areas of higher valley-bottom terrain. In certain areas this surface remained accessible at specific locations in the valley bottom until the first millennium.
5 The nature of the local pre-inundation environment varies according to a range of factors including elevation, ground water tables and sub-surface geology. For example, woodland persists until land clearance in the second millennium at Lafone Street, Southwark (Site 10, Appendix I) and into the first millennium at 283 Tooley Street, Southwark (Site 12, Appendix I). At Woolwich Manor Way (Site 7, Appendix I) dry woodland is succeeded by fen carr as local conditions become wetter, while clay silts were deposited at Hopton Street, Southwark (Site 9, Appendix I).
6 There is a general consistency in the character of the cultural activity, often with a significant degree of coincidence in the distribution of late Mesolithic and early Neolithic cultural material. This may however, be a function of site visibility. Specialised sites have also been noted to occur, especially in the vicinity of the estuary at Purfleet (Site 2, Appendix I) and the Thamesmead-Erith Spine Road sites (Site 4, Appendix I).
7 Late Neolithic/early Bronze Age land-clearance activities have been noted on Horselydown, North Southwark (Site 12, Appendix I) and may point to wider Beaker cultural associations in the floodplain.

Key concepts for an integrated approach to the archaeological record

The major interest now shown in wetland alluvial sequences, and the recognition that sediments from beneath the modern Thames floodplain may contain important archaeological remains (Rackham 1994), is reflected in the investigations carried out as part of developer-funded evaluations. Investigations are presently focused on development sites and the discovery of archaeological remains has been opportunistic. These recent, developer-led investigations have resulted in only minimal consideration being given to attempting to understand the nature of the subsurface floodplain archaeological potential and site-specific sequence development. In many cases investigation strategies have usually relied on presumptions driven from Devoy's model (1977; 1979; 1982). Critically a number of perceptions commonly held by groups investigating this area can be listed:

1 The peat units (Devoy's Tilbury I-V) represent sediments deposited in wetland environments ranging from reed swamps to alder carr woodland. These sequences, indicative of former semi-terrestrial environments, may contain evidence of human activity, particularly in the form of trackways.
2 The clay-silt units (Thames I-V) lying between the peats are indicative of sub-tidal/inter-tidal conditions. Typically these are considered to have lower archaeological potential than the peats.
3 The peat and clay-silt sediment types represent relatively uniform environments and simply reflect either uniform marshland environments or sub/inter-tidal environments.

However, within these broad categories considerable variety is noted in sediment types and associated flora and fauna. Additionally other sediment types present within the area have been ascribed low significance. These include sand-units, calcareous deposits and gravels that are rarely considered by archaeologists except, for example, where sands and gravels form islands within the marshland that may form a focus of activity within a generally wet area.

4 The Tilbury III peat (5000–2400 cal BC) has been broadly equated with the Neolithic period.

The recent work within the area at a number of sites has now progressed sufficiently to provide additional data useful in understanding the archaeological resource and associated environments in the Lower Thames area. Here we examine four elements that are of importance:

1 The distribution of archaeological sites of Mesolithic and Neolithic character,
2 The evidence for complex environments within the area,
3 The nature and speed of environmental change within the area,
4 Cultural perceptions and responses to change.

Site distribution, visibility, and recovery

The number of sites present within the floodplain area of the Lower Thames dating to the Mesolithic and Neolithic periods is currently relatively restricted. Where present these sites are noted to occur at the edge of the modern floodplain, eg sites such as the Slade Green Relief Road (Site 3, Appendix I) (Wessex Archaeology 1994b; Bates and Williamson 1995), the Thamesmead-Erith Spine Road (Site 4, Appendix I) (Masefield 1997), and the recently discovered sites along the northern boundary of the floodplain at Movers Lane and Woolwich Manor Way (Sites 7 and 8, Appendix I) (Gifford and Partners 2000; 2001a; 2001b). Other sites include those on the valley floor adjacent to stream channels in the Crouch (Site 1, Appendix I), within deciduous woodland at Purfleet (Site 2, Appendix I), and associated with sand or gravel islands in Southwark (Sites 9–14, Appendix I). This pattern suggests a range of environments were exploited by these groups and that the scarcity of sites discovered is probably a function, in part, of the depth of burial of sites coupled with the fact that development pressure within the areas of deeper alluvium tends to be lower than those areas where the alluvium is thinner.

Alluvium sequence thickness has been demonstrated to increase downstream from Tower Bridge to a maximum of 35m at Canvey Island (Marsland 1986; Bates and Bates 2000). This wedge of sediment formed following flooding of the surface of the late Pleistocene gravels following sea-level rise during the early and middle Holocene (Stage 3). Consequently early Holocene (Mesolithic) contexts exist at the base of this sequence resting on the Shepperton Gravel surface. Neolithic horizons will occur on the gravel surface at higher elevations or within this stack of sediments and may be broadly coincident with the sediments identified by Devoy as the Tilbury III peats (Fig 6.3). This peat (Stage 4) has been shown to thin both upstream and downstream and the depth below the floodplain surface at which this unit occurs increases downstream. Consequently it would be expected that the chance of recovering remains dating to the Neolithic period would decrease with distance downriver from Tower Bridge. This confirms the pattern previously described.

It should however be noted that variation in depth to gravel surface, or the Neolithic deposits, will also vary across the floodplain. Thinning of the sequences towards the valley margins is to be expected (Fig 6.2) and consequently total sequence thickness and depth to specific horizons will decrease in this direction as well as upstream.

The nature of the 'alluvial' sediment wedge existing in the Lower Thames area presents archaeologists with an apparent conundrum. While sequence thickness increasing downstream makes site discovery and excavation difficult or in many cases impossible, the rapidly thickening sequences indicate that stratigraphic resolution will increase downstream and that better superpositioning, spatial-pattern resolution, and preservation may be expected within the areas of thicker sequences (Bates and Bates 2000).

Environmental heterogeneity and spatial patterning

One of the consequences of the Devoy model for archaeologists, and the use of pollen analysis to aid vegetation reconstruction and understand sea-level changes, has been a focus on the landscape at a regional scale. Where archaeological sites have been investigated, regional landscape reconstructions and patterns of estuary-wide sea-level change have frequently been the focus of investigation. However, it is clear from our understanding of the archaeological remains within the area that the nature, and archaeological context, of sites vary considerably across the landscape. This variability is probably a function both of environmental factors defining resource availability etc as well as cultural factors, such as social/political/spiritual concerns. Consequently the scale and focus of palaeoenvironmental reconstruction may require refinement for archaeological purposes.

Evidence now exists to suggest that considerable detail exists within the stratigraphic record and that spatial patterning can be observed in the

palaeoenvironmental record (Fig 6.4). Recent work at Erith on the foreshore of the Thames has revealed the presence of a well-exposed fossil forest of Neolithic and Bronze Age date (Seel 2000). Careful mapping and species identification of the fallen and *in situ* tree remains indicate that subtle differences in woodland composition can be traced across the site in probable relation to small changes in elevation of the woodland resulting in areas of better drained soils (Seel 2000). Lateral changes in the nature of the preserved sediments and the inferred palaeoenvironmental conditions have been documented at the nearby site of Slade Green Relief Road (Site 3, Appendix I) where changes in the contemporary peat between reed swamp and drier ground woodland habitats have also been recorded (Bates and Williamson 1995). In the later case extensive archaeological remains (ascribed to the Neolithic) were recovered from the surface of the underlying sand beneath the organic sequences (Wessex Archaeology 1994b).

Similar environmental complexity can also be detected from within the sediments ascribed by Devoy to the Thames II transgression. Wilkinson *et al* (2000) and Sidell *et al* (2000) have discussed the evidence for the nature of the pre-estuarine river in the central and east-central London areas of the Thames. They conclude that prior to the impact of sea-level rise within the innermost part of the Lower Thames area, river activity was associated with meandering channels depositing sand bodies within or adjacent to active channels (Stage 2). Direct evidence for fresh water fluvial conditions (early parts of Stage 3) within the east London area prior to accumulation of the main Tilbury III peat has recently been obtained from works associated with the A13 road construction project at Canning Town and where fresh water molluscan remains have been recovered from sediments immediately above Pleistocene sediments and sealed below peats associated with the main phase of peat accumulation noted elsewhere (Stage 4). Furthermore close examination of the organic sediments associated with the Tilbury III peat (Stage 4) from these locations indicates that this peat varies considerably in composition laterally along the route corridor parallel to the floodplain edge and across the floodplain. This is well illustrated in recent work from Mover's Lane and Woolwich Manor Way (Fig 6.6). Principally these variations include changes in the nature of the minerogenic sediments as well as changes in recovered plant remains. A similar complex record of palaeoenvironmental changes has been documented at Purfleet by Wilkinson and Murphy (1995).

The nature and speed of environmental change within the area

The major consequence of sea-level rise within the lower Thames area has been the transformation of the landscape. The late Pleistocene landscape (Stage 1) was one dominated by a braided channel floodplain that was transformed into a meandering channel floodplain during the early Holocene (Stage 2). This landscape would have been underlain by sand and gravel rich sediments. The loss of this landscape occurred as a consequence of sea-level rise and backup of the river (Stage 3) that resulted in the creation of a wetland floodplain characterised by fine-grained sedimentation where fresh water (Stage 4) and brackish water (Stages 3 and 5) elements interacted to control patterns of sedimentation (Fig 6.4). The result of these changes to the physical landscape would have had far reaching consequences transforming the natural flora and fauna of the region. Consequently these changes would have impacted on the resource base for contemporary populations, modified the location of preferred occupation sites, disrupted long-established communication networks, and potentially altered an individual's perception of the landscape and their place within that landscape.

Inferences can already be made regarding the rates of landscape change within the area. Using radiocarbon age estimates for sites where organic facies directly overlie the late Pleistocene topographic template (ie gravel/alluvium interface) (Table 6.2: Fig 6.7A) a model estimating the speed of inundation of the surface of the gravel at different datums relative to Ordnance Datum may be calculated (Fig 6.7B/C). These calculations have been used to calibrate the speed of landscape change across a modelled topographic template for a block of the north Thames floodplain in the vicinity of Barking Creek (Fig 6.4) (Bates 1998; Union Railways (South) Ltd 1999; Bates and Bates 2000). This information suggests *c* 75% of the former floodplain landscape within this area was lost to wetlands between 4700 and 4000 cal BC (Fig 6.7C). This clearly represents a considerable degree of landscape change that may have posed a major challenge to the contemporary population living through these changes. However, these changes also represent considerable opportunities for new subsistence strategies that would have become available.

Cultural perceptions and response to change

Effective modelling of environmental change needs to be matched by an empirical means of assessing the cultural response. There is a tendency in the current literature to make generalised presumptions regarding cultural tolerance to environmental factors such as flooding, with consequent interpretations centred on transhumance and seasonality. In order to fully understand the strategies developed by the Neolithic populations in response to changes, a larger and more representative sample of the archaeology of

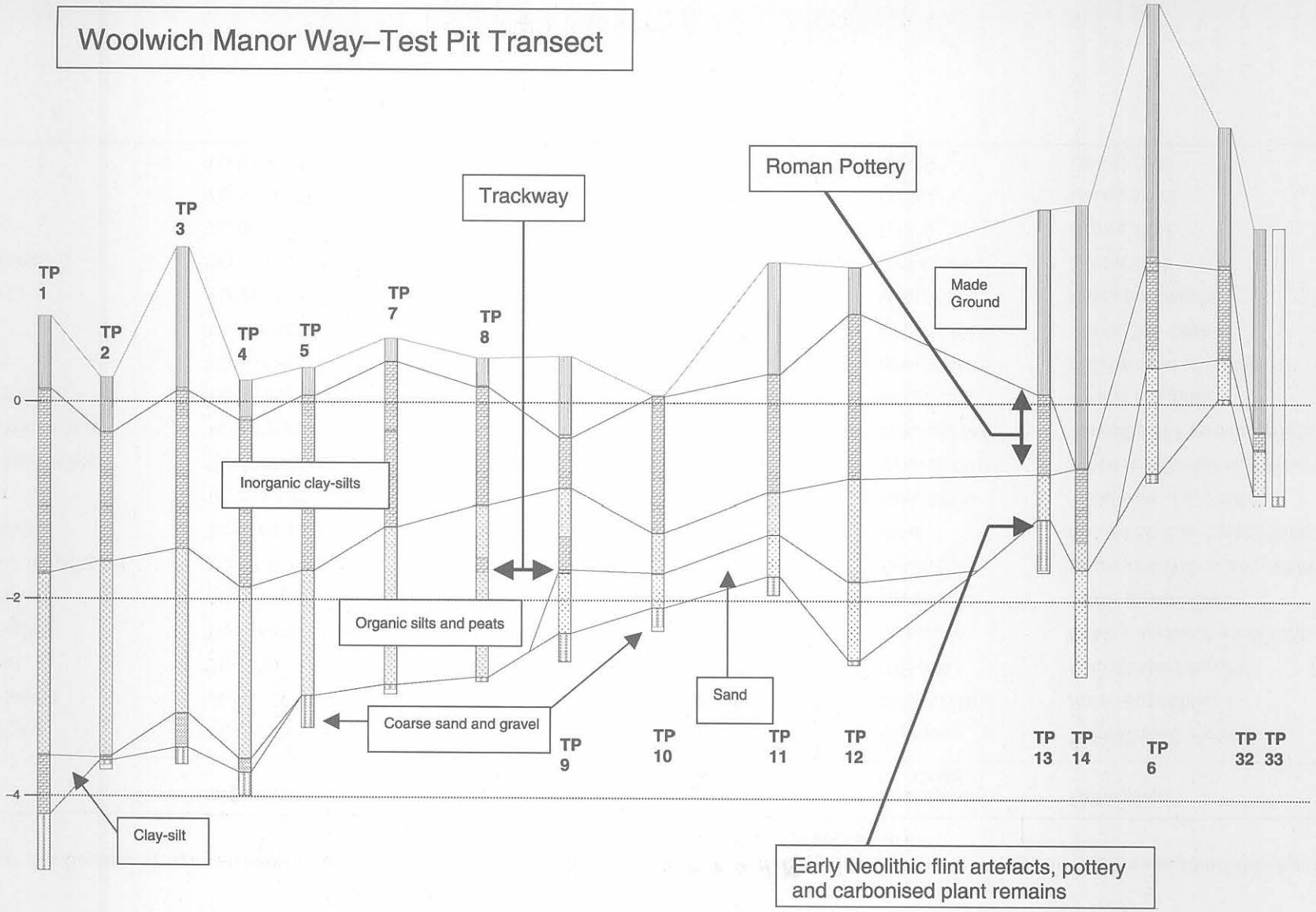
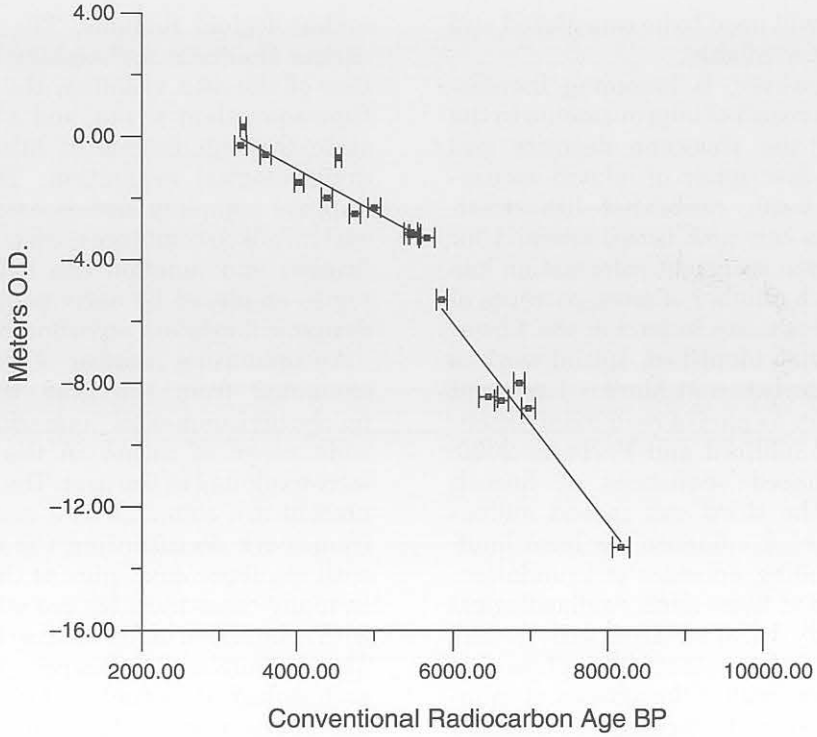
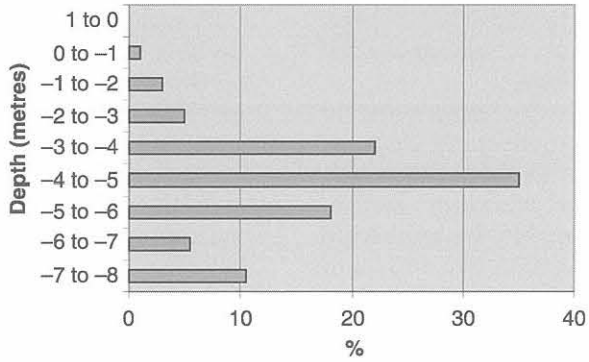


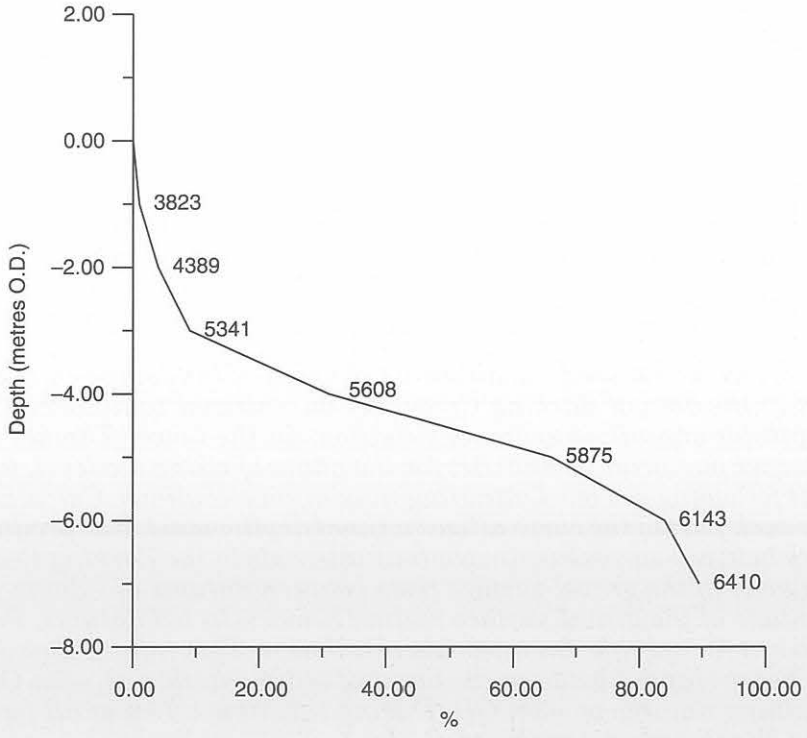
Figure 6.6 Simplified cross-section through sediments at Woolwich Manor Way showing the distribution of archaeological remains within the stratigraphic stack (modified from Gifford and Partners 2001a). Early Neolithic artefacts have been recovered from the surface of a major sand body at the site (a feature common to many of the sites described in this study)

Table 6.2 Radiocarbon age estimates from selected sites in the Lower Thames area used in this study where age estimates are available for contexts immediately overlying non-compressible sediments

Site	Grid reference	Datum (metres OD)	Conventional ^{14}C Age Estimate	Laboratory Code	Reference
Phoenix Wharf	TQ 339 798	0.3m	3310 ± 40 BP	Unknown	Unpublished archive
Westmoor Street	TQ 414791	−0.3m	3280 ± 80 BP	Beta-81970	Bates unpublished
Bellot Street	TQ 3936 7840	−0.6m	3600 ± 70 BP	CIB-325	Unpublished archive
Ebbsfleet Valley	TQ 6165 7420	−0.7m	4540 ± 40 BP	Unknown	Oxford Archaeological Unit, 1997/2000
Canning Town	TQ 397 808	−1.5m	4030 ± 60 BP	Beta-70248	Bates unpublished
Slade Green Relief Road	TQ 5270 7750	−2.0m	4390 ± 70 BP	Beta-76204	Bates and Williamson, 1995
Ebbsfleet Valley	TQ 6165 7420	−2.32m	5000 ± 80 BP	8803	Oxford Archaeological Unit, 1997/2000
Fort Street	TQ 408 803	−2.52	4750 ± 70 BP	Beta-93683	Wilkinson *et al.*, 2000
Woolwich Manor Way	TQ 4249 8220	−3.13m	5460 ± 80 BP	Beta-152740	Giord and Partners, 2001a
Woolwich Manor Way	TQ 4249 8220	−3.19m	5510 ± 70 BP	Beta-152741	Gifford and Partners, 2001a
West Ferry Road	TQ 373785	−3.2m	5460 ± 80 BP	Beta-84317	Pine *et al.*, 1995
Fort Street	TQ 408 803	−3.3m	5660 ± 100 BP	Beta-93689	Wilkinson *et al.*, 2000
Crossness	TQ 488 808	−5.3m	5850 ± 70 BP	Beta-76991	Pine *et al.*, 1994
Borax Works	TQ 4090 8067	−8.0m	6850 ± 70 BP	Beta-76200	Bates unpublished
West Thurrock	TQ 5883 7700	−8.45	6450 ± 120 BP	IGS-C14/153	Devoy, 1982
Broadness	TQ 6057 7664	−8.57	6620 ± 90 BP	Q1339	Devoy, 1982
Stone	TQ 5762 7594	−8.82	6970 ± 90 BP	Q1334	Devoy, 1982
Tilbury	TQ 6466 7540	−13.32	8170 ± 110 BP	Q1426	Devoy, 1982


4.00
0.00
−4.00
−8.00
−12.00
−16.00
Meters O.D.
2000.00
4000.00
6000.00
8000.00
10000.00
Conventional Radiocarbon Age BP


1 to 0
0 to −1
−1 to −2
−2 to −3
−3 to −4
−4 to −5
−5 to −6
−6 to −7
−7 to −8
Depth (metres)
0
10
20
30
40
%


2.00
0.00
−2.00
−4.00
−6.00
−8.00
Depth (metres O.D.)
3823
4389
5341
5608
5875
6143
6410
0.00
20.00
40.00
60.00
80.00
100.00
%

the floodplain area will need to be considered and presently this is not available.

The potential, however, is becoming increasingly apparent. As a result of improvements in the characterisation of the Holocene deposits and sequences, and the description of related archaeological material, local, calibrated lithostratigraphic frameworks can now be established for individual sites. When sufficient information has been gathered from a number of sites, patterns of prehistoric cultural activity in part of the Lower Thames Valley may be identified. Initial work is presently being undertaken at Movers Lane and Woolwich Manor Way as part of road construction activity on the A13 (Gifford and Partners 2000; 2001a; 2001b). Phased sequences of human activity, spanning the third and second millennium BC, and detailed evidence for local landscape change, including episodes of inundation, have been identified at these sites. Archaeological remains can already be associated with events that both predate and postdate the phases of inundation. However, whilst the phases of inundation may lead to waterlogging, potentially adversely affecting existing settlement, elsewhere new wetland habitats may have been created offering a new range of resources for exploitation by these populations.

These and similar sites offer the opportunity to assess the economic and social effects of environmental change, identifying the point at which abandonment and settlement relocation occurs. This may have implications beyond the local scale when patterns of regional settlement shift are considered.

Conclusions

Despite the relative paucity of the archaeological evidence that exists for earlier Holocene human occupation of the Lower Thames area, it is now clear that there has been a significant human presence in the area since the Mesolithic period. Many of the sites listed in the Gazetteer were identified from incidental assemblages collected during the excavation of later, more visible archaeological remains. The apparent rarity of earlier Holocene archaeology is probably a function of the site visibility, the depth of burial of time-equivalent strata, and a tendency to understate the significance of lithic material during archaeological evaluation. There is a need to improve sampling and assessment strategies for early finds assemblages, especially as site identification and function can help clarify the strategies employed by early populations within the dynamic floodplain environment.

An increasing number of sites have now been examined from the area that have revealed palaeoenvironmental material indicative of a wide range of niches in the environment that were exploited in the past. The sites and find spots present are elements in a complex stratigraphic framework documenting the changes associated with sequence development throughout the area. In many cases the sites are intimately associated with elements of extensive buried landscapes. These buried landscapes offer considerable archaeological potential for examining human use of space and adaptations of past groups to change across space and through time.

In order to maximise the potential of the buried archaeological and palaeoenvironmental resource of this area, further consideration needs to be given to refining the models for regional and local palaeoenvironmental change. In particular the scale and focus of palaeoenvironmental reconstruction may require refinement for archaeological purposes. Most importantly, the detail now revealed by study of the sedimentary sequences indicates that questions addressing the response of prehistoric groups to environmental change may now be considered. The adjustment of the contemporary populations to these changes may have involved movement of groups to alternative locations or changes to the survival strategies of groups remaining at the location during and after environmental change. For any groups remaining in place, changes in material technologies would have been necessary; alternatively strategic adaptations of existing technologies may have occurred. In order to detect such strategic

Figure 6.7 Time / depth model used to calibrate the speed of landscape change on the north Thames floodplain in the area of Barking Creek. ***A*** *Conventional radiocarbon age estimates plotted against depth for organic onto gravel situations in the Lower Thames area. This plot shows an initial steeper plot prior to 6000 BP, for the phase of rising sea level, followed by a phase of reduced gradient following sea level attaining maximum elevations. Calculation of the slope of regression lines for each part of the curve allows a time / depth model to be produced.* ***B*** *Percentage of the gravel surface between successive 1m contour intervals in the Barking Reach area. This plot shows that the majority of the gravel surface rests between datums of −3m to −6m OD.* ***C*** *Plot showing the percentage of the gravel surface resting below selected datums. Predicted age estimates (see A above) for specific 1m intervals are shown. This information suggests that only* c *800 radiocarbon years elapsed between the onset of sedimentation at −6m OD and sedimentation attaining datums of −3m OD. During this time c 75% of all former dry ground within the Barking Reach area disappeared*

adaptations, the development of new techniques is required to aid survey, evaluation, and excavation strategies in advance of development, particularly in areas of major urban infrastructure and deeper alluvium. Standardised methodologies for recording and archiving sequences are necessary as well as agreement among the principle groups active in the areas on the key research questions and objectives.

Acknowledgements

The authors would like to thank the staff of Gifford and Partners, Oxford Archaeology, Wessex Archaeology and any others who helped the authors to formulate their ideas. This paper is a contribution to International Geological Correlation Project 449 'Global Correlation of Late Cenozoic Fluvial Deposits'.

Appendix I: Selected Gazetteer of Sites in the Lower Thames and Thames Estuary: Mesolithic and Neolithic

No	Site	Grid Reference	Site Type	Age Estimates	Datum (metres) OD	Stratigraphy	Environment	Categories of Cultural Evidence	Refs.
	Essex								
1	Crouch Site s 4, 15 &17	TQ 8026 9561	Late Mesolithic artefact scatter		0.0	Within a minerogenic soil developed in head deposits.	On valley floor adjacent to early channel.	Burnt flint, retouched blades and cores.	Wilkinson and Murphy, 1995
			Early Neolithic artefact scatter				Subsequent fen carr resulted in peat.	Polished axe, pottery.	
2	Purfleet	TQ 5445 7871	Neolithic artefact scatter	3910 ± 70 BP	−1.0	Within a soil formed in the surface of early Holocene clay silt.	On valley floor within dry mature deciduous woodland.	Polished axe, chisels, flint saw, animal bone (aurochs).	Wilkinson and Murphy, 1995
	SE London								
3	Slade Green Relief Road	TQ 5275 7760	Artefact scatter			Modified surface of late Devensian or early Holocene sand.	On valley floor adjacent to valley margin.	Flint debris.	Wessex Archaeology, 1994b
4	Thamesmead Erith Spine Road	TQ 501 791	Artefact scatter	4670–4230 Cal BC* (peat sealing archaeological assemblages)	−1.65 to −1.80	Modified surface of late Devensian or early Holocene sand.	On the valley floor, adjacent to floodplain margin. Dominant closed lime woodland, with oak and hazel also important.	Flints debris resulting from 'industrial-scale' bifacial tool and blade preparation. Sample recovery of 80 cores, core rejuvenation flakes and retouch blades. Tool types include scrapers, and awls, but tranchet axe production may have been the primary activity. Burnt flint and animal bone. Grimston-Lyles Hill pottery (carinated bowl).	Masefield, 1997
5	Culling Road	TQ 351 793	Late Neolithic artefact scatter		1.2	Modified surface of late Devensian or early Holocene sand.		Peterborough Ware, flint blade, burnt flint.	Sidell *et al*, 2000
6	Ebbsfleet Valley	TQ 6165 7420	Later Mesolithic	6420 ± 50 BP	−6.05m OD	Organic rich sands.	Edge of brackish water channel.	Struck flints, burnt flint, hazel nut shells and charcoal.	Oxford Archaeological Unit, 1997

			Neolithic	6340 ± 80 BP to 4730 ± 70 BP	1.42m OD	Within or resting on peat	In reed swamp	Flakes, blades and cores with associated Ebbsfleet Ware pottery and wooden stakes.	Oxford Archaeological Unit, 2000
	NE London								
7	A13 Woolwich Manor Way	TQ 4249 8220 (site centre)	Early Neolithic artefact scatter	5520 ± 80 BP to 3840 ± 60 BP	−0.40	Modified surface of late Devensian sand and overlying peaty sand.	Edge of lower terrace and the floodplain margin Wetland scrub, including hedgerow species.	Mildenhall pottery, hazelnuts, processed grain (emmer & einkorn), burnt flint and all stages of flint core reduction, including cores and retouched blades, resulting from the production of thin narrow blades. Leaf shaped arrowhead.	Gifford and Partners, 2001a
			Late Neolithic/early Bronze Age sherd	3380 ± 60 BP to 2910 ± 70 BP	−0.40				
			Small late Mesolithic/early Neolithic artefact scatter	5690 ± 60 BP	−3.19	Peaty sand overlying valley bottom terrace gravel.	Associated with the onset of peat forming alder fen carr in the valley bottom.	All-over-combed Beaker sherd and burnt flint.	
8	A13 Movers Lane	TQ 4530 8330 (site centre)	Late Mesolithic						Gifford and Partners, 2001b
			Early Neolithic		0.60–1.20	Modified surface of late Devensian sand and terrace gravels.	Sand and gravel surface of lower terrace immediately adjacent to floodplain margin.	Extensive ditches, pits and post holes ceramics.	
	North Southwark								
9	47–67 Hopton Street, Southwark	TQ 3185 8040	Small Mesolithic and Neolithic lithic scatter			Modified surface of late Devensian or early Holocene sand.	Adjoining stream on margin of sand island.	Burnt flint, flakes, pottery, bone.	Ridgeway, 1999

(continued)

Appendix I Continued

No	Site	Grid Reference	Site Type	Age Estimates	Datum (metres) OD	Stratigraphy	Environment	Categories of Cultural Evidence	Refs.
			Late Neolithic and early Bronze artefact scatter and land clearance				Abandonment associated with deposition of estuarine clays in early Bronze Age.	Flakes and pottery. Structured deposits (Beaker bowl, flint core and blade). Ard marks and charred fills to tree boles. Post and stakehole structures.	
10	10–16 Lafone Street, Horsleydown	TQ3370 7980	Small late Mesolithic/early Neolithic artefact scatter		0.30 to 0.50	Modified surface of late Devensian or early Holocene sand.	Eastern margin of sand island.	Tranchet axe and axe sharpening flakes. Leaf arrowhead.	Bates, 1996
			Late Neolithic/ Early Bronze Age artefact scatter and land clearance					Late Neolithic/ early Bronze Age pottery. Ard marks.	
11	1–2 Three Oak Lane, Horselydown	TQ3365 7984	Buried soil	6040 ± 60 BP	0.18 to −0.10	Modified surface of basal Holocene sand.	Open woodland on eyot margin (Horselydown).		Proctor and Bishop 2002
			Late Mesolithic lithic assemblage		0.18 to −0.10			Microliths, pyramid core, backed and truncated blades.	
			Late Neolithic pits, postholes and ditches		0.18 to −0.10		Locally cleared woodland.	Grooved Ware, daub, rubber stone, cattle bone, petit tranchet arrowhead, refitting flakes and cores. Interrupted ditches.	

					Settlement continues into the late Bronze Age when peat formation has commenced coinciding with a reduction of local woodlands and increase in local grassland.			
12	283 Tooley Street, Horsleydown	TQ 3375 7977	Small Mesolithic lithic assemblage	0.60 to 0.65	Modified late Devensian or early Holocene sand.	On north east sloping edge of eyot, adjacent to infilled stream channel, which Abandonment of later Iron Age activity on the sand surface is associated with deposition of alluvial clay.	Undiagnostic blades and flakes, opposed platform core and tranchet axe sharpening flake.	Saxby,1994
13	Butlers Wharf Estate, Horselydown	TQ 3375 7989	Small Late Mesolithic/Neolithic artefact scatters	0.31	Sand clay fills of channel dividing two islands formed of late Devensian sand.	Open deciduous woodland on eyot margin. Abandonment associated with deposition of peat within mid Bronze Age alder carr.	Microlith, tranchet axe sharpening flake and piercer.	Ridgeway 2003
14	Hunts House, Guys Hospital	TQ 3275 7995	Small late Mesolithic lithic assemblage Small late Neolithic lithics and site clearance	0.25 to 0.50	Modified surface of Devensian or early Holocene sand.	Possibly adjoining stream channel between two eyots.	Burnt flint. Flakes. Ard marks and charred fills to tree boles.	Taylor-Wilson, 2002

(continued)

Appendix I Continued

No	Site	Grid Reference	Site Type	Age Estimates	Datum (metres) OD	Stratigraphy	Environment	Categories of Cultural Evidence	Refs.
15	Wolseley Street	TQ 3397 9775	Small late Neolithic/early Bronze Age artefact scatter and land clearance.		0.80 to 0.85	Modified surface of Devensian or early Holocene sand.	Abandonment associated with deposition of alluvial clay.	Ard marks and associated soil, containing possible Peterborough Ware pottery (late third to early second millennium BC), burnt flint and a small lithic assemblage including opposed platform blade cores and a scraper of late Neolithic/early Bronze Age date.	Drummond-Murray, 1994
16	B & Q Site, Old Kent Road	TQ5344 1778	Two early Mesolithic artefact scatters		0.80 to 1.20	Modified surface of Devensian or early Holocene sand.	Ridge overlooking the southern shore of Late Glacial lake.	Hearths, all elements of core reduction, including cores, preparation flakes, unmodified flakes and blades, range of retouched tools, (microliths, scrapers and burins. Red deer bone.	

*uncalibrated age estimates not available

7 Aerial survey and its contribution to understanding the Neolithic of the South East

by Bob Bewley, Simon Crutchley, and Damian Grady

Introduction

There are two ways in which aerial survey can improve our knowledge and understanding of the archaeology of ancient landscapes in the South East of England. The first is through repeated aerial reconnaissance and the second is by interpretation, mapping, and syntheses of existing (and new) vertical and oblique aerial photographs (Riley 1987; 1996; Palmer 1984; Bewley 1998a; 1998b). In this short piece the contribution of aerial survey to Neolithic studies in the South East will be explored. The purpose of this article is to highlight some new discoveries and promote the sources of information relating to aerial survey. As this volume shows, syntheses of the Neolithic develop and change. Using aerial survey evidence alone will produce biases and its integration with other forms of evidence is crucial for promoting knowledge and understanding.

Recent aerial reconnaissance

There are many archaeologists capable of undertaking aerial reconnaissance surveys and a number do so in the South East. These locally-based flyers operate throughout the region and for Hertfordshire and Essex Davy Strachan (formerly of Essex County Council) received grants from English Heritage to support this work. The results were published as a county-wide view of the potential of aerial survey (Strachan 1998). In addition the former RCHME (now English Heritage) based its flying operation at Biggin Hill from 1967 to 1990 when it transferred to Oxford (Kidlington) airfield. This shift resulted in less aerial reconnaissance being undertaken in Kent and Sussex than formerly but this is not to say there have not been new discoveries. In the drought year of 1995 a possible new long barrow was photographed in the Golf Course at Rottingdean (Fig 7.1). The construction works for the rail link to the Channel Tunnel were also surveyed and the Neolithic house at Blue Bell Hill was photographed in 1998 (Fig 7.2). Finally a programme of monitoring Scheduled Monuments (SAMs) from the air was introduced in 1997 and a number of sites in Kent were monitored in 1998 including Little Kit's Coty House and the Coldrum Mesolithic tomb (Fig 7.3).

The distribution of aerial photographs (held by the NMR) taken by the former RCHME and English Heritage in the South East can be seen in (Fig 7.4). This shows the culmination of many years' work as well as highlighting the limitations of aerial reconnaissance in areas such as the Weald and the inaccessibility of the Gatwick Air Traffic Zone.

Interpretation, mapping, and syntheses

Photography is only one part of the process of aerial survey and without interpretation and

Figure 7.1 A possible new long barrow, centre left, photographed in August 1995 on the Golf Course at Rottingdean. 15-AUG-1995 NMR 15380/17 © Crown copyright. NMR

Figure 7.2 Excavations at Blue Bell Hill in Kent in advance of the Channel Tunnel Rail Link discovered a Neolithic house (top, left of centre) photographed from the air on 10-NOV-1998 NMR 18209/09 © Crown copyright. NMR

mapping the information contained on the photographs cannot be fully understood (Stoertz 1997; Bewley 1998a; 1998b). In 1988 pilot projects were initiated in Kent, Hertfordshire, and the Thames Valley as part of a cropmark classification project (Edis *et al* 1989; Bewley 1993) to assist with SMR enhancement as well as the Monuments Protection Programme (Fairclough 1996). For Berkshire and Kent all the available aerial photographs, both oblique and vertical, were examined (for Hertfordshire only oblique aerial photographs were used) and the crop and soilmark sites were interpreted, mapped, and recorded. All the information relating to these projects (maps, records, and reports) is available in the appropriate SMR, and in the NMR in Swindon.

In the Kent project twelve possible long barrows, eleven sites that might be henges (although only one is likely), and a causewayed enclosure were identified from the aerial survey (RCHME 1989). In addition there were a further eleven sites or 'complexes' which, although multi-period, may have had their origins in the Neolithic. In Hertfordshire there were two possible cursus

Figure 7.3 The Coldrum chambered long barrow was photographed as part of a pilot project to monitor scheduled monuments from the air. 6-AUG-1998 NMR 18101/31

monuments, nine long barrows and seven henges, and eight pit alignments recorded (RCHME 1992). Many of these sites may have received further investigation since these reports were written and all the information about their location is available from the SMR or NMR. Further investigation is required to determine the date and function of all these sites.

The value of recording and presenting the information derived from aerial survey in a mapped form with accompanying records is that sites are placed in a landscape context and are amenable to further study. This future research can take many forms – analysing all sites of a similar shape or size, or attempting to understand sites of one particular period. This has begun with the work of Oswald *et al* (2001) on Neolithic enclosures for the whole of England. This work has examined all possible enclosures, mainly causewayed, and attempted to reassess previous theories. In aerial studies the seminal work on these sites was Palmer (1976) and the division of southern England into four regions (for causewayed enclosures) can now be refined. Since 1976 new discoveries throughout England, often as a result of aerial reconnaissance, have provided enough information for a revision of the Palmer regions, perhaps suggesting smaller groupings or clusters.

One of the major results of these projects was the development of a methodology and scope for what is now known as the National Mapping Programme (Bewley 1995; 1998a; 1998b). This programme has completed twenty-six projects with seven ongoing and new ones being started each year (Fig 7.5). The early pilot projects did not record earthwork sites and were therefore not particularly relevant for Neolithic studies but this is now standard practice. In the South East, coastal erosion has been identified as a major threat and new projects have begun to examine the Suffolk and Norfolk coasts as well as the north Kent coast. For all NMP projects which have been completed so far there has been a high percentage of new sites (ie not recorded in either the SMR and NMR) for Kent this was 100% as there was no

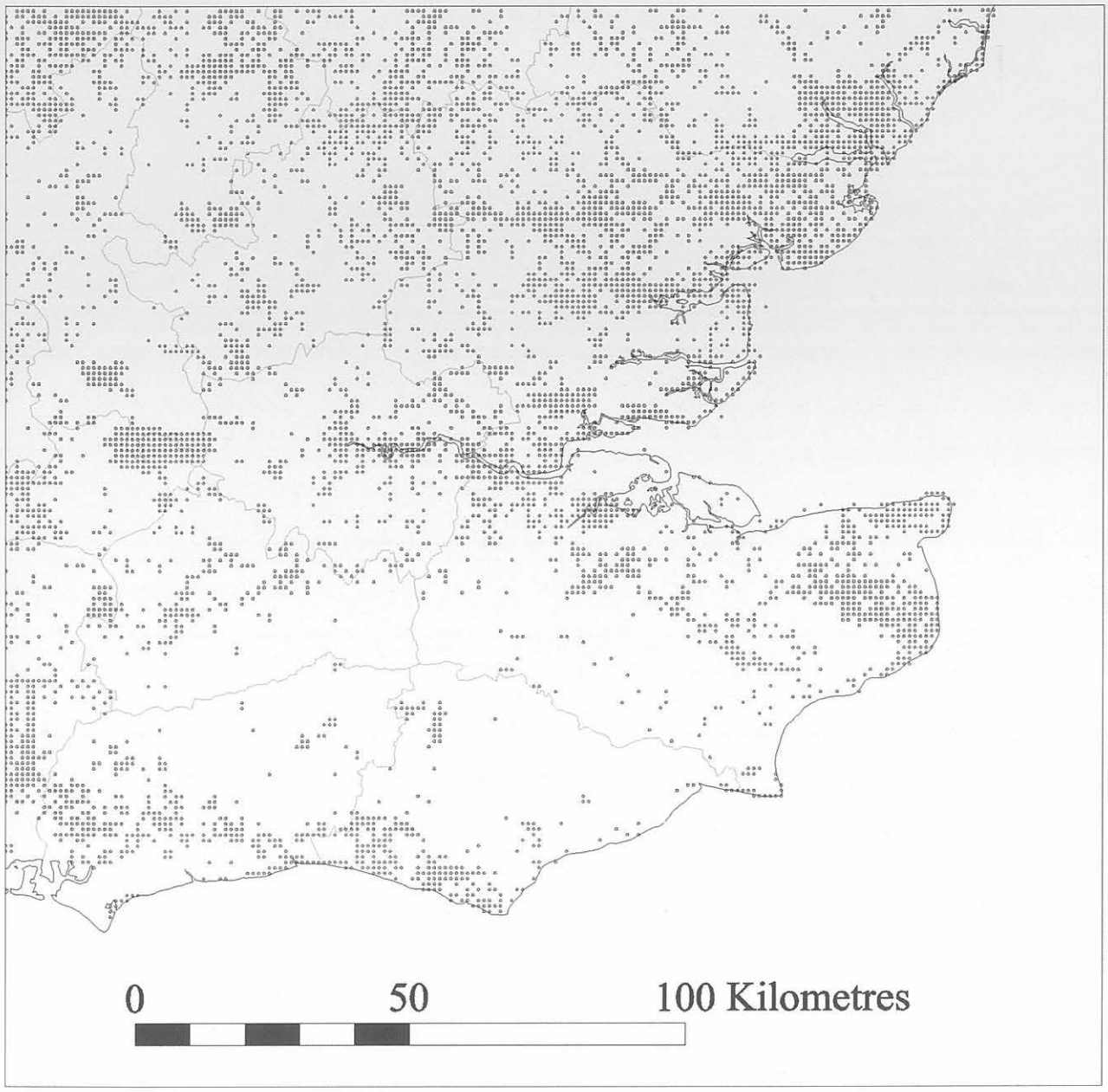


Figure 7.4 A distribution of specialist oblique aerial photographs held by the NMR. Each dot represents at least one photograph for each 1km square. © English Heritage. NMR

SMR prior to the project and for Hertfordshire 46% of the sites recorded were new.

Conclusion

There has been nearly a century of aerial photography for archaeology and it has only been the past 25 years which has seen the beginnings of a consistent approach to the analysis and understanding of the evidence contained on the photographs. Despite the number and intensity of aerial surveys, new sites are being discovered each year both from interpretation and mapping and from continued reconnaissance. Thus there is every intention for aerial survey to continue its approach in the South East of England, as elsewhere. Despite this positive attitude it must always be remembered that aerial survey is only one of many survey techniques and it is the combination of the evidence from a variety of sources which will provide the greater understanding for the Neolithic (or any other period).

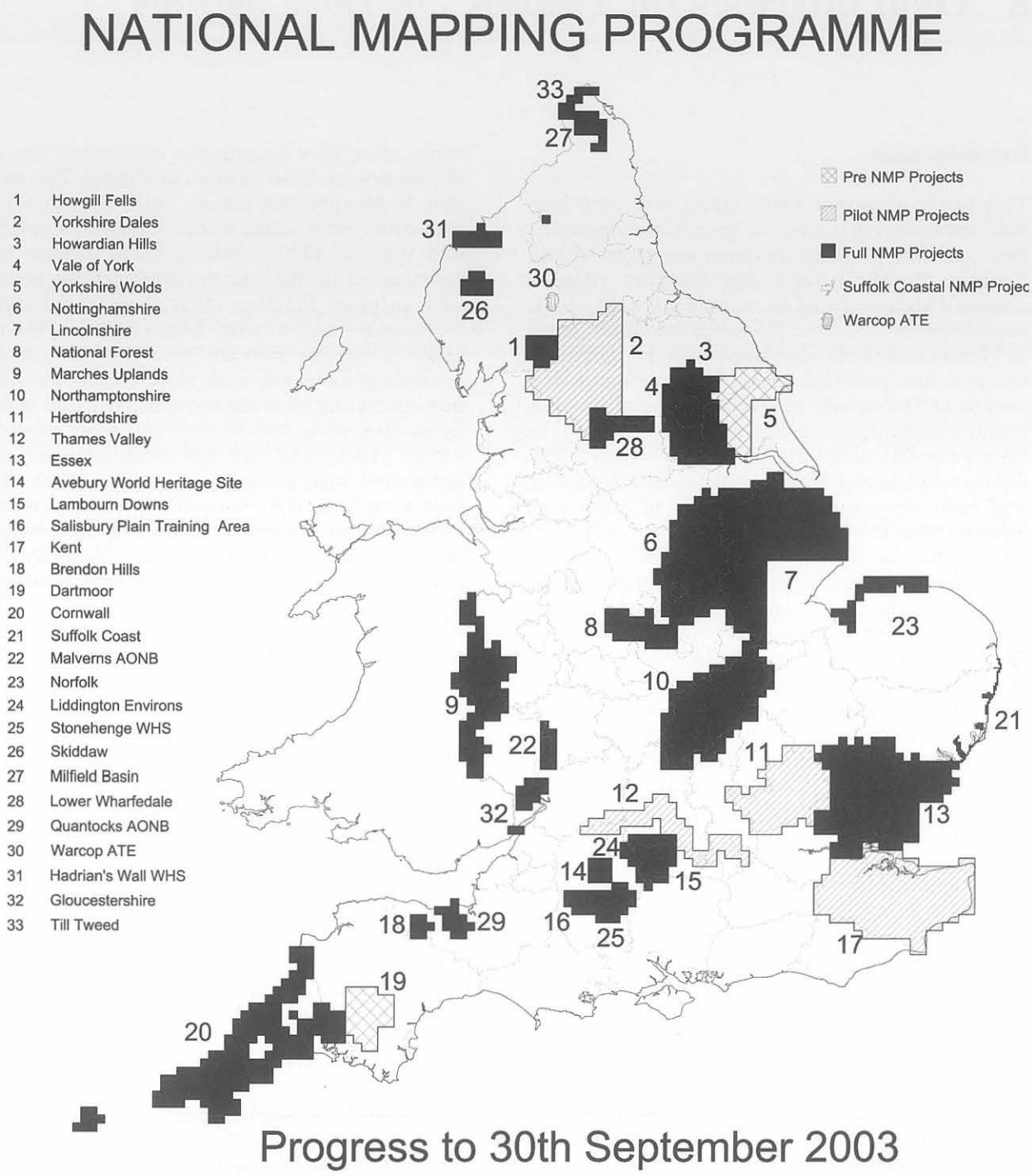


Figure 7.5 The current extent and progress of NMP projects. © English Heritage. NMR

8 Oval barrows on Thanet *by Dave Perkins*

Introduction

This paper examines three small oval-plan barrows excavated in the Isle of Thanet and discusses their possible place in the local evolution of late Neolithic-Beaker Bronze Age funerary rites. A distorted picture would be created were they to be considered in isolation. Research and excavation in Thanet and north-east Kent over the last three decades has revealed an hitherto unsuspected wealth of prehistoric monuments. In particular, hundreds of ploughed-out round barrows have been recorded and collated by the writer[1]. The following is a brief overview of the late Neolithic and early Bronze Age archaeology of north-east Kent as seen at present.

Only late in the last century was it realised by archaeologists working in north-east Kent that this part of the county possessed prehistoric ritual landscapes that, the presence of great monuments apart, rivalled those of Wessex. That they had previously gone unnoticed was due to their most common feature, the round barrow, being ploughed level in more than 95% of cases, a process commencing as far back as the Iron Age[2]. In and after the 1970s, programmes of aerial photography increasingly revealed these barrows and other monuments as cropmarks.

The distribution of ring-ditch cropmarks in Kent is very localised. Of 739 sites (as of 1995), 356 are in the cropmark concentration south-west of the Wantsum floodplain[3], and 315 in Thanet. Only 68 (9.2%) being found throughout the rest of the county, mostly on the high ground west of the Medway. Within the two barrow-rich areas, these sites appear singly, as small groups, and in 'barrow cemeteries', their pattern indicative of the topography and the density and nature of human settlement in these landscapes.

As the barrow distribution was examined in detail, associated phenomena such as ditched field systems, causewayed camps, for example at Chalk Hill, Ramsgate (Dyson *et al* 2000), and at least one probable cursus were noted[4]. Chance discovery has also added to the emerging picture. Evaluations by the writer in Thanet have sampled two ditched enclosures yielding evidence of Neolithic occupation and Beaker reuse (Perkins 1998; Boast and Gibson 2000).

To 1995 only about 30 barrows had been investigated in the whole of Kent. This small sample revealed a wide diversity in terms of diameter and the sectional profiles and dimensions of the ditches. Particularly interesting are a series of circular ring-ditches of between 20m and 40m diameter, most of them in Thanet. The writer and N Macpherson-Grant, both of whom have excavated such monuments (Macpherson-Grant and Perkins 1980b), believe them to have been constructed in the late Neolithic period, perhaps with primary function other than, or additional to, funerary use, as with 'henge barrows' (Ashbee 1960). Evidence from the excavated monuments consists of finds and ditch stratigraphy, the latter demonstrating that the outer ditches had infilled by natural processes to over half their cut depth before recuts and internal modifications, some associated with Beaker pottery, took place. Such metamorphosis is far from unique, being observed elsewhere on a variety of sites. It has recently been discussed by Bradley (1998). If the phenomenon records the adaptation of long redundant ditches and earthworks to a burial practice then new to Thanet, it is perhaps contemporaneous with the oval barrows as a competing rite. This point is dealt with in the discussion.

The small oval barrows

Three examples of these small monuments have been excavated to date, with a further five tentatively identified from aerial photographs (Fig 8.1). As only eight among Thanet's 315 observed ring-ditches, they would seem rather rare, but because of their size and the shallowness of their cut into chalk bedrock, they would tend to show, if at all, as small faint and ephemeral cropmarks. The dimensions of the three excavated oval ditches were between 9m and 12m on their long axes.

Attributes shared by all three barrows are:

(i) Oval plan. The ditches are constructed from five slightly curving joined segments of unequal length, and in two of the three excavated barrows the segments varied in depth, width, and sectional profile.
(ii) They enclose more than one burial pit, the pits sometimes containing or having the capacity to contain more than one burial.

Barrows 2 and 3 share the following:

(iii) Disturbance and removal of human skeletal material
(iv) Evidence indicating that a cairn of flint cobbles once covered the burial pit/pits.
(v) The proximity of flat graves.

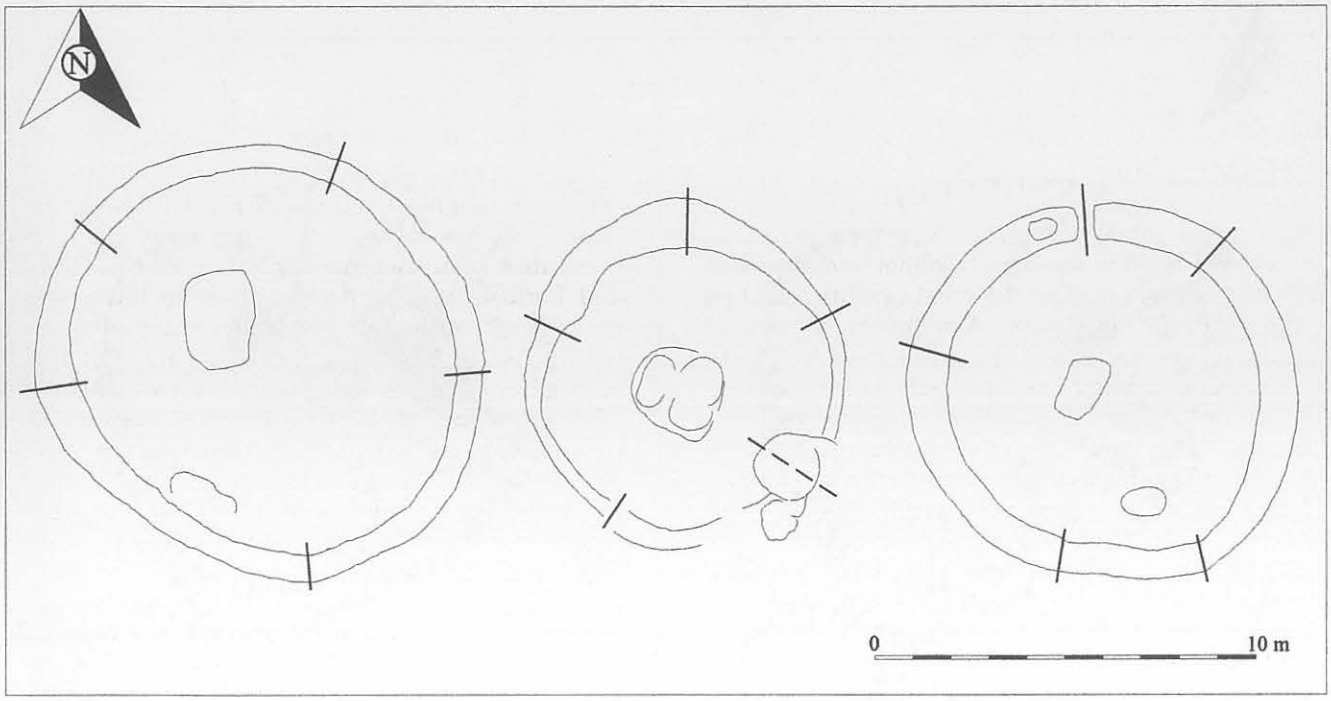


Figure 8.1 Plans of small oval barrows 1, 2 and 3 to scale as shown

Barrow 1

This was located at Manston, Ramsgate, at NGR TR351652. The measurements of the long and transverse axes were 12m × 10.7m. There were two burials, and the barrow possessed attributes i, ii, and iii. The topography was high on the east-facing slope of a Chalk Downland rise. Archaeological associations included two circular ring-ditches nearby, plus cropmarks indicating pits or possibly flat graves (Perkins and Gibson 1990).

The central pit contained a crouched burial with a Beaker radiocarbon-dated to 3630 ± 50 BP (BM-2642, 2140 – 1820 cal BC) although this may not have been the primary burial (see discussion). Three later-Neolithic sherds were found close to the peripheral second burial but an association could not be definitely established.

Barrow 2

This was at South Dumpton, Broadstairs, NGR TR39296634. Measurements of long and transverse axes were 9m × 8.5m. There were seven burials, and the barrow had attributes i – v. The topography was that of a south-west facing Chalk Downland escarpment overlooking the English Channel. Archaeological associations included three flat graves within 2m of the ditch (see also Note 8), and the ploughed-out remains of a small oval ring-ditch enclosing a shallow pit with ?Beaker sherds about 40m away (Perkins 1994).

Detailed description: construction

The five segments of the ditch varied considerably in width, depth, and profile, so that the resulting 'oval' was asymmetric (Fig 8.1). Central within the oval, an irregular bowl-shaped pit had been cut into the chalk to a maximum depth of 0.2m. Within this were three oval pits (two conjoined) cut to a depth of 0.45m and containing seven crouched burials, six superimposed. These were covered by a plough-truncated layer of flint nodules central to an extensive flint scatter, suggesting that the graves had been capped by a cairn.

The burials

The burials were *in situ*, but incomplete in five cases. Presumably as a ritual practice, skulls had been removed when cadavers or skeletons had been uncovered by subsequent interments. The orientation of the burials varied, but if the interments were carried out in the order Burial 1 – Burial 7, they seem to have been carried out on alternate alignments. This sequence, broken down into four drawings for clarity, is shown as Fig 8.2, a – d. Burials 1, 3, and 6 are roughly north-east/south-west, heads north-east facing south-east, and Burials 2, 4, and 7 are north-west/south-east, head south-east facing south-west. Only Burial 5

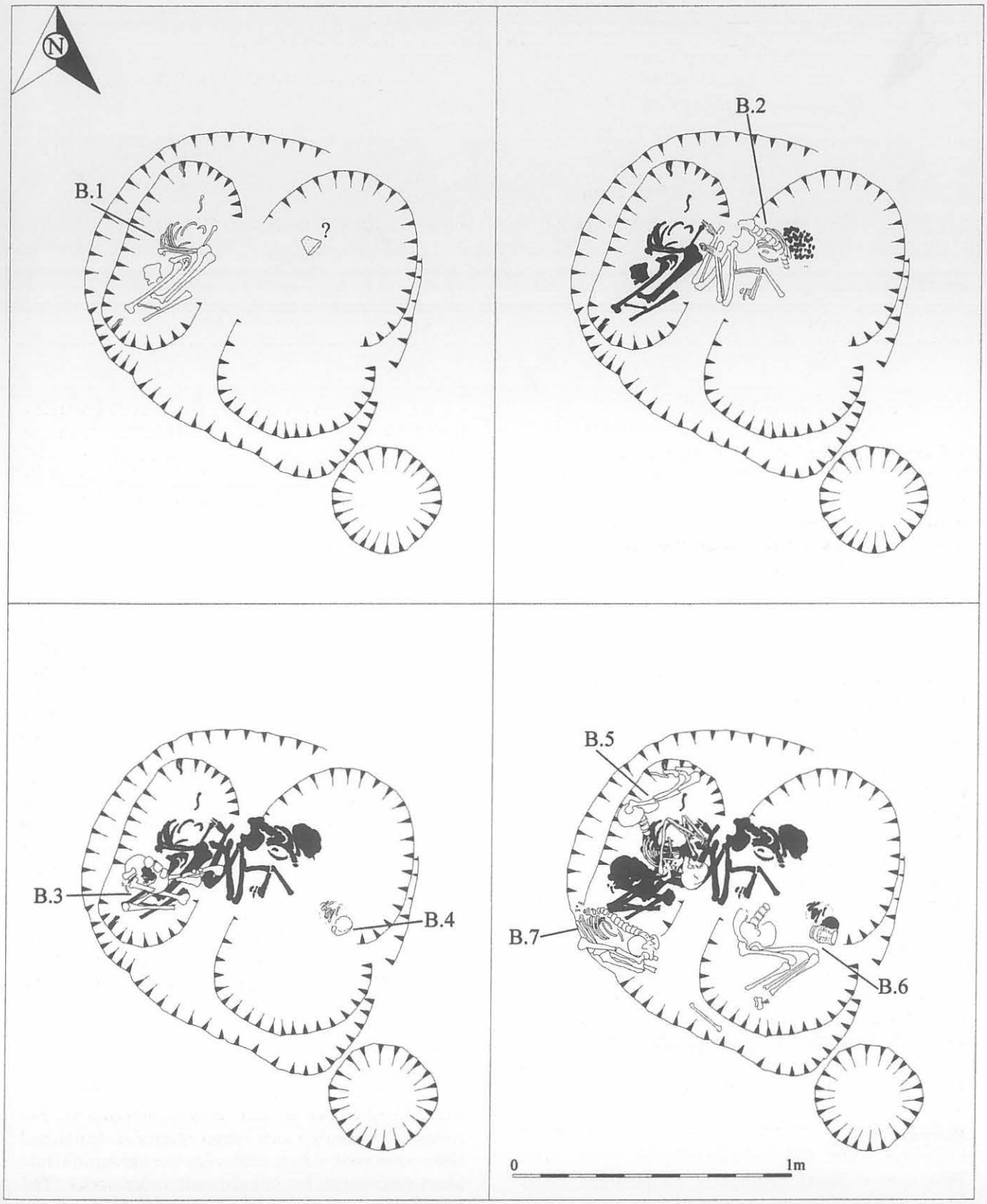


Figure 8.2 Phases of interment in the Barrow 2 pit complex

(presumably contemporaneous with 6 and 7 but probably the final burial) breaks the sequence in being north-west/south-east, head facing north-east.

A detailed report on the skeletal material has been prepared[5] and awaits a South Dumpton 'whole site' publication[6]. The age and gender data of the individuals is tabulated (Table 8.1).

Table 8.1 Summary of burials related to Barrow 2, Thanet

Burial No	Sex	Age	Details	Radiocarbon date
1	Male	Mature adult		2140 – 1880 cal BC (BM-2957; 3630 ± 45 BP)
2	Male	?Juvenile		–
3	Female	–		2030 – 1740 cal BC (BM-2940; 3560 ± 50 BP)
4	–	Infant, estimated at 4 years from teeth		–
5	Female	Estimated at 21 + years	Small bones found in pelvic area	1950 – 1730 cal BC (BM-2864; 3520 ± 40 BP)
6	Male	20 – 25 years old		–
7	Male			–

The ceramic evidence

A fragmented Food Vessel was found on the chalk floor of Pit B beneath Burial 2, while a Beaker was located high in the fill of Pit C, associated with either Burial 4 or Burial 6. It is unusual to find a Food Vessel below a Beaker in a funerary context. The sequence Burial 1 – Burial 2 – Burial 3 – Burials 5 and 7 can be demonstrated absolutely by overlapping stratigraphy. While Burial 4, Burial 6, and the Beaker are higher than Burial 2 in fill, and while the truncated lumber vertebra of Burial 6 came within 0.15m of overlapping the left forearm and hand of Burial 2, it is *conceivable* that Burial 2 postdates Burials 4 and 6. However, the radiocarbon date estimate for Burial 3 (overlapping and in contact with Burial 2) places it firmly in the date range of another three Thanet Beaker burials[7]. The fill between and at the level of Burials 2 and 3 yielded a sherd from a rusticated pot Beaker.

The Barrow 2 pottery has been examined by Dr Alex Gibson. With regard to the Beaker, while finding no close parallel for its decoration, he equates its form to Clarke's (1970) Wessex/Mid-Rhine group or step 3 in Lanting and van der Waals's (1972) scheme, and therefore typologically early in the British sequence. Of the Food Vessel he remarks that they are rare in southern England, and rarer still in Kent, where this is only the third example, one other coming from Thanet. A detailed ceramic report has been written by Dr Gibson, and awaits a South Dumpton whole site publication.

Barrow 3

This was located at the St Stephen's College site, North Foreland Hill, Broadstairs, at NGR TR39706925. The measurements of long and transverse axes were 10.5m × 10m. Three burials were recorded, and the barrow possessed attributes i – iv. It was situated on a north-west facing Chalk Downland escarpment. Associated with the barrow were five flat graves within 30m and two barrows at a distance of 50m and 100m, one with burials, the other a ring-ditch with no trace of internal features (Perkins and Boast 2000).

Detailed description: construction

The ditch differs from Barrows 1 and 2 in two respects. Firstly, that the segments are reasonably consistent in width and section, and that care has been taken to match up the levels of the ditch floor where segments join. Secondly, in a major departure, the ditch is broken by a causeway entrance. Interestingly, but no doubt fortuitously, a line taken across the barrow and through the centre of the causeway runs almost true north. Close to the central burial, the plough-abraded chalk surface was cut by a pit filled with large flint nodules. These flints could well be the entrapped remnants of a ploughed-off cairn, and possibly evidence of a shaft being driven down through a cairn. In support of this hypothesis, the round barrow (St Stephen's 2) situated 50m south-east of Barrow 3 had a flint cairn over the central burial.

The burials

Barrow 3 had two plough-truncated grave pits within the ditch, one central, the other only 0.8m in from the ditch. In both cases the shallowness of the surviving bowl-shaped cuts had allowed plough damage to the extent that only teeth and small bone fragments were present. In the north-western terminal of the ditch beside the causeway, the chalk floor of the ditch was cut by a small oval pit containing the crouched skeletal remains of a young child. The grave was capped by a fragment of whale bone (mandible) measuring 1.5m in length and 0.15m thick, placed longitudinally over the grave and supported at each end by the ditch floor.

Discussion

Neolithic burial practices in the Isle of Thanet

What is remarkable, bearing in mind Thanet's cropmark display of hundreds of round barrows, is the paucity of evidence for burial customs previous to the Bronze Age. There are some tantalising clues. Were the 'Hakemdown Banks' at Kingsgate, entered by 18th-century treasure seekers (Jessup 1957) earthen long barrows? What were the linear tumuli with their associated burials destroyed at Seven Stones, Broadstairs, in the 1960s[8]? A few Thanet cropmarks may represent long barrows, among them 'Thunor's Pit' (Crawford 1933). Three of Thanet's flat graves contained Beakers, and have been radiocarbon dated, see Note 7. There remain however a further twenty or so excavated graves, two of them within the Chalk Hill causewayed enclosure, for which dates have yet to be obtained. Even if a substantial number of the latter burials prove to belong in the Neolithic, the overall dearth of remains in Thanet would suggest that the Island was sparsely populated in the Neolithic, experiencing a population explosion during the Bronze Age.

To date the most impressive Neolithic funerary discovery in Thanet is the large oval-plan burial pit found at Nethercourt Farm, Ramsgate, in 1949 (Dunning 1966). It held a crouched burial covered by the sherds from a hemispherical bowl of Windmill Hill type. Above this were found the 'dismembered' remains of another individual scattered in a layer of fill strata containing occupational debris. The pit was located about 600m north-east of the Chalk Hill causewayed enclosure.

The adaptation of Thanet's larger ring-ditch monuments

As mentioned in the introduction, six of Thanet's larger ring-ditched enclosures provide evidence of major modification and renewal works, these having taken place at a time when the ditches had infilled to at least two-thirds of their depth by natural processes. All these enclosures are more than 20m in diameter, with ditches of truncated V-section, typically 3m wide and over 1.5m deep. In dimensions and form they stand quite apart from another fourteen 'conventional' barrows excavated in Thanet. Cropmark evidence establishes that they have at least eight counterparts in the Thanet landscape, as against (where scale in air photos can be determined) hundreds of smaller barrows. A seventh enclosure in the Lord of the Manor (LOM), Ramsgate, henge-barrow group Site 2D (LOM 2D) hints at the original role of these enclosures. With a diameter of 23m, it had a wide causeway entrance, a slotted ditch floor, an inner bank, and a central pentagonal post setting surrounding a hearth (Macpherson-Grant and Perkins 1980a). However it may have functioned, it was certainly not a barrow. Modifications to the six enclosures took the following forms:

A The cutting of one or more concentric ring-ditches within the original ditch: LOM 1 (Macpherson-Grant 1977), LOM 8 (Perkins 1995), Monkton, Barrow 3[9],
B Recutting the whole ditch leaving traces of the original fill and chalk-cut profile in section: LOM 5 (Perkins and Macpherson-Grant in preparation), LOM 8 (Perkins 1995), St Stephen's Barrow 2 (Perkins and Boast 2000),
C Intermittent and alternate quarrying of the ditch fill and chalk-cut sides of the ditch: LOM 3 and LOM 5 (Perkins and Macpherson-Grant in preparation),
D Partial removal or slighting of a causeway entrance: LOM 3 and LOM 5 (Perkins and Macpherson-Grant in preparation).

Three of the six enclosures yielded early Bronze Age pottery. Within the ditch of LOM 1 an horizon holding Beaker sherds, bones, and worked flint, was cut by two concentric ditches and six graves, one of them a Food Vessel cremation burial accompanied by a barbed-and-tanged arrowhead. Near the centre of LOM 3, two pits containing flint flakes, animal bone, and charcoal, had been sealed by an overall layer of soil-stained chalk rubble. This had been cut near the centre by a pit holding a cremation burial in a Collared Urn. The site having the most direct bearing on the small oval barrows is LOM 8. At the centre of this 25m diameter enclosure was a shallow plough-truncated pit containing two human teeth and fragments of flint-gritted pottery. This feature was encircled by a ditch 9m in diameter and about 0.3m wide by 0.2m deep. Its fill yielded more small potsherds, one of them with impressed decoration as of a Beaker (Perkins 1995).

Comparanda: the small oval barrow burials

The Barrow 1 grave pit was big enough to have contained multiple burials. Missing bones from the Beaker burial and a superfluous femur, with the hindsight now provided by Barrow 2, suggest that the theory of Dark Age Jutish disturbance (Perkins and Gibson 1990, 19) can be abandoned. While the Barrow 3 central and peripheral burials do seem at first glance to represent the 'standard rite', extensive plough truncation and the possible loss of a cairn may have provided a false picture. In general, the affinities of Barrows 1, 2, and 3 suggest that they are products of the same tradition.

The Barrow 2 multiple burials are not unique, finding close parallels in a rather small type assemblage of which all but half a dozen are concentrated in east Yorkshire. Between 1860 and 1900 no less than 425 barrows were excavated in the Wolds of east Yorkshire (Greenwell 1890; Mortimer 1905). Of these 65% contained multiple burials as distinct from the 'standard rite' of a single primary burial with occasional peripheral secondary burials. Only seven barrows, however, contained six or more burials, and only three barrows (containing four, five, and seven burials respectively) held both Beakers and Food Vessels (Peterson 1972). Barrow 2 is unique however in exhibiting the sequence of Food Vessel followed by Beaker. On grounds of similarity, the Barrow 2 burial pit could be a far outlier of a Yorkshire tradition, perhaps evidence of social contact via coastal trade.

What are we to make of the dichotomy between the small oval Barrow 1 Beaker burial, and, only about 100m away, a round ?Beaker barrow of similar dimensions central within the formidable ditch of LOM 8? To the writer a picture appears of a small insular community at the close of the Neolithic taking tentative steps towards adopting the round barrow rite, while subject to influence from contending imported traditions.

Notes

1 Research by the writer during the course of study for a PhD thesis: Perkins 1999, Chapter 3.
2 Barrows at Lord of the Manor, Ramsgate, exhibit plough cuts in the chalk bedrock dated by pottery and coin evidence to the late Iron Age. Thanet Archaeological Society archives.
3 This is a triangular area of the North Downs bounded by Canterbury, Deal, and Folkestone. It has been christened the 'Sutton Wedge' by the writer from the village of that name at the focus of the multi-period cropmark display, constituting 44% of Kent's recorded cropmarks.
4 A linear cropmark bordered on both sides by round barrows can be seen to run roughly east-west for at least 1.4km on chalk downland north of Monkton in Thanet.
5 By José Gibbs of Thanet Archaeological Society in consultation with Trevor Anderson. It awaits 'whole site' publication of the South Dumpton site.
6 Publication of this important multi-phase prehistoric site has been delayed as regrettably the Office of the County Archaeologist (Kent) could not agree post-excavation funding with the developer.
7 Radiocarbon dates were obtained from three Beaker flat-graves discovered in Thanet. The date estimates were:

   Ebbsfleet Lane 3630 ± 60 BP (BM-2725; 220–750 cal BC),

   Monkton A253 (1) 3640 ± 50 BP (BM-2898; 215–880 cal BC),

   Monkton A253 (2) 3700 ± 50 BP (BM 2923; 2280–940 cal BC).
8 In the 1960s during housing development of the grounds of 'Seven Stones' a house at South Dumpton, Broadstairs, 'many' crouched burials were disturbed, and two linear earthworks were destroyed, the latter being shown on OS Third Edition and later maps. Local amateur archaeologists and interested site workmen witnessed these events but no recording was allowed. The north-western boundary of this site is just 3m from the ditch of Barrow 2.
9 *Pers comm* Dr Ian Stewart who supervised the excavation.

Acknowledgements

Thanks are due to Dr Alex Gibson and the late Len Jay for advice on ceramics and regional burial traditions, and to Emma Boast for preparing the illustrations.

9 Opening the wood, making the land: the study of a Neolithic landscape in the Dorney area of the Middle Thames Valley *by Tim Allen, Alistair Barclay, and Hugo Lamdin-Whymark*

Introduction

This paper provides a study of the evidence for, and the impact of, Neolithic people in an area of the middle Thames Valley between Taplow and Eton. It deals largely with the results of two landscape projects conducted by Oxford Archaeology (formerly the Oxford Archaeological Unit, and hereafter OA) for Eton College and for the Environment Agency respectively, which together provide one of the most intensive archaeological investigations of any stretch of the Thames Valley. The Eton Rowing Course (formerly known as Eton Rowing Lake) comprises a 2.5 by 0.75km block of land on the north bank of the Thames, the Maidenhead-windsor Flood Alleviation Channel a transect 15km long and 60m wide across the surrounding area.

These projects cross an area of ?Shepperton gravel terrace deposits (Gibbard 1985) containing Neolithic and later sites. The terrace deposits are cut through by a series of palaeochannels of the River Thames and its tributaries, the Eton Rowing Course including a major channel that was active until the end of the prehistoric period. Between this channel and the gravel 'islands' were large areas of alluviated floodplain, which have preserved *in situ* prehistoric activity areas, and smaller floodplain areas were also present alongside palaeochannels throughout the Flood Alleviation Scheme. Late Pleistocene and early Holocene channels, which became choked early on, also left hollows crossing the gravel terrace islands that preserved Neolithic deposits from ploughing.

The archaeology of the two projects is complementary. The Eton Rowing Course project offered the opportunity to explore the utilisation of different topographies and varied environments within a coherent block of landscape over time, and the excavation strategy was designed to examine the broad spatial and perceptual relationships between them. Although involving large-scale excavations spread over a number of years, the Rowing Course project is, however, in some respects a detailed investigation of a relatively limited area, while the linear archaeology of the Flood Alleviation channel provides a wider context for Neolithic activity along this stretch of the river. In addition, the archaeological investigations on the line of the Flood Alleviation channel expanded the range and character of topographies and environments investigated.

The archaeology carried out in connection with the Eton Rowing Course and the Flood Alleviation Scheme began with a cropmark and walkover survey carried out for Thames Water in 1985 (Carstairs 1986) followed by phases of evaluation by OA in 1987, 1990, 1994 and 1995, and along the Flood Alleviation Scheme by Thames Valley Archaeological Services (Ford 1991). On the basis of the evaluations, areas were selected for detailed excavation supplemented by other areas of watching brief by OA between 1995 and 2000 (Allen 1995; Allen and Welsh 1996; 1997; 1998; Durden *et al* 1997; Foreman 1998; Foreman and Bradley 1998; Allen 2000).

A plan showing the extent and geographical proximity of the two schemes, and the areas selected for detailed excavation, together with the cropmarks of likely Neolithic date, are shown on Figure 9.1. The approximate locations of recent excavations by OA at Taplow Court (Allen and Lamdin-Whymark 2000) and at Cippenham by Ford (Ford and Taylor this volume) are also indicated.

Chronology and definitions

For the purposes of this paper the Neolithic is divided as follows:

Early Neolithic - 4100–*c* 3300 cal BC, including Carinated Bowl, Plain Bowl, Decorated Bowl and Ebbsfleet Ware;
Middle Neolithic - *c* 3300–*c* 2900 cal BC, including Mortlake Ware and Fengate Ware;
Late Neolithic - *c* 2900–2200 cal BC, including Grooved Ware (*c* 2900–2200 cal BC) and Beaker (after 2500 cal BC).

Dating from lithic assemblages alone has only distinguished between early Neolithic, middle/late Neolithic and late Neolithic/early Bronze Age (including Beaker).

Archaeological context

The stretch of the Thames between Maidenhead and Windsor contains one definite and one probable causewayed enclosure (Fig 9.1), and a small number of mortuary enclosures and ring-ditches. Gates' aerial survey of the Middle Thames

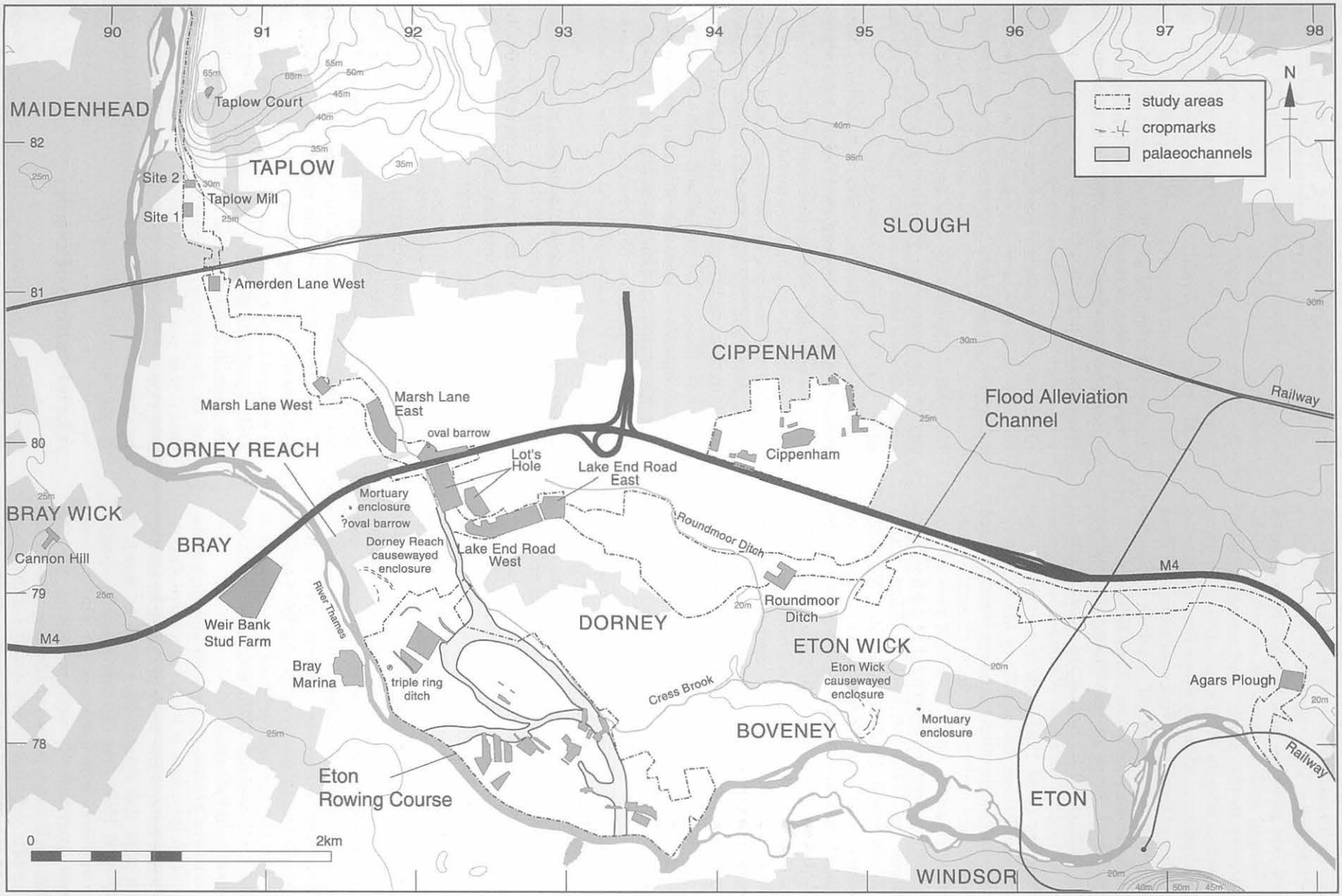


Figure 9.1 Cropmark and other Neolithic sites in the Dorney area, showing the extent of the Eton Rowing Course and Flood Alleviation Channel and palaeochannels of the Thames

did not identify any of these, and the evidence only came to light with a survey carried out by P Carstairs for Thames Water (Gates 1975, maps 28 and 29; Carstairs 1986, fig 2 Site D). Carstairs identified one possible causewayed enclosure at Dorney Reach, with a probable mortuary enclosure adjacent to the north, and another causewayed enclosure only 5km downstream at Eton Wick. Limited excavation by Steve Ford confirmed the existence of the Eton Wick enclosure and Ford identified the cropmark of another probable mortuary enclosure adjacent (Ford 1991–3).

On the south bank of the Thames a natural shaft at Cannon Hill, Berkshire, was found to contain a deposit of early Neolithic Carinated Bowl (Bradley *et al* 1981), while salvage in the Hoveringham gravel pit (now Bray Marina) revealed early Neolithic human bones accompanied by antler combs and struck flints (Holgate 1988, 278). More recently, early Neolithic pottery and flintwork was recovered from a pit and a hollow in excavations at Weir Bank Stud Farm, Bray (Barnes and Cleal 1995, 11). A later Neolithic assemblage of struck flint was excavated at Maidenhead Thicket (Boismier 1995), while the river itself has yielded a collection of Neolithic axes from dredging (Adkins and Jackson 1978, fig3). The area is only 10km upriver from the excavated Neolithic sites of Runnymede and Staines (Robertson-Mackay 1987; Needham 1991).

Themes

In general terms, the landscape study was made possible by three circumstances: exceptional preservation of material evidence *in situ*, excellent preservation of environmental evidence, and the presence of a good chronological sequence. The survival of a prehistoric palaeochannel of the Thames untouched by dredging, the potential for the preservation under alluvium of buried land surfaces on the adjacent floodplain, and the localised survival of similar land surfaces within hollows on the gravel terrace provided evidence of a quality rarely encountered or excavated, particularly on the large scale. A key aim of the Rowing Course mitigation strategy was to take advantage of the large areas available to address questions of the spatial variability in the context of a project where much of the evidence was intact or relatively undisturbed.

Due to the migration of the meandering palaeochannel, leaving parts of each successive channel fill sequence behind the bank of the next, another key aim was the establishment of as much as possible of a Holocene environmental sequence (Parker and Robinson forthcoming). The evidence has been particularly well preserved for the Neolithic to Roman periods, allowing the reconstruction of a detailed environment within which to attempt to understand Neolithic activity.

Material of the early Neolithic, the middle Neolithic, and the Beaker period was recovered from evaluation, indicating that most phases of the Neolithic were represented within the area, and offering good opportunities to look at changing patterns of use of locations within the area over time. By the time excavation had finished, pottery of all phases of the Neolithic had been recovered in reasonable quantity. Between them the projects have provided a very significant assemblage for the region as a whole.

In the context of recent focus on 'inhabitation' of landscapes (Andrews *et al* 2000), it is important to recognise that many of the activities of Neolithic people did not leave traces below ground, and that much of the material evidence was deposited on the contemporary ground surface. Without adequate preservation, or strategies specifically designed to recover this material from the ploughsoil, landscape studies in the Neolithic are of limited value. The Dorney projects, however, offered the possibility both of recovering more and of better contextualisation.

As is usual following PPG16 guidelines, the most significant monuments were left undisturbed, although small-scale monuments did fall within the developments, including a possible oval barrow and penannular enclosure of Neolithic date, and the ring-ditches of four Bronze Age barrows, and these were investigated. Much of what was to be examined was thus non-monumental in character and the opportunity was presented to look at living sites within a landscape against a background of monuments, and study the development of the 'domestic' aspects of this landscape. For the fourth millennium cal BC in particular, these projects would be examining a large area of the hinterland of two causewayed enclosures, and thus provide a valuable opportunity to test current theories on the relationship of these monuments to Neolithic settlement patterns.

Types of feature encountered during the evaluation included palaeochannels, natural hollows, tree-throw holes, pits, flat graves, occupation spreads, and specialised activity areas. There was thus the potential to examine a number of aspects of the Neolithic record: the nature of settlement, the extent of tree clearance, the use of natural features and places, patterns of discard and deposition, mobility, and seasonality. During the excavations it became clear that sites belonging to the primary Neolithic were present, and that it was possible to examine at a local scale the adoption of farming. Collectively the evidence provides one of the best opportunities to explore Neolithic landscape history.

A brief outline of results

The sequences of waterlogged channel and floodplain deposits have enabled the reconstruction of

the environmental development of the area from the beginning of the Holocene until the present day. At the Rowing Course, two extensive deposits of early Neolithic material including midden dumps, each containing thousands of struck flints, pottery, and bone fragments, lay in hollows less than 1km apart, and a third smaller but similar hollow deposit was found at Lake End Road West (Fig 9.2). At the Rowing Course other smaller early Neolithic spreads of pottery are widespread on the gravels, while a dense concentration of lithic scatters indicating a wide range of activities has been recovered from the floodplain. Some of these scatters lie on the contemporary channel edge, and Neolithic deposits including human and animal bones have been recovered from the river itself.

Early Neolithic pottery and flints have been recovered from pits or tree-throw holes on all the sites close to the Thames along the Flood Alleviation Scheme. Tree-throw holes at the north-west end of the Eton Rowing Course (close to the probable Dorney enclosure) contained Ebbsfleet pottery and associated flintwork. On the floodplain an Ebbsfleet Ware assemblage was found close to the Thames palaeochannel, and two unaccompanied flat graves of middle Neolithic date (possibly associated with a ring-ditch) were found adjacent to the larger early Neolithic hollow deposit.

In the middle Neolithic, a group of ten pits, nine of them containing a large assemblage of Mortlake Ware (1000+ sherds), the other Fengate Ware, came from Lake End Road West, close to the Dorney Reach cropmark enclosure. Further Peterborough Ware pits have come from Taplow Mill Site 2 and from Marsh Lane East, and a late Neolithic pit from Taplow Mill Site 1. Tree-throw holes along the Flood Alleviation Scheme have also produced evidence of the manufacture of chisel arrowheads. Outside the two major schemes, early Neolithic flintwork has been recovered from the hilltop at Taplow Court (Allen and Lamdin-Whymark 2000, 23), and at Cippenham near Slough pits containing early Neolithic Plain Bowl have also been found (Ford and Taylor this volume).

At the Eton Rowing Course, four late Neolithic pits, two containing Grooved Ware, have been found at the north-west and in the centre of the site, while ring-ditches of Beaker date have been excavated in the centre and south-east. A cropmark triple ring-ditch at the north-west end of the Eton Rowing Course probably represents a large barrow of several phases. Two further ring-ditches, one oval and possibly Neolithic, the other early Bronze Age, have been found adjacent to one another at Marsh Lane East on the Flood Alleviation Scheme. A range of further lithic scatters have been found on the floodplain at the Eton Rowing Course, some associated with Beaker pottery. Because of the paucity of material of Grooved Ware date, the middle, late Neolithic, and Beaker periods have been combined on Figure 9.3.

The utilisation of the floodplain continues into the early Bronze Age, as hearths and pottery vessels (Collared and Biconical Urn) have both been recovered at the Eton Rowing Course. There is little Beaker or early Bronze Age pottery from sites on the Flood Alleviation Scheme, although the excavation of a round barrow at Marsh Lane East produced a central cremation deposit associated with a large Collared Urn that had been placed on a wooden bier. Some of the lithic scatters, which can only be dated broadly as late Neolithic or early Bronze Age, may also belong to this period.

Interpretation at the local level

Middens

Any consideration of the Neolithic in the Dorney area has to begin with the large-scale occupation deposits in Areas 6 and 10 (Figs 9.4 and 9.5). Of all the sites these are the most striking and arguably contain the earliest deposits. They occurred in the silted hollows of former channels. In Area 6 a length of nearly 200m of the hollow, which was up to 25m wide and 0.2m deep, was stripped, and over 32,000 artefacts recovered (Fig 9.6). Just less than 20% of the hollow was excavated in detail, and further finds recovered in salvage from sorting the spoil from machine-excavation of the rest. In Area 10 nearly 5000 artefacts were recovered from a 600m^2 sample of the hollow, which was of similar width but only survived up to 0.15m deep.

In Area 6, distinct areas of black charcoal-rich soil containing concentrations of finds were noticed within the overall spread of finds along the hollow. Some of these proved to be lying upon the surface of the hollow, others to be infilling tree-throw holes. These areas are interpreted as representing discrete areas of dumping. In Area 10 there were no such discrete areas of black soil except within tree-throw holes, though similar concentrations of finds were found. In both areas lesser concentrations of pottery and struck flint were identified, and around these was a background scatter. The density of finds ranged from as many as 400 to as little as 4 per square metre.

No hearths, floor surfaces, or posthole buildings were found accompanying the deposits within the hollows, nor in the surrounding excavated areas. These may have existed north of Area 6 or to the north-east of Area 10, but in the latter case in particular sufficient of the surrounding area was excavated to suggest that these deposits lay at some distance from any substantial buildings (if such existed).

The pottery assemblages from these sites (respectively *c* 6000 and *c* 1600 potsherds) both include Carinated Bowl pottery of the type usually associated with the earliest or primary Neolithic (Herne 1988) (Fig 9.7). The bulk of the pottery is, however, of Plain Bowl type very

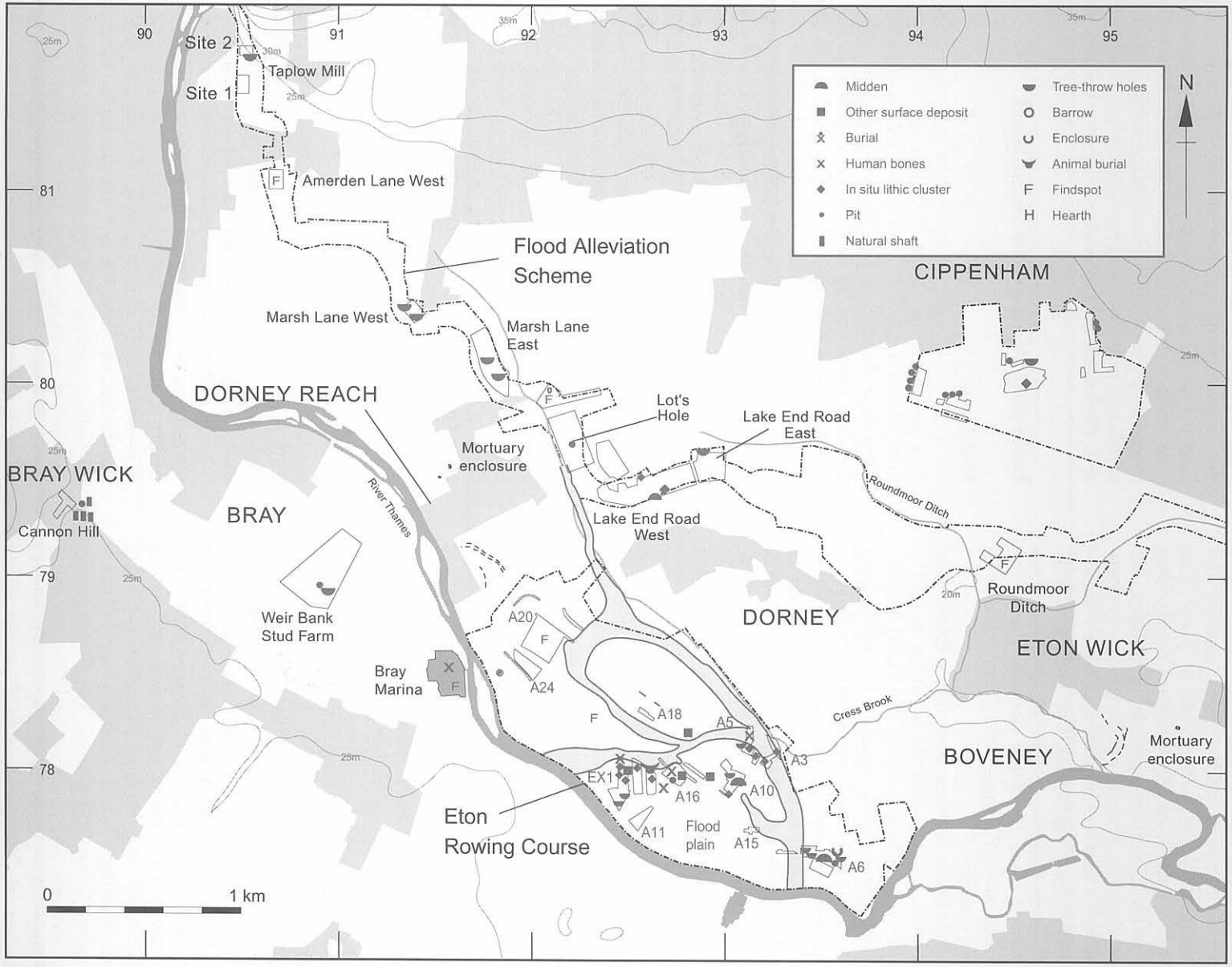


Figure 9.2 Early Neolithic sites discovered within the two schemes and in other recent work, including an indication of the character of activity

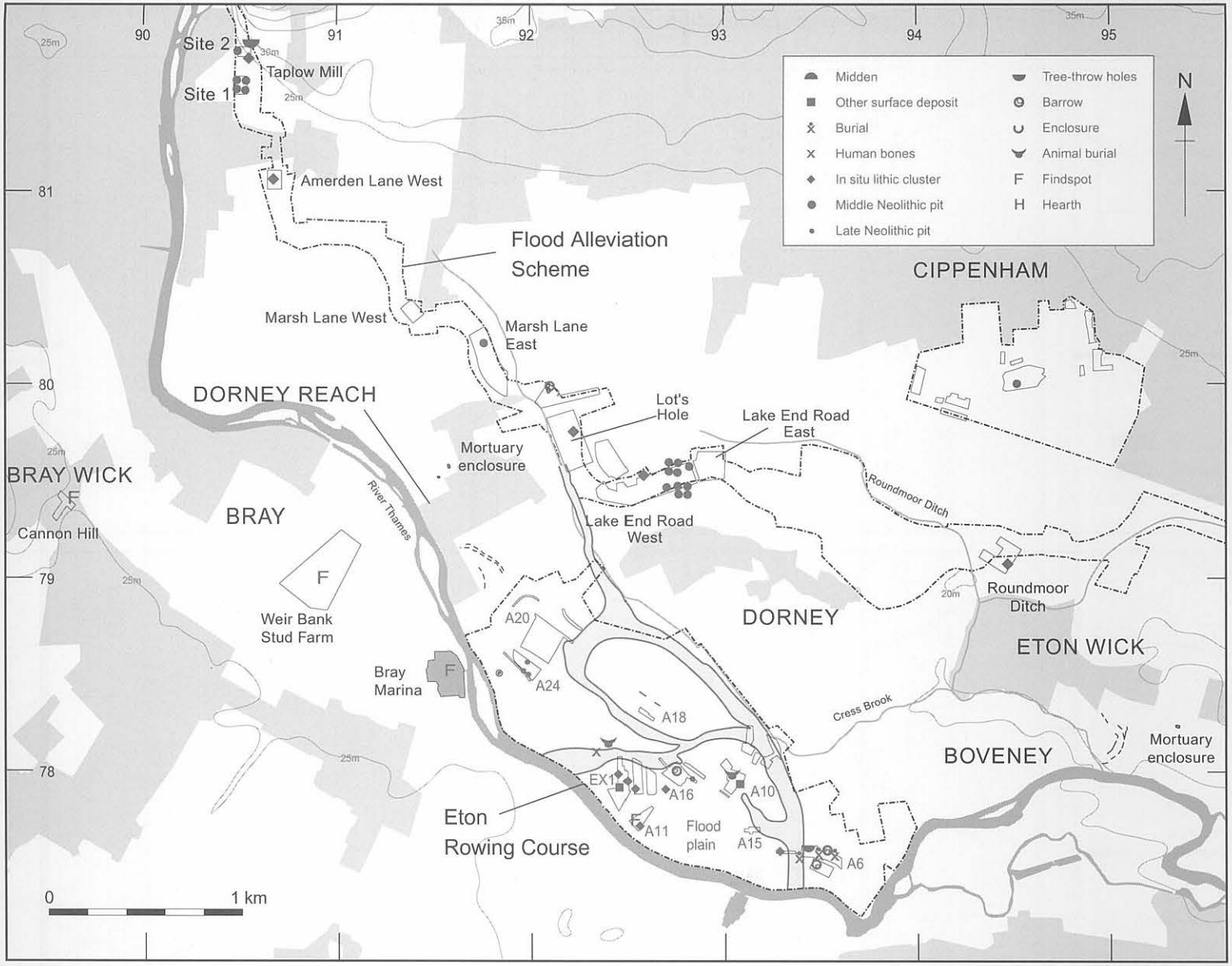


Figure 9.3 Middle and later Neolithic activity discovered within the two schemes and in other recent work

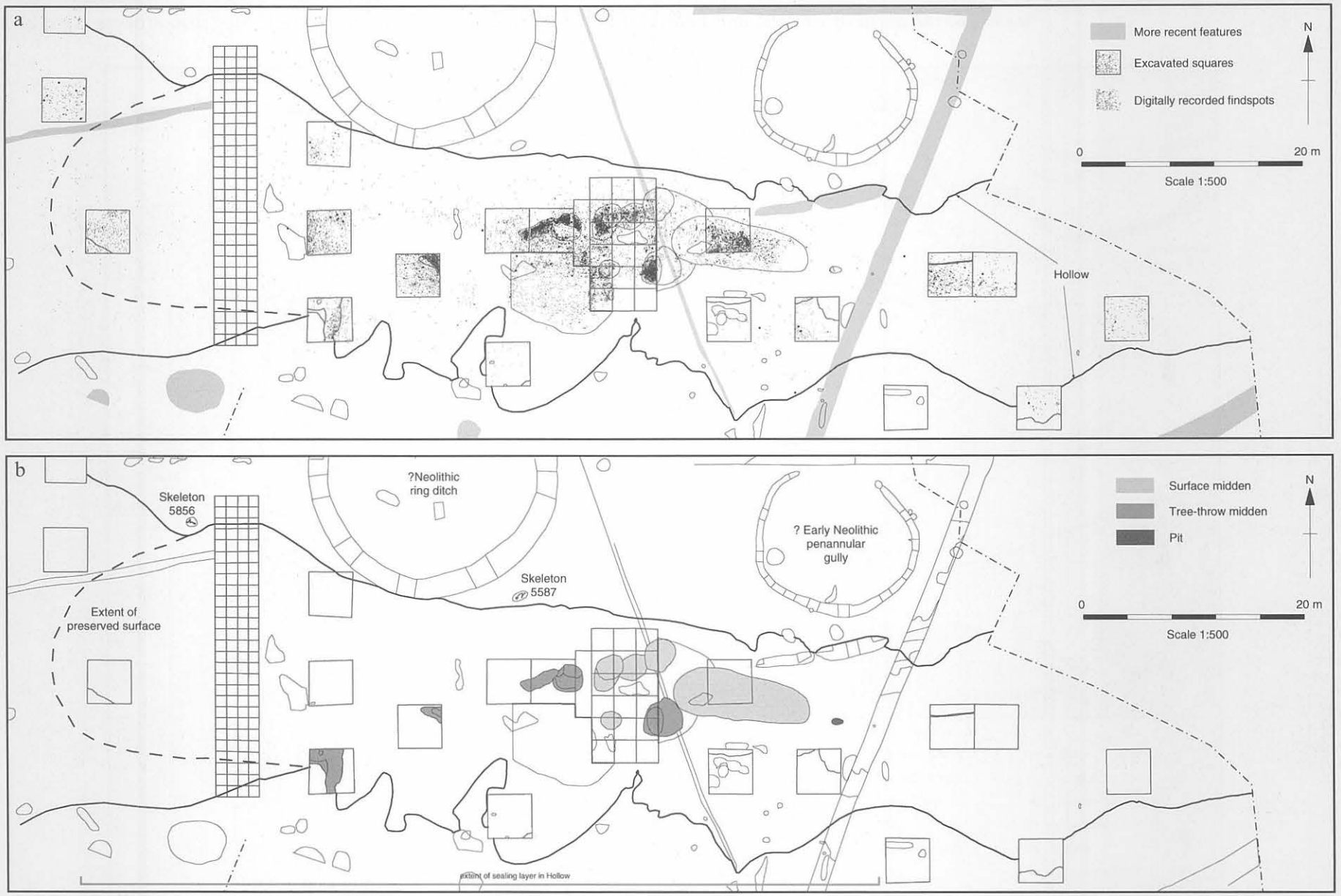


Figure 9.4 Plan of the Area 6 hollow showing the surface and tree-throw hole middens and lesser artefact concentrations

Figure 9.5 Overall view of the Area 6 hollow and ring ditches, with the Thames in the background, from the north-east

similar to that at Staines (Robertson-Mackay 1987), and there are Decorated Bowl elements confirming continued occupation later in the fourth millennium BC, as the radiocarbon dates also indicate. The ceramic material from these two hollows includes refitting elements of semi-complete vessels in discrete dumps, clusters of similar material that may represent individual dumps, and a more abraded element in which the degree of fragmentation or brokenness is relatively high. The varied state of the material supports a picture of repeated occupation. The assemblages include a range of vessels such as cups, fine burnished bowls, and heavier coarser bowls. There is evidence of use in the form of absorbed fatty and burnt residues. Some vessels have been refired or overfired indicating either deliberate or accidental contact with fire or perhaps representing waster material from ceramic production. There is also slight evidence that some vessels were repaired. The hollow deposits appear to represent a long period of use. Ebbsfleet and Mortlake Wares are also found in small quantities on both sites, particularly towards the west end of the Area 6 hollow and at the Lake End Road West hollow as well.

The lithic assemblages from the Area 6 and 10 hollows (of which respectively 23,000 and 3500

Figure 9.6 The Area 6 midden at the Eton Rowing Course during cleaning in 1996

Figure 9.7 The Area 6 midden showing a smashed Carinated Bowl during excavation

struck flints were analysed) also indicate repeated or continuous occupation, partly from their size and the variety of retouched tools, but more significantly from the overall degree of utilisation. Low-power use wear on a significant proportion of the flakes (respectively 8% and 11%) showed that 50–65% of the flints had been utilised. The utilisation is also of varied character, and is coupled with a low proportion of refitting material. All of this indicates very intensive use of these areas, and is most plausibly explained by the utilisation and reworking of deposited material over an extended period of time.

The struck flint was generally in a fresh state, but the evidence of frequent breakage of flakes and of slight edge-damage indicates that the material was exposed for some time before being fully buried, and was probably trampled occasionally. Micromorphological analysis of the hollow soils by Richard Macphail (forthcoming) also suggests that the soils were disturbed, possibly by animal trampling. A combination of animal trampling and reworking of the deposits would also help to explain why many of the pottery sherds were small and somewhat abraded.

In addition to the struck flints, hammerstones, and pottery there were also large quantities of burnt flint (upwards of 15kg in Area 6 and 62kg in Area 10). Other materials were 1300 fragments of animal bone, small numbers of charred cereal grains, quernstones and pounders, fragments of fired clay, a bone awl, and part of an antler mattock. Significantly the deposits lack exotic material. There were no human bones and only one partial cattle skeleton, otherwise no unusual or 'special' deposits of bones. The pottery was made in a very limited range of fabrics, which petrological analysis suggests could all be of local origin. Almost all of the flint is local gravel flint. Most of the polished axe fragments are of a light-grey flint, potential sources for which range from South Oxfordshire via Buckinghamshire to Sussex. Contrary to our earlier assumptions of 'ritual destruction' (Allen *et al* 1997, 124), we believe that the breakage of polished axes occurred during use (Jorgensen 1985, 45), and the pieces were then reworked to make further tools. The only truly exotic items in Area 6 were half of a shafthole adze from Whin Sill (Group XVIII) in Northumberland (F Roe pers comm) and a fragment of an oval bead of cannel coal, also from the North of England (A Sheridan pers comm), although in both cases the objects were only broken fragments. An unstratified flake from a Cumbrian axe (within the range of Group VI) axe found in Area 10 could have derived from the hollow there.

These assemblages can be described as 'domestic' in character, in that they contain a great quantity and a wide range of material, but almost all of this is of local origin, much of it broken, and there is no evidence of the selective deposition characteristic of 'ceremonial' deposits. They are therefore interpreted as evidence for long-term Neolithic settlement by the river at the Eton Rowing Course site, beginning in the earliest (or primary) Neolithic. Due to the deliberate and repeated dumping of material at the same location, and the significant reuse of that material, we have interpreted these deposits as middens rather than simply refuse-rich deposits (cf Needham in Needham and Spence 1996, chapter 1). A third, smaller, hollow deposit at Lake End Road West, although only producing 670 sherds of pottery and 800 struck flints, is also regarded as the remnants of a similar midden, as use wear of an 11% sample has suggested 65% utilisation of the lithic assemblage. However, this

midden lacked the range of artefactual and ecofactual material found at the two Eton sites, and the pottery was entirely Plain Bowl.

Charred cereal grains and quern fragments were recovered from both the Area 6 and Area 10 middens. Four dates obtained from the Oxford Radiocarbon Accelerator Laboratory on charred emmer grains from Area 6 lie between 3900 and 3530 cal BC (4910 ± 40 BP (OxA-9891), 4925 ± 40 BP (OxA-9819), 4895 ± 50 BP (OxA-9859), and 4935 ± 40 BP (OxA-9889)). These are some of the earliest secure dates for cereal cultivation in Britain. A charred hazelnut shell associated with one of the charred cereal grains and a cattle bone associated with another have also given dates very early in the fourth millennium cal BC, 4995 ± 40 BP (OxA-9890: 3940–3660 cal BC) and 4970 ± 45 BP (OxA-9858: 3940–3650 cal BC). The quantity of charred cereal grains (93 from the bulk environmental samples) was not however large, nor do cultivated cereals figure largely in the pollen evidence. The presence of hazelnut shells probably indicates gathering from the woodland as well.

The animal bone assemblage also indicates a predominance of cattle, traditionally woodland browsers. Lipid residue analysis carried out by Professor Richard Evershed at Bristol University has established that a significant proportion of the early Neolithic vessels contained animal fats, almost exclusively those of cattle or sheep, and some vessels had clearly held milk (Evershed *et al* forthcoming). Dairying was therefore part of the animal husbandry of the early Neolithic. Other domesticated species were sheep, pig, and dogs, the last being found in the edge of the early Neolithic channel in EX1 on the floodplain (Fig 9.2).

There was also a fair proportion of wild species including aurochs, wild boar, red deer, roe deer, badger, beaver, and fox. The last three may have been hunted for their pelts. This supports the received view of early Neolithic communities as practising a mixed economy including animal husbandry, hunting and gathering, and small-scale cereal cultivation. Pike bones also show that some fishing was undertaken, though the fact that pike is the only species may indicate that a particular significance was attached to it. One of the crouched middle Neolithic inhumations in Area 6 at the Eton Rowing Course was found with a pike bone in front of the body between the arms and legs, possibly a deliberate offering (compare Levitan and Serjeantson 1999, 239).

Tree-throw holes and pits

The black soilmarks within the middens proved to be of two types, representing either surface spreads (true middens) or tree-throw holes filled with dark occupation material. The tree-throw holes were largely filled with the same dark soils and finds, though sometimes gravel spills separated two or more episodes of infilling. The density of finds within the tree-throw holes was just as great as that of the surface middens, and the composition and utilisation of the lithic assemblage of both types of deposit was very similar. It therefore appears that the tree-throw holes were filled deliberately, but using material some of which had been lying about for some time.

Evans, Pollard, and Knight have recently discussed similar tree-throw features from a range of sites across southern Britain (Evans *et al* 1999). All of these belong to the earliest phase of the Neolithic, and the authors have interpreted these as deliberate acts of middening, not the chance accumulation of material washed in from surrounding occupation. Although the Eton Rowing Course hollow shows that high surface-densities of artefacts can be extensive, the concentration of finds in the tree-throw holes within the hollow bears out this general conclusion. The authors also argued that the middening had taken place after the trees had fallen, rather than being deposited at the foot of standing trees and later becoming incorporated (Evans *et al* 1999, 248). At the Rowing Course the flintwork at the bottom of the tree-throw holes included a significant proportion of corticated material including residual Mesolithic flintwork, whereas the upper fills had denser finds of fresh appearance. This strongly suggests that the middening occurred after the trees had fallen, and, possibly, after significant clearance in the early Neolithic.

Evans *et al* (1999) drew attention to the widespread use of tree-throw holes on their 90ha excavation at Barleycroft, with another fifteen examples of significant deposition of early Neolithic date in tree-throw holes overall. This pattern is repeated in the Dorney area, since another six tree-throw holes (at Taplow Mill Site 2, Marsh Lane West and East, and Lake End Road East) on the Flood Alleviation Scheme have produced significant assemblages of flintwork and in some cases Plain Bowl pottery and animal bones, and considerably more tree-throw holes contain smaller assemblages of flintwork. Among these were tree-throw holes both within the Area 6 midden and at the north-west end of the Rowing Course that were associated with Ebbsfleet Ware.

Evans *et al* (1999) also compared the use of tree-throw holes for deposition of large assemblages of material to the large early man-made pits such as the Stonehenge Anomaly at Coneybury (Richards 1990, 40–61), and implied that the use of tree-throw holes was superseded by the groups of intercutting pits of middle and late Neolithic date within their site. The use of natural hollows would appear to be a locally common phenomenon in the Dorney area, as a similar deposit was found in a natural shaft at Cannon Hill, Maidenhead, Berkshire (Bradley *et al* 1981). The origins of such

a practice may lie with the indigenous Mesolithic population. The association of tree-throw holes with large assemblages of Mesolithic struck flint has been known for a long time, but has occasioned little comment, being regarded either as residual material incorporated into the tree-throw hole, or as the result of hunters using tree-throw holes as temporary shelters or working hollows while hunting. Given the clear evidence from pottery and other finds for deliberate infilling of tree-throw holes on primary Neolithic sites, however, archaeologists should perhaps consider whether this might not be the continuation of a Mesolithic tradition. Just such a late Mesolithic tree-throw hole containing more than 150 struck flints was found at the Eton Rowing Course, area EX1.

As for the replacement of tree-throw holes by man-made pits later in the Neolithic, the Dorney landscape contains only two certain pits of early Neolithic date, though significant assemblages of finds were retrieved from one of these at Lake End Road West. Pits were however apparently more common at Cippenham only 2–3 km to the north-east (Ford and Taylor this volume). The use of tree-throw holes for deposition of significant groups of artefacts appears largely to disappear in the Dorney area after the early Neolithic, the latest material in such features being chisel arrowheads and clearly contemporary Ebbsfleet Ware pottery. In contrast ten pits with Peterborough Ware appear at Lake End Road West, four at Taplow Mill Site 1 and one at Marsh Lane East, and two Grooved-Ware pits at the Eton Rowing Course (Fig 9.3). Charred hazelnuts from two of the pits at Lake End Road West, 4425 ± 45 BP (GU-9282:3340–2910 cal BC) and 4410 ± 45 BP (GU-9284:3330–2910 cal BC) and one at Taplow Mill, 4455 ± 45 BP (GU-9276: 3350–2920 cal BC) fall within the range 3350–2900 cal BC. These features do not however simply replace tree-throw holes as places of deposition, as they contain distinctive types of finds assemblages different to those of the early Neolithic. However, pit digging is a dominant and recurring feature of the middle Neolithic landscape in the Dorney area, while middens and deposition within tree-throw holes and other natural features seem to decline. Several tree-throw holes at Taplow Mill Site 2 contained large assemblages of late Neolithic/early Bronze Age flintwork, but at least some of these appear to be later features incorporating earlier artefacts.

Pit deposits (like the earlier middens) tend to contain a range of artefactual and ecofactual material and like the middens there is strong evidence that what was deposited derived from occupation. Although one pit contained the fragments from an unusual and elaborately decorated vessel (Figs 9.8 and 9.9) and significant portions of two further vessels, the pottery is generally fragmentary, with signs of use and repair. There is also a range of vessels that includes large and small bowls and more rarely deeper jar-like vessels. The lithic assemblages however from both the middle and late Neolithic pits have distinctive characteristics that indicate either the association of pits with a particular range of activities, or the deliberate selection of material for deposition. Both contain a high proportion of retouch, on average 7.2% in the pits associated with Peterborough Ware and 10% in those associated with Grooved Ware. The retouched artefacts are not distinctly 'special' objects (except possibly for a reworked polished axe fragment that came from the pit containing several substantially complete pots). The proportion of use wear (between 50% and 70% of the flintwork was utilised) was similar to that of the early Neolithic midden deposits, but the use actions (comprising mostly the cutting/whittling and scraping of medium and hard materials) were not. Proportions of burning and breakage are relatively high in pits of both periods, but reach 50% in the pits with Grooved Ware. This would suggest that the material deposited in these pits was carefully selected, rather than simply a representative sample of occupation debris like that in the early Neolithic middens.

Another characteristic of the pit deposits is the relatively high ratio of pottery to flint, which could suggest a preference for the burial of pot within this type of context. These features were also generally poor in plant remains and animal bones, although charcoal was common. At Lake End Road West and at Taplow Mill most of the pits occurred in groups, although others were isolated. These distributions could be interpreted as the repeated use of the same area perhaps on a seasonal or yearly basis. Although pit deposits seem to represent the richer assemblages, there is evidence that other features were still used for deposition. As noted above, deposition on a reduced scale still took place at all three middens in this area. Fengate Ware was deposited in the Area 6 midden and at Amerden Lane West.

Other sites

In addition to the three middens and the tree-throw holes already mentioned, at the Eton Rowing Course there was also a smaller focus of early Neolithic activity at the south edge of Area 10 and another in Area 16, 70m and 200m away from the Area 10 midden respectively. Other activity of this date includes a probable hearth associated with part of a Carinated Bowl on the west of the former Thames palaeochannel, and further Plain Bowl sherds have been recovered from Areas 18, 20, and 24 in the north-west part of the site. A scatter of early Neolithic pottery and flints were found at Amerden Lane, Marsh Lane East, and Roundmoor Ditch (Fig 9.2).

Figure 9.8 View of pit 1050 at Lake End Road West, showing the upper deposit of Mortlake Ware

On the floodplain at the Eton Rowing Course (Areas EX1, 2 and 3) numerous *in situ* lithic scatters were found sealed beneath alluvium, and another concentration of struck flints was found on the north bank of the loop of the Thames palaeochannel (Area 3). The fairly arbitrary sample of the floodplain excavated suggests that a similar density of scatters is likely to exist elsewhere along the floodplain in this area. Further floodplain scatters occur along the Flood Alleviation Scheme at Amerden Lane West. All of this adds up to a continuous spread of early Neolithic activity from Taplow to Eton Wick.

In the wider landscape in general early Neolithic activity is concentrated close to the River Thames (and its palaeochannels). Quite apart from the Eton Rowing Course palaeochannel, most of the sites in the northern half of the Flood Alleviation Scheme lie along the line of a former palaeochannel. As well as lines of communication, the prehistoric Thames and its tributaries provided the water source needed by early herders for their livestock.

At Amerden Lane, Plain Bowl pottery and animal bone survived together with lithic clusters. Elsewhere on the floodplain, due to the soil conditions only crumbs of pottery survived even in the largest lithic clusters, so these can only be dated by the associated tool types as broadly early Neolithic. Animal bone was also sparse, and proved too degraded to obtain radiocarbon dates. Plain Bowl and Ebbsfleet Ware pottery was, however, found in the channel edge in Area 5 (layer 3839) and Area EX1 (layer 718) respectively, along with struck flint. Radiocarbon dates have been obtained on an associated human skull

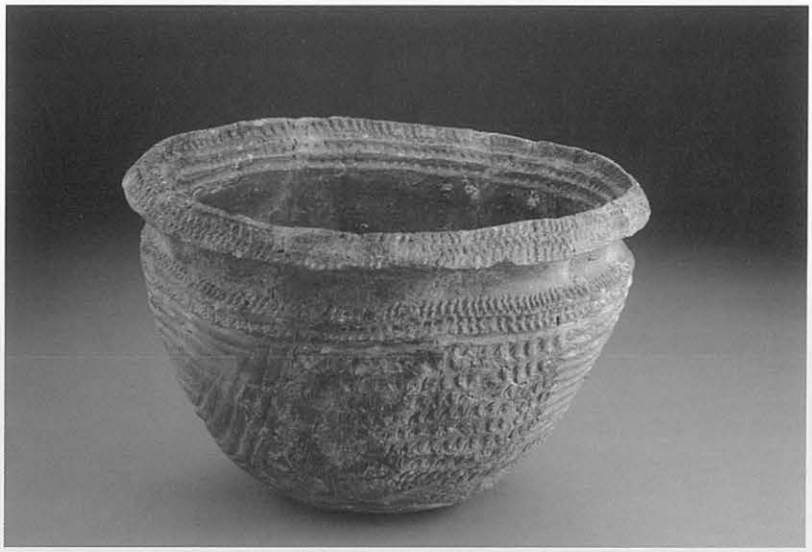


Figure 9.9 The reconstructed Mortlake Ware vessel from the upper deposit of pit 1050

(SF46603) and waterlogged seed in Area 5 and on a beaver-gnawed twig in EX1, 4795 ± 50 BP (OxA-8820:3670–3370 cal BC); 4641 ± 38 BP (OxA-9525:3520–3340 cal BC); 4700 ± 50 BP (BM-3815:3640–3340 cal BC). Those from Area 5 combine to indicate a date (at 95% confidence) between 3520 and 3370 cal BC, and that from EX1 a date between 3670 and 3340 cal BC, towards the end of the early Neolithic (cf Ebbsfleet Ware from Remenham (Holgate and Start 1983–5)).

Despite the difference in preservation, it is clear that the character of some of these clusters was different from that of the middens. Apart from the relative lack of pottery, quernstones and charred cereal grains were absent. The largest such cluster was found in an arc around a burnt area, probably the site of repeated fires, as some of the flint debitage had been burnt. This cluster included 32 incomplete or misshapen leaf-shaped arrowheads in various stages of manufacture (Fig 9.10), possibly indicating that this was a hunting camp.

Other lithic clusters of varying sizes indicate the range of activities that occurred on the floodplain, from the manufacture of new toolkits to the utilisation of already prepared tools and their eventual discard (Allen 1998). There is a strong correlation between the presence of burnt flint and the size and variety of the struck-flint assemblage amongst these clusters, suggesting that the larger sites involved the lighting of fires, and thus probably camps used for one or more nights.

The context of these floodplain scatters also needs to be borne in mind. The major palaeochannel of the Thames was flanked by wide areas of floodplain covered by extensive alder carr in the later Mesolithic. By the early Neolithic the floodplain was drying out, and during the whole of the period there was relatively little (0.15m) sediment deposited on the floodplain. At the Eton Rowing Course both the pollen evidence and the plant macros and insects suggest that there were clearings in the early Neolithic woodland, and that clearance increased gradually in scale throughout the period. Lithic concentrations of early Neolithic character were found wherever excavation took place along the channel edge in a zone extending up to 50m from it (Fig 9.11). Only one early Neolithic scatter was found further than 50m from the channel. This perhaps suggests that in a largely wooded environment, waterways were the main routes of communication and transport, and also that away from settlement foci penetration into the wildwood was limited.

Implications of the discoveries

Later Mesolithic settlement in the Thames Valley is seen as centred upon base camps by the river (Holgate 1988, 129–33). Although there are later Mesolithic sites at Cannon Hill and at Green Lane, Maidenhead, within the study area (Holgate 1988, 223 and map 9), and small-scale activity at the Eton Rowing Course (Areas EX1 and 6), there are no large base camps such as existed at the Rowing Course in the early Mesolithic (Allen 1995). The immediate area may therefore have been visited, but not intensively used, in this period. Several very large collections of Mesolithic material are recorded at Bray and Maidenhead by Wymer (Wymer 1977, 4–5 and 8), including one on the south bank of the Thames opposite the Rowing Course, but it is not clear whether these are early or late Mesolithic. In the

Figure 9.10 Arrowheads and blanks from an early Neolithic activity area on EX1 at the Eton Rowing Course

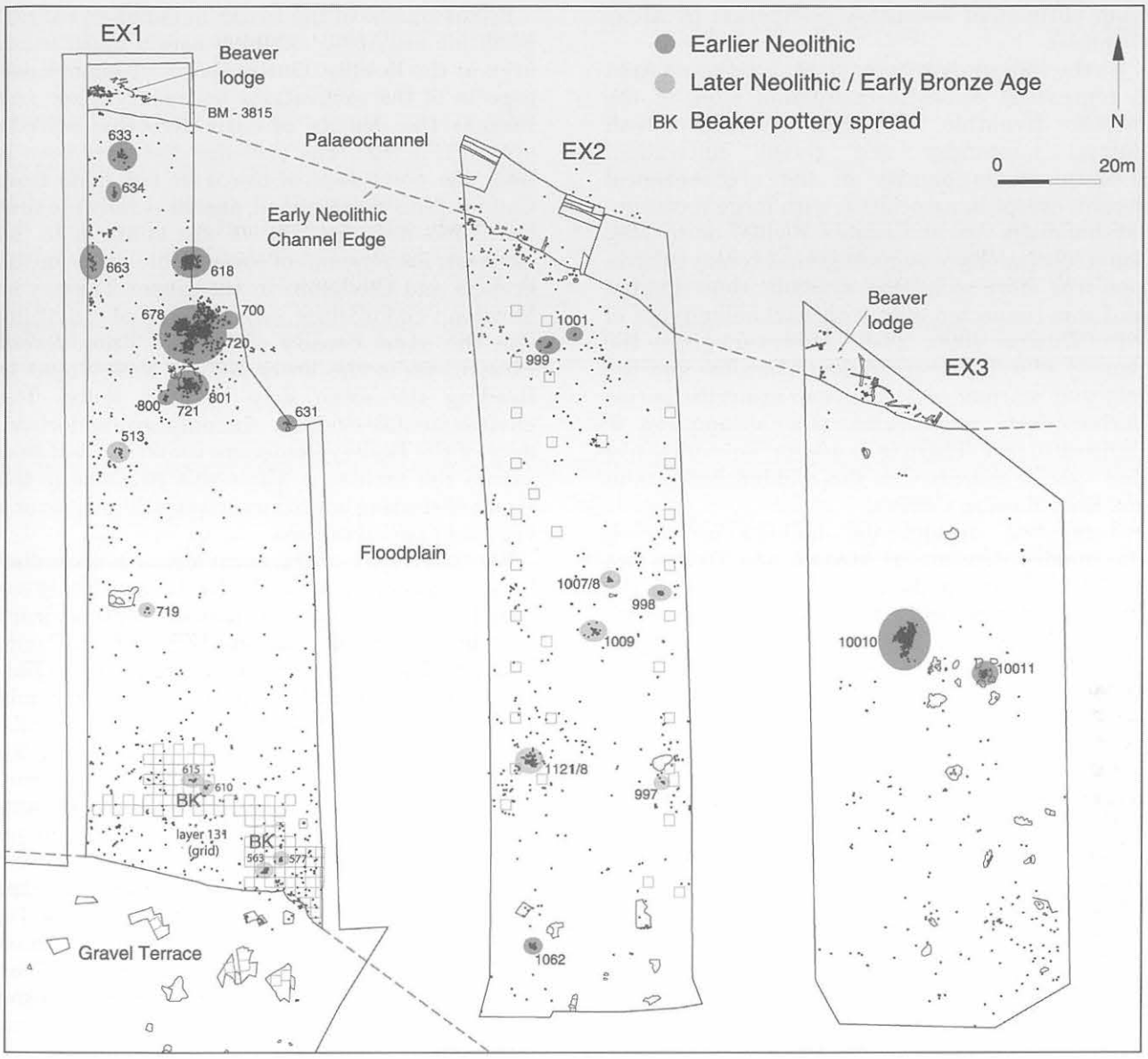


Figure 9.11 Distribution of early Neolithic and late Neolithic/early Bronze Age lithic clusters on the floodplain at the Eton Rowing Course, Areas EX1-3

Dorney area, the largest primary Neolithic settlements in the area occur at Areas 6 and 10, both of which lie on islands of gravel approximately 1km long between two arms of the contemporary river Thames. If Neolithic settlers, or at least Neolithic ways of life, were unfamiliar in the area, it may have seemed safer to site the earliest such settlements in restricted areas surrounded by water. It is also possible that Neolithic practices, and possibly settlers, moved up the Thames.

Alternatively, the Rowing Course sites may indicate continuity of certain Mesolithic practices regarding settlement and mobility. Holgate (1988, 132–5) contrasted a pattern of later Mesolithic base camps by rivers with one of domestic early Neolithic settlement on higher ground, and only task-specific sites close to the Thames (Holgate 1988, 132–5). The occupation sites, including large-scale middens, at the Rowing Course, seem rather to continue his late Mesolithic pattern, and Area 6 in particular has a small quantity of late Mesolithic material, principally microliths. Pollard has recently drawn a distinction between large Mesolithic midden sites, which he interprets as the result of repeated seasonal visits over hundreds or thousands of years, and the much smaller Neolithic occupation deposits, which he takes to indicate short-term occupation and shifting 'swidden' agriculture (Pollard 1999, 82–3). The Rowing Course evidence shows that longer-term settlement did occur in the early Neolithic. It is not entirely clear whether this resulted from repeated occupations of the same locations (continuing Mesolithic practice) or

from permanent sedentary occupation in Areas 6 and 10.

As the radiocarbon dates show, activity on Area 6 represents domestic occupation sites of the primary Neolithic, with clear evidence of both animal husbandry and cereal cultivation. Because of its paucity in the archaeological record, except in association with large rectangular buildings (as at Lismore Fields) or in pits, some scholars have suggested that cereal cultivation was more social and symbolic than dietary, and was connected only with particular types of site (Thomas 1999, 24–5). However, given the paucity of well-preserved domestic sites and the fact that much of what is known about the period derives from monuments this assumption is difficult to test. There is, however, no evidence of any special character to the midden deposits at the Eton Rowing Course.

Excavation around the hollows containing the midden deposits in Areas 6 and 10 was not sufficiently comprehensive to rule out the presence of substantial buildings in the vicinity. No watching brief was carried out beyond the excavation areas. Nevertheless, the absence of associated buildings or pits within either site suggests that middens and structures could have been kept separate. Two other sites in the south of England with large rectangular posthole buildings, at Yarnton, Oxfordshire, and White Horse Stone, Kent, were not associated with midden deposits (Hey and Bell 1997; Glass 2000). At Runnymede Bridge, however, only 10km from Dorney, a house with associated midden deposits has been claimed (Needham and Trott 1987). Beneath the long cairns at Hazleton North, Gloucestershire (Saville 1990, 240–41) and Ascott-under-Wychwood (Benson unpublished archive), middens did occur alongside hearths, pits, and postholes, but the posthole structures do not appear to belong to substantial post-built structures. In contrast to these last examples, the Dorney middens were not overlain or superseded by the construction of monuments. Instead, midden accumulation continued over a period of several hundred years, resulting in assemblages otherwise matched in size only at causewayed enclosures such as Staines (Area 6: *c* 25,000 struck flints, *c* 6000 potsherds; Staines: 24,562 struck flints, 5658 sherds).

The density of Neolithic activity at the Eton Rowing Course and in the adjacent landscape is very considerable. The hollow deposits in themselves represent remarkable concentrations of material residues, at present only paralleled by midden deposits found at The Stumble on the Essex coast (Wilkinson and Murphy 1995), and perhaps at Woolwich Manor Way in Newham, East London (Whittaker and Bates this volume), while the tree-throw holes and other finds demonstrate the widespread use of the whole area.

By the middle of the fourth millennium cal BC, Neolithic activity is apparent over a much wider area in the locality. One of the most remarkable aspects of the excavations between Taplow and Eton is the density of early Neolithic activity overall (Fig 9.2). The evidence discussed here is from the north side of the river but finds from Cannon Hill, Maidenhead, and Bray indicate that the same may be true of the south side. In contrast, excavations of comparable scale on the gravels and floodplain in the Upper Thames at Yarnton, Oxfordshire, do not reveal anything like the same density of pottery. From recent excavations in the lower Kennet Valley near to Reading the same may be true there. The environmental evidence for only gradual clearance of the Dorney landscape would suggest that within the area as a whole this evidence is the result of shifting but continuous settlement over a very long period of time.

The later part of the occupations represented by the midden sites, and by the lesser pottery assemblages in the area, are broadly contemporary with the life of the causewayed enclosure only 1km downriver at Eton Wick (Ford 1991–3). This enclosure has not been investigated on any scale, but radiocarbon dates of 4680 ± 110 BP (BM-2535:3700–3050 cal BC) and 4680 ± 50 BP (BM-2534:3630–3350 cal BC) were obtained from the primary fill of one segment of the enclosure ditch. The scale of occupation evident both on the gravel terraces and the floodplain on both schemes shows that the hinterland of this monument was certainly not peripheral to settlement, as has previously been claimed (Thomas 1999, 38–41), and casts doubt on the arguments often quoted as reasons for siting causewayed enclosures in geographical locations such as this.

Cropmark evidence would suggest that a second enclosure exists at Dorney Reach, so that there was once a pair of causewayed enclosures, one at either end of the divided channels of the Thames that surround the two primary Neolithic island settlements. The location of the causewayed enclosure (or enclosures) might then be related to the earlier settlements on the islands in between, perhaps the ancestral foci of settlement in this area. The primary settlements themselves continued in use, although by the middle Neolithic when Mortlake Ware is in use the scale of activity seems to have reduced considerably. The greater concentration of finds in pits at Lake End Road West and generally at the north-west end of the Eton Rowing Course and throughout the landscape to the north-west, north, and north-east may reflect a shift in the concentration of activity towards the causewayed enclosures and away from the river.

During the middle Neolithic the function and significance of the ancestral settlements at Areas 6 and 10 may have been redefined, as two

crouched burials, one a man (5587) and one a juvenile (5856), were buried in purpose-dug graves at Area 6, and a partial animal skeleton (6915) was in Area 10 (Fig 9.4). All these have been radiocarbon-dated to the late fourth millennium cal BC [5587], 4500 ± 50 BP (BM-3173:3360–3020 cal BC); [5856], 4400 ± 50 BP (BM-3170:3180–2900 cal BC) and [6915], 4530 ± 50 BP (BM-3188:3370–3030 cal BC). It is interesting to note that these sites were treated in a similar way to early Neolithic monuments with the addition of burials and placed deposits. At Horton in the Colne Valley an early Neolithic U-shaped enclosure that contained midden-like deposits in its ditch fill was enclosed by an oval ditch which received a variety of placed deposits including a complete Fengate-Ware pot, stitched bark containers and a wooden staff (Ford and Pine 2003). At Goring a secondary inhumation, 4360 ± 45 BP (BM-2835:3100–2880 cal BC) was inserted into the ditch of a possible early Neolithic enclosure (Allen *et al* 1995).

North of the hollow in Area 6 a penannular gully with a wide entrance to the north and a circular ring-ditch may conceivably also be of Neolithic date (Fig 9.4). A similar enclosure was excavated by David Miles at Thrupp, near Abingdon, Oxfordshire, less than 1km from the causewayed enclosure (Miles unpublished archive; Case 1986, 23). This produced early Neolithic pottery, flintwork, and animal bone including aurochs, and is tentatively interpreted as an early Neolithic enclosure.

The range of Neolithic burial traditions in this area is now very wide. There are two cropmark probable mortuary enclosures adjacent to the causewayed enclosures, and geophysical survey by P Catherall suggests that the triple ring-ditch at the north-west end of the Rowing Course may have begun as a Neolithic U-shaped enclosure. The two middle Neolithic crouched inhumations in flat graves on Area 6, one accompanied by a pike bone, may be peripheral to a circular ring-ditch (Allen *et al* 2000, 71). At the Rowing Course a skull (minus the mandible) was placed in the edge of the channel in Area 5, 4795 ± 50 BP (OxA-8820:3670–3370 cal BC), and in the middle Neolithic the crown of another skull came from the channel upstream of EX1, 4410 ± 45BP (OxA-8821:3330–2910 cal BC) and an ox skull overlain by a red deer antler, 4500 ± 50 BP (OxA-8815:3360–3030 cal BC) lay on the western channel edge in the same area (Allen *et al* 2000, 86–9). These indicate the significance of the river for deliberate ritual deposition, but of a different type to the exotic stone axes and complete pots recorded elsewhere along the Thames in this period (Bradley 1998, 67).

In addition, finds of single human bones associated with other cultural material, such as those at Bray Marina - clavicle in the channel in EX1, a skull fragment in a pit on the gravel terrace in Area 16, or a femur in the middle of a struck flint cluster on the floodplain– suggest that the movement of human bones around the landscape, usually particularly associated with long barrows and causewayed enclosures, was occurring as an accompaniment to the full range of human activities. This is particularly important as evidence for the involvement of ritual in all aspects of Neolithic life rather than being confined to certain places or times, and the absence of a distinction between secular and religious activity as we understand these concepts.

In the late Neolithic the scale of activity appears to diminish (cf Ford and Taylor this volume). Grooved Ware pits are found at the Eton Rowing Course in Areas 16 and 24, and a low density of Grooved Ware pottery overlay both the Area 6 and Area 10 midden sites, while a skeleton (81318) was also found in the former Thames channel adjacent to Area 6. Numerous lithic clusters were found on the floodplain in areas EXb1–3 (Fig 9.5), though these can only be dated as broadly late Neolithic/ early Bronze Age. Assemblages of struck flint have been found at Taplow Mill Site 2 on the Flood Alleviation Scheme, but overall there is little artefactual evidence. It must however be remembered that the triple ring-ditch at the Eton Rowing Course, close to which most of the late Neolithic pits were found, has not been investigated, nor the area of the Dorney Reach putative causewayed enclosure.

In general the apparent decline in late Neolithic activity at Dorney is reflected elsewhere in the middle Thames, where Grooved Ware associated sites are still relatively rare despite the undertaking of a number of large-scale projects (Barclay 1999, 15; Longworth and Cleal 1999). What was almost certainly a core area of early Neolithic settlement and of middle Neolithic activity seems to have become a more peripheral region by the late Neolithic. Again comparison can be made with the large-scale project at Yarnton where at least fifteen Grooved Ware pits have been excavated (Hey pers comm).

Despite this lack of cultural evidence, the pollen and the macroscopic plant remains from the Eton Rowing Course show a gradual opening up of the landscape throughout the Neolithic and into the early Bronze Age. This comes principally from the analysis of late Neolithic deposits in Area 15, of a late Neolithic phase of the channel in Area 5, and from early Bronze Age channel deposits in Area 3. This progression has received confirmation from three radiocarbon dates on charcoal from 'burnt mound' deposits, two (12812 and 12177) from opposite sides of the Thames channel in Areas 14 and 16, and the third (10700) from the floodplain in Area 11. All three date to the third millennium cal BC [12812] 4282 ± 39 BP (OxA-9413:3020–2700 cal BC); [12177]

4004 ± 38 BP (OxA-9414:2630–2450 cal BC); [10700] 3784 ± 38 BP (OxA-9415:2340–2040 cal BC). The deposit in Area 16 was of limited extent, but the burning on the west side of the palaeochannel in Area 14 extended for at least 20m along the channel and was 5m in width and 0.2m deep. The deposit in Area 11 lay upon a charcoal-flecked horizon covering the full extent of the floodplain within the excavation area, and can reasonably be described as a clearance horizon. The late Neolithic also sees the formation of a log jam within the channel, dated by radiocarbon to the first half of the third millennium BC. The log jam may have resulted from the contemporary clearance activity on the floodplain either side of the river, although none of the trees examined showed signs of felling.

In the Beaker and early Bronze Age period there is only a single pit on the gravel terraces at the Eton Rowing Course, but there are numerous lithic clusters, sometimes intermingled with spreads of domestic pottery and hearths (ie occupation sites), on the floodplain. The pottery is in some cases Beaker, in others Collared Urn. This evidence has similarities to that from Yarnton, where the floodplain and adjacent gravel islands have been found to be occupied throughout the later Neolithic and early Bronze Age, apparently in preference to areas further from rivers (Allen *et al* 1997, 120). Round barrows are, however, constructed close to the ancient course of the river both in Area 6 and in Area 16, the former possibly continuing the earlier tradition of Neolithic burial at this site.

Conclusion

The large-scale investigation of this landscape has revealed information of a quality rarely recovered on any scale in Britain, which has been particularly important for the earlier Neolithic period, and has raised significant questions about current interpretations of some aspects of early Neolithic settlement. The detailed study of the hollow deposits has helped to understand the development of these 'middens' as accumulations of occupation material over long periods, the middens themselves acting as a source of material (particularly struck flint) for reuse. Important assemblages of material have been recovered for the middle Neolithic, together with valuable evidence for the clearance of the landscape throughout the period. For the Beaker period, the discovery of domestic occupation on the floodplain has also suggested that, as in the Upper Thames, domestic occupation may have been focussed preferentially upon lower-lying areas now deeply buried.

Other issues, for instance in relation to the neighbouring evidence from Cippenham (Ford and Taylor this volume) have not been explored in detail. General chronological trends for the area have been discussed in relation to the evidence from the two sites examined, but it must be remembered that the two projects together represent only a sample of the landscape as a whole, key elements of which (whether early or late Neolithic) still remain to be explored before a comprehensive narrative for this area can reasonably be attempted.

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10 Neolithic occupation at Cippenham, Slough, Berkshire *by Steve Ford and Kate Taylor*

Introduction

This short contribution is not intended to demonstrate an exceptional range of Neolithic deposits, but to highlight the nature of Neolithic occupation evidence in a hitherto blank area of the otherwise rich Middle Thames region. The Middle Thames Valley is by far the richest area in this region for evidence of earlier Neolithic settlement (Holgate 1988; Ford 1991). The region boasts three causewayed enclosures (Staines, Eton Wick, and probably Boveney) and three long barrows/mortuary enclosures (Horton, Eton Wick, and Boveney). Stray finds of leaf-shaped arrowheads and pottery are also numerous with many less securely dated flint and stone axes dredged from the Thames itself (Chappell 1987). Deposits that may be of a 'domestic' nature were recorded at the monumental sites at Staines, Eton Wick, and Horton, but sites of domestic character without monumental structures are only known at Runnymede Bridge and Cannon Hill (Bradley *et al* 1976; Needham 1985). Recent work at Dorney has revealed further evidence of extensive Neolithic activity in the form of a large midden infilling the top of an old river channel (Allen and Welsh 1998a; 1998b; see also Allen *et al* this volume). In addition to this, isolated pits, as at Remenham (Holgate and Start 1985), pits with 'Neolithic' pottery in the Colne Valley (Ford 1991, fig. 6.3), and a flint scatter of earlier/later Neolithic character at Maidenhead (Bowden *et al* 1981–2) may also be evidence for domestic sites.

In general, evidence for later Neolithic settlement is rarer than for the earlier Neolithic (Healy 1988) and when subsoil deposits of these periods are found, they are equally difficult to interpret. Few sites or deposits are present in the Middle Thames Valley (Ford 1991, fig 6.3) and the evidence consists largely of flint and stone axes from the Thames and isolated pits, such as at Iver (Lacaille 1937). Fieldwalking on the chalklands in east Berkshire, to the west of Cippenham, have revealed a number of flint scatters that probably include a later Neolithic component (Ford 1987). Further afield, on the brickearth deposits of west London, later Neolithic material has been recovered at Harmondsworth. At Prospect Park, a pit and hollow produced Grooved Ware and possibly Peterborough Ware pottery, with other, possibly contemporary, features nearby (Andrews 1996, 13; fig. 58). Grooved Ware pits were recorded at Holloway Lane (MoLAS 2000, map 3). In the immediate locale of Cippenham the rich sites present close to the Thames contrast strongly with the lack of sites or finds on the wide expanses of brickearth to the west of Slough (Ford 1987).

The excavations

The fieldwork was carried out in advance of a major housing development on the 'Cippenham Sector' – an area of farmland to the south-west of Slough, at the eastern end of Berkshire (Fig 10.1) (SU 948803). The project was composed of a number of discrete components, each of which comprised one or more large excavation trenches, and was based on the results of earlier evaluations. The main body of the fieldwork took place between 1995 and 1997, with the preliminary evaluations taking place in 1991 and 1994.

The Cippenham sites lie on level ground at a height of about 22m above OD and on one of the wide, flat terraces of the River Thames, which is 2km to the south. To the north, a gentle slope rises up onto an earlier terrace. The British Geological Survey shows three outcrops within the area, namely floodplain gravel, Taplow gravel, and alluvium, the latter probably representing infilling at the end of the last glaciation (BGS 1981). However, the excavations showed that the gravel was often capped by a clayey silt (brickearth) and all of the sites encountered this material to a greater or lesser extent.

Earlier Neolithic

Earlier Neolithic deposits and stray finds were discovered on several of the trenches displayed on Figure 10.1. The earlier Neolithic deposits were concentrated in two areas of the Old Way Lane excavations; a group of four pits at the south end of trench D (1500, 1603, 1609, and 1613) with two possible postholes (1604 and 1616) further north; and three pits in trench B (600, 332, and 531). Five of the pits were typical bowl-shaped examples ranging in diameter or length from 0.25m to 1.57m and no more than 0.23m deep, whilst 1613 was larger, deeper (0.4m) and had a steeper profile. Most of these features produced considerable quantities of plain Neolithic pottery and worked flint, including a polished flint axe. Pit 332 differed in appearance, being circular, 0.74m in diameter and 0.36m deep, with a beehive-shaped profile more typical of Iron Age pits. The fill was rich in charcoal and burnt flint and contained 232 struck flints and 94g of burnt and unburnt animal bone. Stray finds of struck flint in trenches B, C, and D are also certainly or

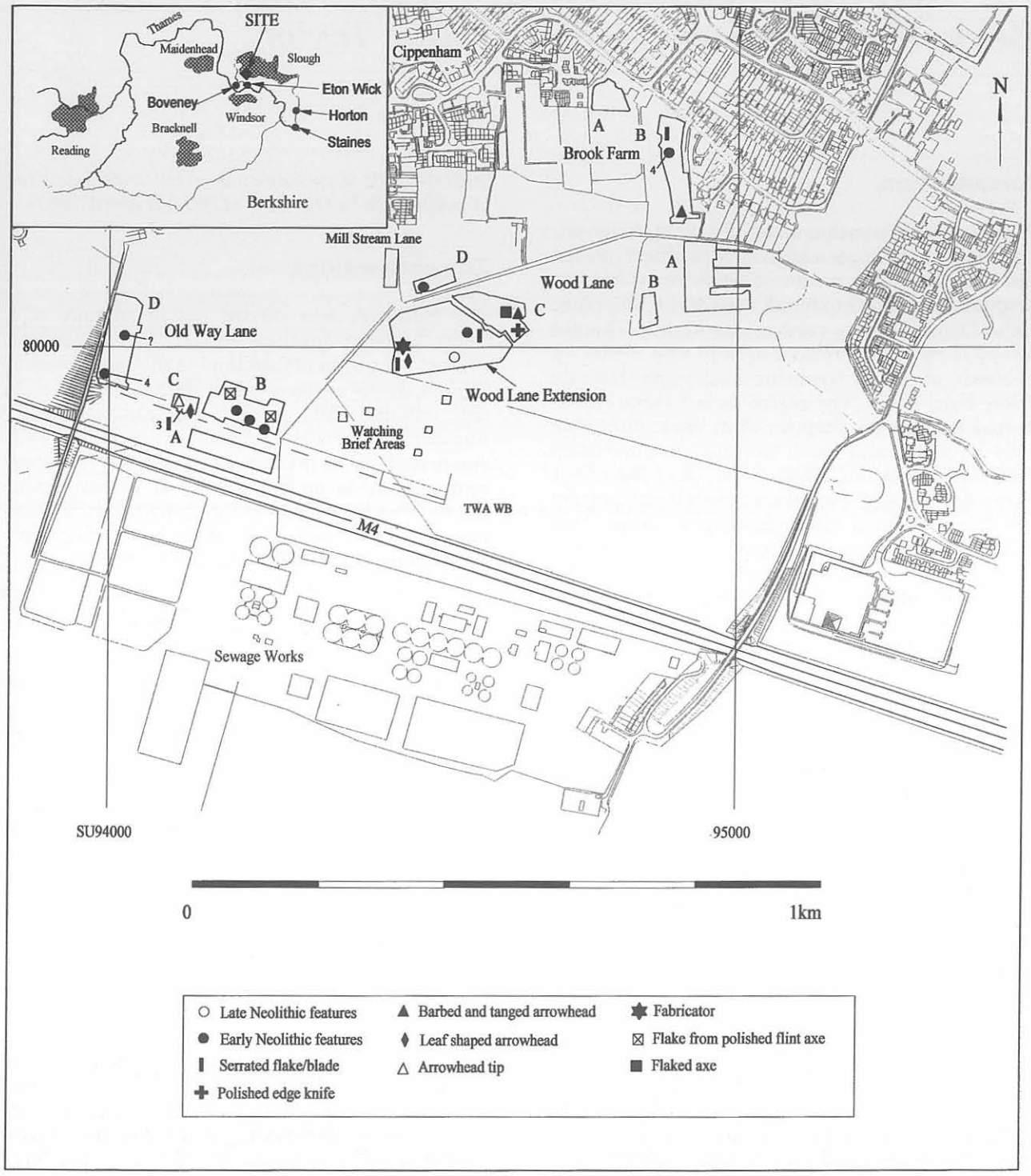

Figure 10.1 Location of Cippenham within the Middle Thames region plus local sites mentioned in text and showing site areas with Neolithic features and stray finds

probably of earlier Neolithic date. Apart from fragments of burnt animal bone from pits 332 and 1500, no faunal remains or charred plant remains were recovered from any of these features.

Some of the Neolithic deposits excavated at Old Way Lane are unusual. The beehive character of pit 332 (trench B, Fig 10.2) is rare for this period, although pits with a similar profile were recorded at Broome Heath, Norfolk (Clark *et al* 1960, fig 3). The 1.776kg of quartz recovered from pit 1500 (trench D) is also striking. Quartz and other highland zone rocks are to be found within the gravel of the area (Dewey and Bromehead 1915) but personal experience suggests it is not ubiquitous. The attributes of the flint assemblages and the pottery show that the pits belong to the earlier

Neolithic tradition, but it is not clear where each of the sites lie within the long span of time that this period represents. With the exception of pit 1500, which produced a decorated vessel in the Ebbsfleet tradition, the other pottery is undecorated and this might be taken as an early characteristic. However, without an absolute chronology this is speculative.

Earlier Neolithic deposits were discovered on just one of the Wood Lane trenches (D). Pit 10 was an irregular elongated oval containing 166 sherds of earlier Neolithic pottery and 153 struck flints, with a small amount of burnt and unburnt animal bone. The bone was submitted for AMS radiocarbon dating but was not able to produce a date (Pettit pers comm). In addition, flintwork certainly or probably of earlier Neolithic date, comprising blades, a flaked axe, and a polished edge knife, were found in the upper levels of a palaeochannel in trench C.

Earlier Neolithic deposits on the neighbouring Wood Lane Extension site comprised a single pit (12), which cut an earlier, undated feature (13), two possible features (9 and 10), and a number of stray finds of earlier Neolithic pottery and flintwork. Pit 12 was similar to feature 10 on Wood Lane trench D, which is rather irregular in plan with a bowl-shaped profile. It contained 34 sherds of pottery and ten flint flakes, including an arrowhead fragment. However, no faunal remains or charred plant remains were recovered.

Brook Farm trench B contained two pits, 1001 and 1004 (not illustrated), and two posthole-sized features, 1018 and 1019, of earlier Neolithic date (Fig 10.2 and 10.3). Pit 1001 was large and oval with a bowl-shaped profile, it contained 304

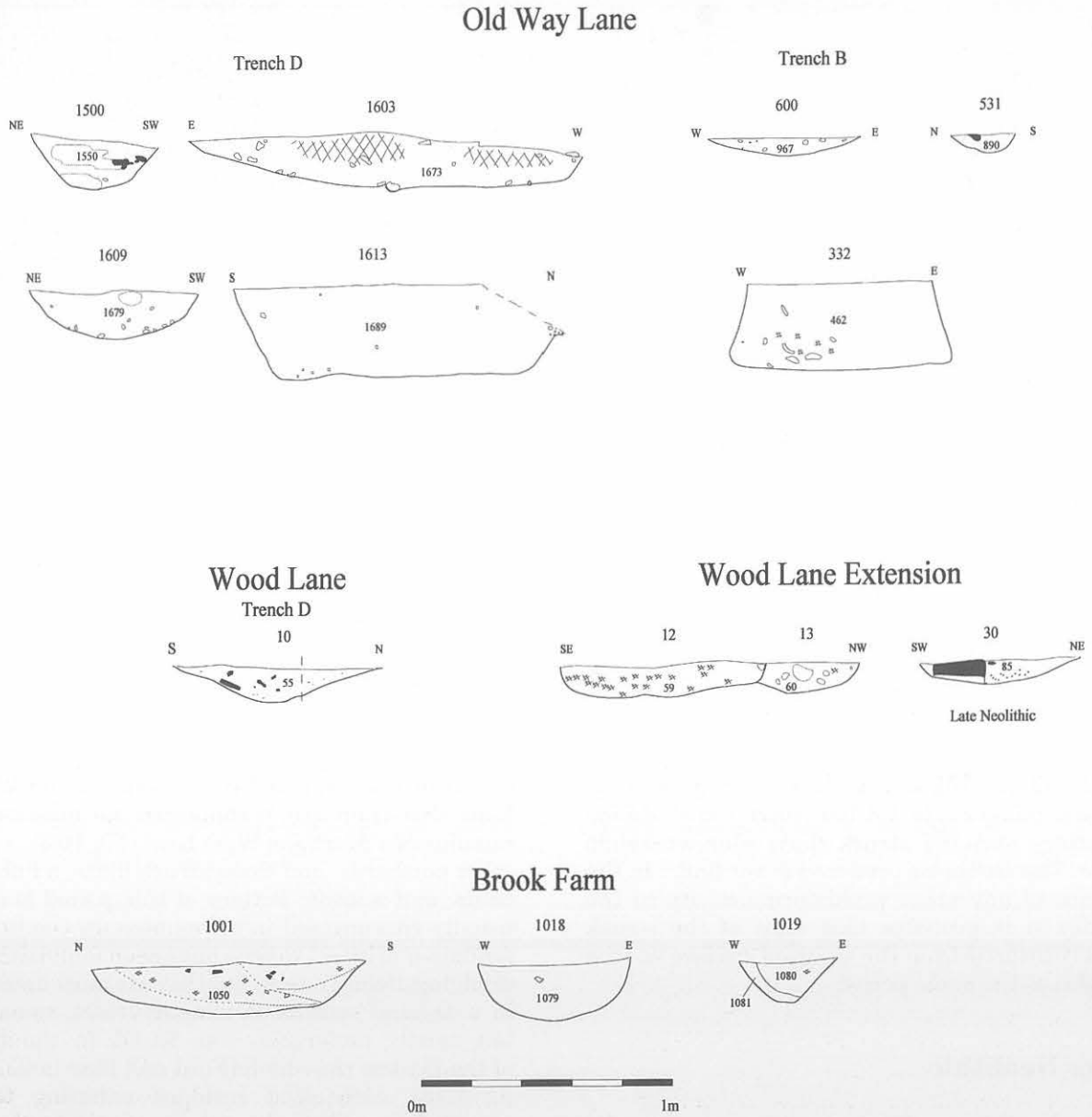

Figure 10.2 Sections of Neolithic features

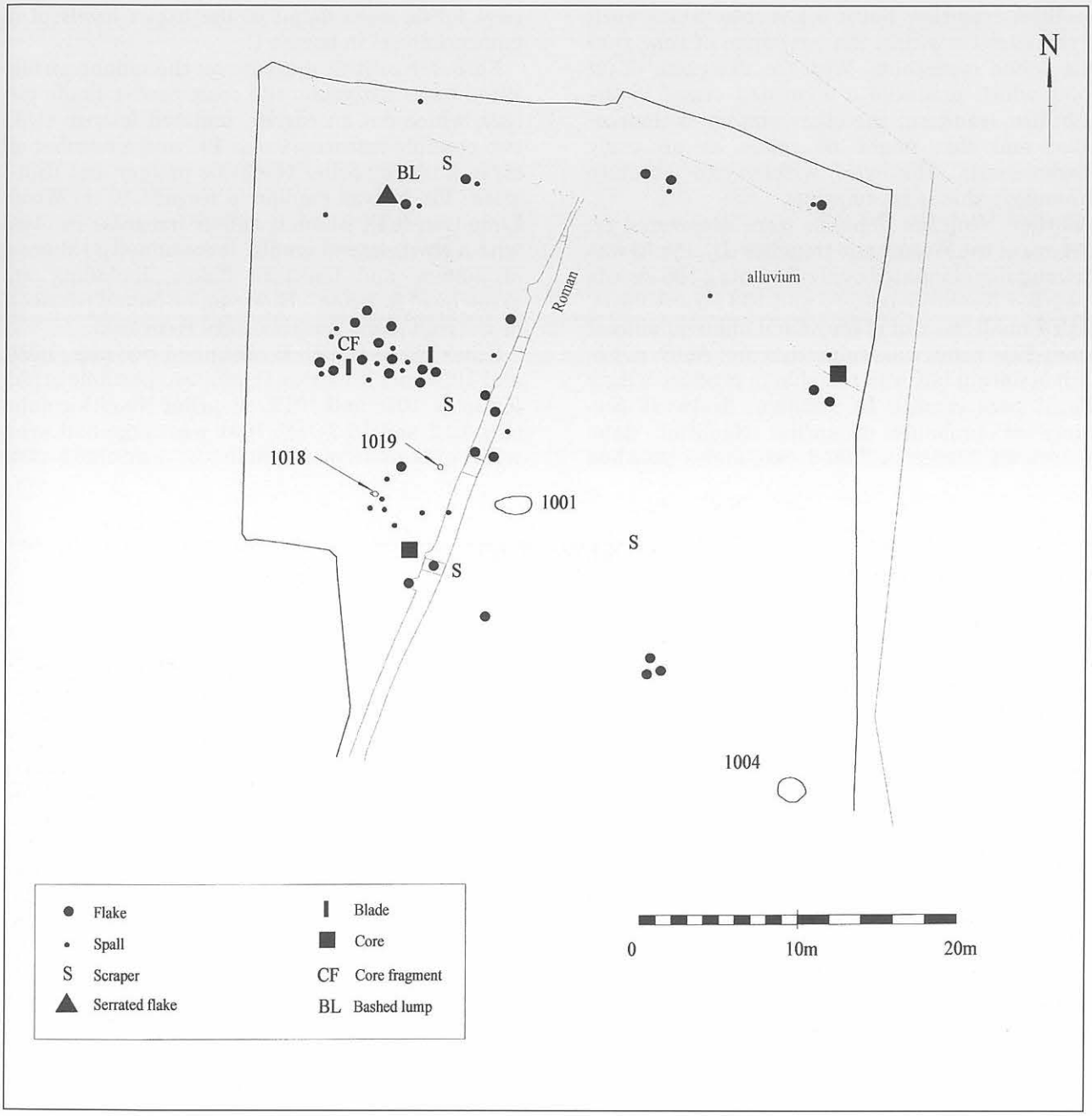

Figure 10.3 Plan of features and stray finds on Brook Farm, trench B

sherds pottery, 853 struck flints, and a quantity of flint workshop waste. Pit 1004 produced 47 sherds of pottery and 167 struck flints plus workshop waste. The postholes produced fewer finds. In the absence of any other prehistoric activity in the vicinity, it is probable that most of the struck flints recovered from the stripped surface nearby are also of the same period.

Later Neolithic

Later Neolithic subsoil deposits on the site comprise a single, shallow bowl-shaped pit (30), 0.72m in diameter and 0.1m deep, on the Wood Lane Extension site. It contained the substantial remains of a Mortlake Ware bowl (Fig 10.4), a few other potsherds, and three struck flints, a flake, a blade, and a knife. Pottery of this period is only usually encountered in a fragmentary condition. A number of intact vessels have been found during dredging of the Thames but they are most unusual in a dryland context. A similar vessel, smashed but mostly restorable, was found on the floor of the Horton ring ditch (Ford and Pine 2003, 37, fig 2.16), carbonised residues adhering to it provided a radiocarbon date of 4520±80 BP (OXA-3578:3500 – 2900 cal BC). This comparison

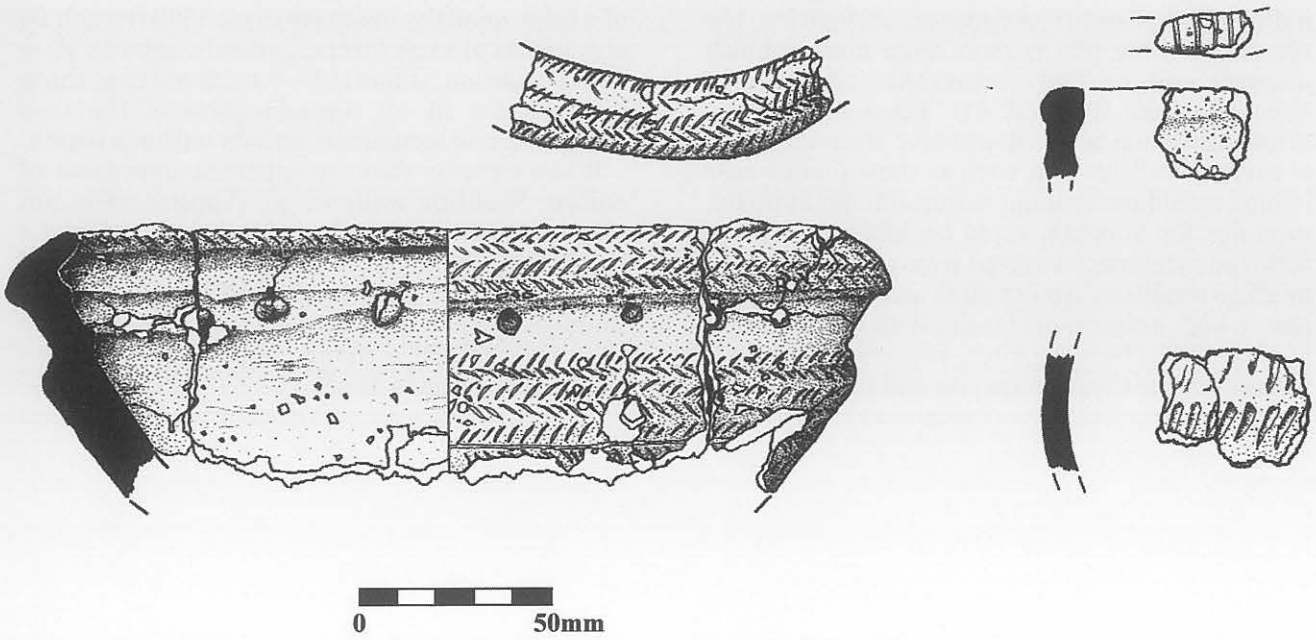

Figure 10.4 Pottery from later Neolithic pit 30 in Wood Lane extension trench

may provide a guide to the date of the Cippenham vessel, but also serves to indicate the diversity of the context of discovery.

Discussion

The Cippenham fieldwork has produced a relative wealth of earlier Neolithic deposits and finds, but were it not for the finding here of four clusters of pits, occupation sites would still be outnumbered by monumental sites in the Middle Thames Valley. Our expectation that the number of occupation sites should greatly exceed that of monumental sites needs further consideration if the Cippenham finds are to be placed in context.

The absence of earlier Neolithic occupation sites could be the result of several factors. In particular, it could be related to the process of discovery; the small size and ephemeral nature of these sites could restrict the chances of discovery by casual observers or through controlled survey work, such as the evaluation carried out prior to the excavations at Cippenham. Also, if ephemeral subsoil features were typical of the earlier Neolithic, they may have suffered more from later ploughing than sites of other periods.

In recent years, much attention has been paid to the possibility that many earlier Neolithic occupation sites, and indeed sites of earlier periods in general, are largely represented by scatters of struck flints within the topsoil (Schofield 1991). Where it is not possible to examine the topsoil content or where flint usage is very low, such as away from chalk or gravel subsoils, it must be considered that a component of the earlier Neolithic settlement pattern may not be retrievable. Even where such sites are studied under optimum conditions, there is evidence to suggest that earlier Neolithic sites are not that well represented in topsoil artefact clusters (Healy 1983).

What light does this throw on the earlier Neolithic settlement of the region? Models suggested by Healy (1988) and Pryor (1984, 203–05) considered that earlier Neolithic occupation took the form of small units dotted around the landscape, probably not occupied for great lengths of time; perhaps the majority of the population lived 'in rather flimsy and temporary dwellings' (Thomas 1996, 2). It is not clear if these sites were widely distributed or only occurred in general proximity to monuments. The latter scenario appears to be the case in the middle Thames region. It is clear that certain geological outcrops, such as the claylands and heathlands of East Berkshire, were avoided in the earlier Neolithic and were not exploited until later Neolithic or Bronze Age times (Ford 1987).

The evidence from Cippenham, ie small numbers of pits and postholes, is typical of many earlier Neolithic occupation sites across the country, such as that at Hemp Knoll, Wiltshire (Robertson-Mackay 1980), although larger groups of pits and postholes are also known, such as those at Hurst Fen (Clark *et al* 1960), Broome Heath (Wainwright 1972) and, more recently, in the Kennet valley at Reading Business Park (Moore and Jennings 1992). Structural remains, such as houses, or indeed other settlement features, are a much less common trait (Darvill and Thomas 1996).

The discussion so far has considered that the earlier Neolithic features are a domestic component of the settlement pattern and that they contrast with the monumental sites. However, whilst ultimately these features may prove to

indicate the presence of domestic occupation, the content of these pits is more than mere rubbish disposal and probably represents ritual deposition (Thomas 1991, 60, 61). Thomas (*ibid*) has drawn attention to the distinctive characteristics of earlier Neolithic pits, such as their shallowness (which would make them unsuitable for storage), evidence for burning, rapid backfilling, and the fact that artefacts recovered from pits are often in pristine condition. Struck-flint assemblages often have a high proportion of tools. With the exception of evidence for burning, these features are present for most of the Cippenham pits and the deposition of a large quantity of quartz in pit 1500 (trench D) also points to some form of symbolic activity. As a note of caution, it has to be considered that these pits are not at all representative of the true distribution of occupation activity within a region.

It is a paradox that the apparent abundance of earlier Neolithic evidence at Cippenham is not matched by that for the later Neolithic, with just a single later Neolithic pit present. The nature of later occupation sites is not well known and our findings do little to enhance this situation other than to highlight a change of landuse or depositional practice over time.

11 Perry Oaks – Neolithic inhabitation of a west London landscape

by John S C Lewis and Ken Welsh

Introduction

Over a period of twelve months from November 1998, a team of archaeologists from Framework Archaeology (a joint venture formed by Wessex Archaeology and the Oxford Archaeological Unit) undertook the excavation of a 21ha site at Perry Oaks Sludge Works in west London (Fig 11.1). The work was carried out at the request of Thames Water Utilities Limited, who own the site, and with the support of BAA plc.

The original research design (BAA 1998), drawn up by Gill Andrews and John Barrett for BAA plc, proposed that the project should aim to move beyond the recovery and description of archaeological remains and instead should attempt to create an understanding of the history of human inhabitation of the landscape and to develop this into a site narrative during the course of the excavation programme. The building of such a narrative requires the constant feedback of information as excavation progresses in order to allow new interpretations to be formulated and challenged. In order to do this, Framework Archaeology has developed an integrated database and GIS system, which allows site staff access to up-to-date stratigraphic, artefact, and environmental information during the course of excavation.

This paper draws on the results and extensive digital archives of the 1998/1999 excavations at Perry Oaks (site code: WPR98) (Framework Archaeology 2000a), two smaller areas of excavation to the north (site code: GAI99) (Framework Archaeology 2000b) and to the south-east (site code GAA00) (Framework Archaeology 2000c), and an excavation carried out by MoLAS in 1996 (site code: POK 96) (Andrews *et al* 1998) (Fig 11.2). The archaeological background to the Neolithic of the Heathrow area has been summarised elsewhere (Cotton *et al* 1986 and more recently Lewis 2000) as has the cropmark evidence (Longley 1976, RCHME 1995) and will be referred to here.

Location and archaeological background

For the purposes of this paper the Heathrow area can be defined topographically as that part of the Taplow gravel terrace bounded to the west by the Colne Valley, to the east by the Crane Valley, to the north by the edge of the Lynch Hill gravel terrace and to the south by the edge of the Taplow terrace. Over much of this 'Heathrow terrace' the Taplow gravel is sealed by the Langley Silt Complex or 'brickearth', a highly fertile silty loessic deposit.

Although the landscape is largely flat, the siting of prehistoric monuments was greatly influenced by very slight variations in topography, in some instances of no more than a few tens of centimetres. This is of particular importance when considering the Neolithic landscape, since the architecture of monuments such as the Stanwell cursus, ring-ditches, and barrows was often designed to enhance or take advantage of specific viewpoints within the landscape.

The transformation of hunter-gatherer landscapes

Around 6600 BC people gathered adjacent to a stream channel at the western end of what today is the Perry Oaks site, and left behind a series of pits filled with burnt unstruck flint (WPR98). It may be that these are all that remain of a cooking midden or low mound, or possibly the bases of burnt post settings. The pits occupy a classic hunter-gatherer location, next to a stream, and on the margins of the Heathrow terrace where it meets the Colne floodplain. No other remains dating to the Mesolithic were recovered from the site, and this mirrors a pattern that has been observed generally in west London. That is, that during the later Mesolithic, human activity which left archaeological traces, whether kill sites, temporary camp sites, or these pits, was confined to the margins of the floodplain and gravel terrace. These activities were thus located on the boundary between different geological and vegetational zones. Over many millennia, the boundary zone, together with the floodplain and the Heathrow terrace, must have acquired a cultural and social significance beyond merely providing different resources. For instance the memory of the use of the Colne floodplain many centuries previously (prior to inundation and peat formation) will have remained and so the boundary zone marked the transition from the ancestral past of the floodplain to the descendants' future on the gravel terrace. The Perry Oaks burnt pits may therefore represent a communal meeting place where feasting and ceremonies took place on a regular cycle.

Communities in the earlier Neolithic appear to have been more active on the Heathrow terrace than during the preceding millennia. In addition to more general occupation of the terrace,

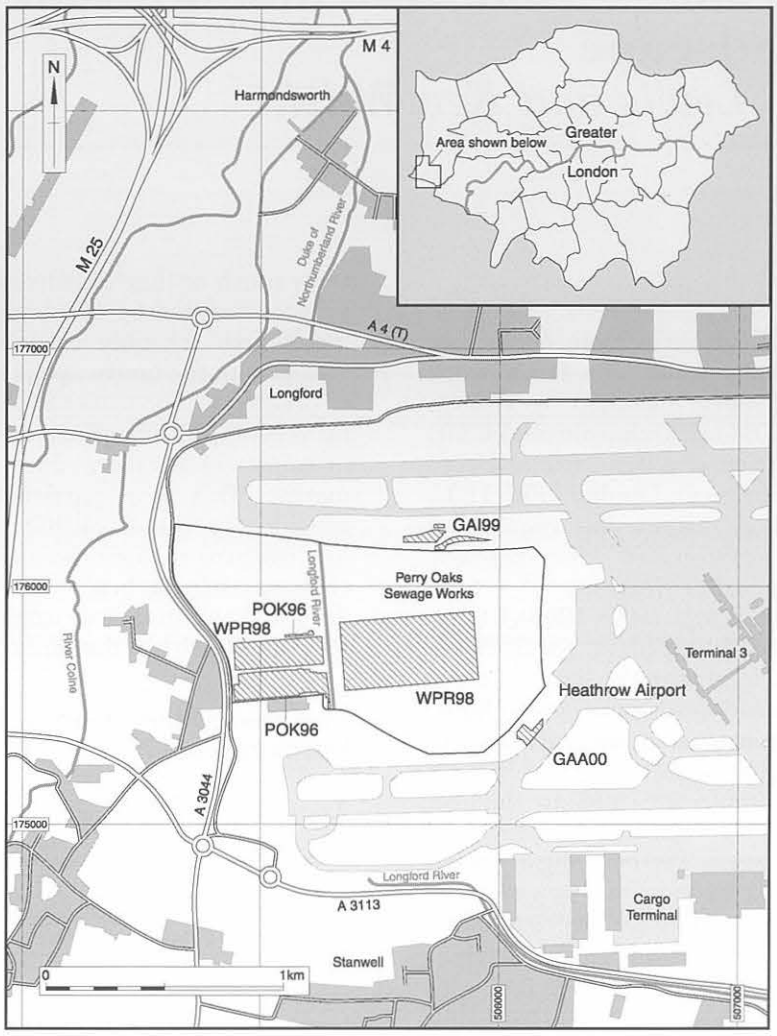

Figure 11.1 Perry Oaks: Site location plan

monuments were constructed and acted as foci for ceremonial and ritual activities. To the south (POK96), a double row of offset timber posts seems to have been associated with ceremonies that produced burnt flint that survives as residual material in later ditches. This monument consisted of two parallel rows of posts, *c* 22m apart, consisting of four and five posts each. Each posthole was *c* 0.6m in diameter, and extended *c* 0.2m beneath the base of the cursus ditches. The spacing between the postholes varied from 4.6m to 4.8m. The rows of posts were later removed during the construction of the cursus ditches, which almost exactly followed their alignment. Ceremonies associated with a horseshoe-shaped enclosure also deposited a finds assemblage dominated by burnt flint with no pottery. Further to the south, in Burrows Hill, a possible ring-ditch has been recorded although this produced no finds at all (MoLAS 1994).

In broad terms, the finds assemblages from these monuments are very similar in composition to those from the Mesolithic pits, but are in clear contrast to those associated with the occupation of the wider landscape. The pattern is one of movement and activity across the entire landscape of the terrace resulting in the deposition of pottery and struck flint, as well as burnt flint, in tree throws and as material subsequently incorporated into later deposits. People do not seem to have carried out any activities that left material residues on the floodplain to the west of the now largely silted-up stream channel. The progression from valley floor to terrace that started in the Mesolithic was accelerating.

It is thus possible to see the monuments as a formalisation of practices that had been in existence for several millennia. As has been argued, many of these ceremonies occurred along the transition between floodplain and terrace, and were probably linked by ceremonial processions that visited different locations along the route during different seasons. As time progressed, new locations and rituals were added, whilst others were merely visited but not resanctified, or may have faded from memory. The rituals and ceremonies had inevitably changed with time and with changes in the subsistence

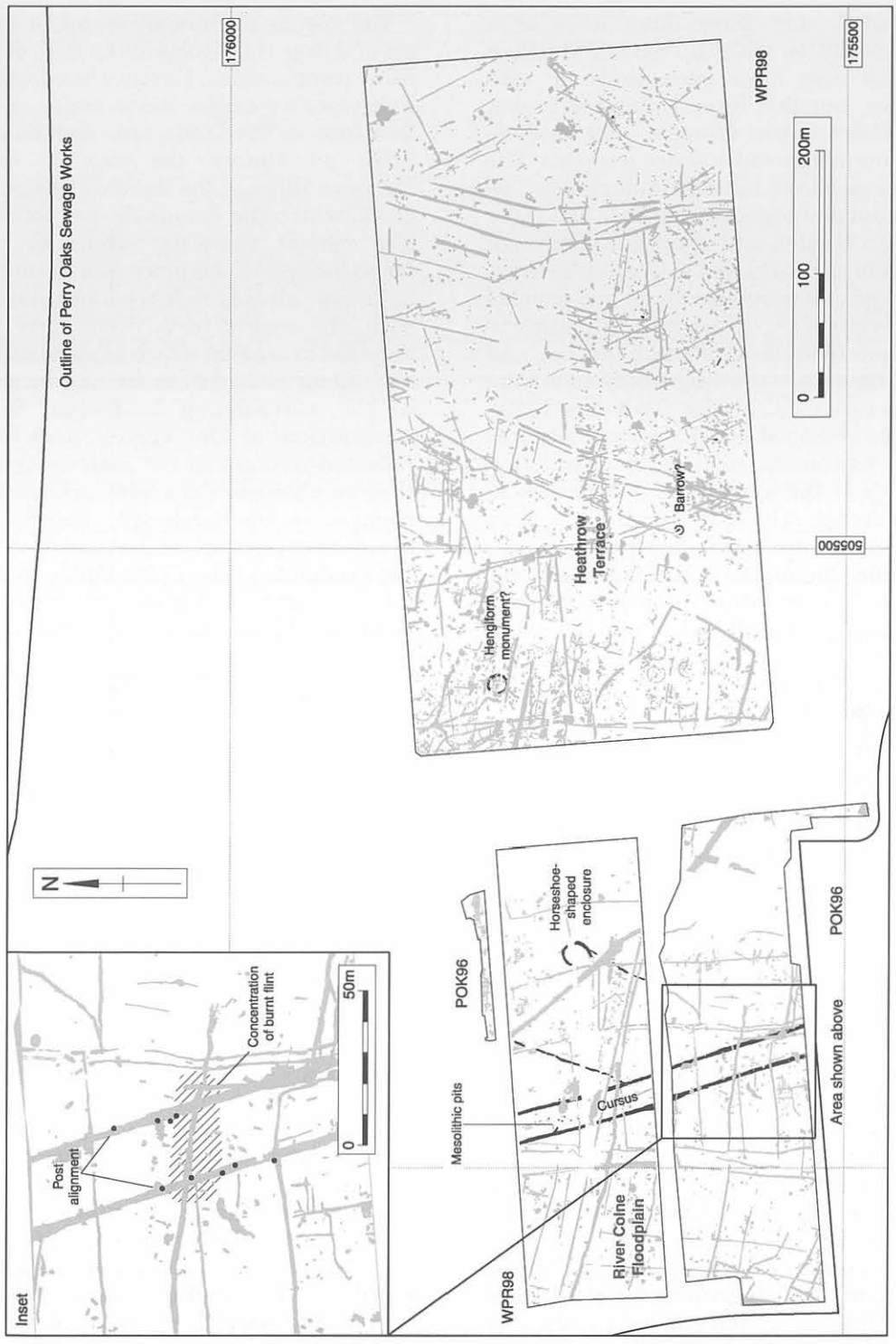

Figure 11.2 Perry Oaks: Plan of excavated features, with Neolithic monuments in bold

economy. It is thus unsurprising that the ceremonial practices required a modification of the landscape and a new monumental architecture to reflect these changes.

Cursus landscape

The modification of the landscape and the incorporation of new architectural elements continued into the middle Neolithic with the construction of the Stanwell cursus and possibly the horseshoe-shaped enclosure a little to the east (Fig 11.2). Preliminary analysis of the pollen data from the cursus ditches gives the impression of a very open landscape in the locality – while trees were present, they were poorly represented when compared with the herbaceous taxa. Ferns such as *Polypodium* (polypody fern) and monolete *Pteropsida* (undifferentiated ferns) were quite

well represented, and these may have been growing in association with the trees. *Pteridium* (bracken) may also have been growing with stands of trees, but this fern is confined to dry, acidic soils where it can compete well on open ground; it is often an invader of dry pastures. The area certainly seems to have been dominated by weedy grassland and open, broken soils and these may have been created and maintained through active management associated with stock rearing. Cereal pollen grains were also found and some of the ruderal weeds such as *Artemisia* (mugwort), *Chenopodiaceae* (goosefoot), *Rumex* (docks), and others, could have been growing where soils were opened up for cereal cultivation (Wiltshire 1999).

The horseshoe-shaped enclosure was situated on a natural rise in the underlying gravel that would have given the monument prominence in this open landscape. The monument would have been clearly visible across the floodplain, though less visible from the terrace to the east due to the break in slope. The enclosure ditch probably had an internal bank, separating the outside world from the ceremonies carried out inside. However, the open south-western side of the enclosure was aligned on the double timber alignment described above, suggesting that ceremonies at the two monuments were linked, both visually and possibly also by procession. Modification of the south-western entrance of the enclosure may be related to this. However, the major architectural addition to the landscape during the middle Neolithic was the construction of the cursus.

The Stanwell cursus is the second longest of its kind in the country, extending for *c* 4km from the edge of the Taplow terrace in the south to the Bingley Ditch in the Colne Valley to the north west. Unlike most other cursus monuments, the Stanwell cursus consisted of a central mound and two flanking quarry ditches. Recent digital analysis by Framework Archaeology of a detailed level survey undertaken by the Air Ministry prior to the construction of Heathrow Airport has shown that in 1943 the central bank still survived to a height of *c* 0.4m. It is estimated that the cursus bank would originally have been 4m wide at the base and 1.6m high, perhaps higher if the mound had a turf revetment. It would have formed a very significant feature in this largely flat landscape. This was confirmed at the end of the WPR98 excavations, when Framework Archaeology used a mechanical excavator to reconstruct a short length of the cursus. It is possible that the mound was not continuous but consisted of two separate mounds – the profiles of the quarry ditches suggest that the two mounds dipped lower and joined at the boundary between POK96 and WPR98. Apart from this change in the ditch profiles, no other evidence for segmented ditch construction exists although this may be due to regular cleaning of the ditches rather than reflecting the original construction techniques used.

The cursus monument seems to have fulfilled several important roles in the lives of middle Neolithic communities. Firstly, the cursus appears to link together earlier monuments and important locations in the landscape, including the Mesolithic pit cluster, the possible ring-ditch at Burrows Hill and the double alignment of timber posts, which the cursus ditches followed exactly. The cursus therefore seems to represent a formalisation of the processional route through a landscape already rich in history and meaning. As such, the central bank would have provided an elevated causeway, which allowed anyone processing along its length to see and be seen by those in the surrounding landscape. Secondly, the composition of the cursus bank would have reflected changes in the underlying geology and thus emphasised the geological and vegetational changes in the landscape. Thirdly, the cursus acted as a physical and visual barrier between the floodplain of the Colne Valley to the west and the flat gravel terrace of what was later Hounslow Heath to the east. When viewed from the west, anyone on top of the cursus bank would have appeared to be walking along the skyline, whilst the bank itself precluded views to the east. The monument was thus both inclusive, in that it allowed people on the top of the bank to see and be seen, particularly from the Colne floodplain, but also exclusive, in that it divided the landscape by means of a line of horizon. Finally, the central mound served to bury and seal the earlier locations and monuments, as if acting as a final line ruled over the history of the past 3000 years.

The various elements of this landscape seem to be united by two ditches in a zone on either side of the cursus, dug on a north-easterly alignment that defined a corridor from the cursus to the horseshoe-shaped enclosure. They were constructed in segments and were dug shortly after the primary infilling of the eastern cursus ditch. They are stratigraphically earlier than the middle Bronze Age field system and may therefore date to the late Neolithic/early Bronze Age. These ditches produced few finds except for some struck and burnt flint. Their depositional signature is comparable with that of the monuments rather than that of the broader landscape occupation or of the middle Bronze Age field system. The two ditches could have channelled the movement of people and/or animals through the partial gap in the cursus bank and towards the horseshoe-shaped enclosure.

Apart from one example from GAI99, there are no pits associated with either Peterborough Ware or late Neolithic Grooved Ware assemblages and this is in marked contrast to other sites in west London (eg Imperial College Sports Ground (Wessex Archaeology 2000)). It is not clear why this should be although it might reflect the specific nature of activities (although IMC96 has both Peterborough Ware and monuments).

Evidence for a human presence in the landscape in the early Bronze Age is sparse. The ring-ditch or hengiform monument at the western end of the largest excavated area may date to this period, although it is more likely to be Iron Age in origin, and there is a small ring-ditch monument further south which could be a small barrow with a central mound. Unfortunately, truncation and a lack of finds make this monument difficult to interpret. This lack of material accords with the general pattern seen throughout west London, although a few abraded fragments of pottery (possibly Beaker and Collared Urn) residing in later features, together with several unstratified barbed and tanged arrowheads, show that people were present and moving through a landscape dominated by the ritual locations and monuments of the previous millennia.

In summary, the hunter-gatherer landscape is transformed during the Neolithic into a monumental landscape. This was not an abrupt transformation, but occurred more gradually as part of the process of constructing the Neolithic itself. Underlying the process was a complex view of the world originating in the Mesolithic period, which involved meeting at special locations and processing through the landscape, in addition to subsisting within it. These traditions and practices changed only slowly over two millennia during the Neolithic, as people's view of the world and their place within it changed. These changes demanded a different, more formalised architecture within which to practise the ceremonies. The monumental architecture and location provides an insight into the sort of society that inhabited the area. As noted above, the cursus provided an elevated processional causeway for a small group of people. Unlike the situation with most other cursus monuments, these people could be seen by others in the landscape, and especially dramatically looking east from the Colne Valley. The procession and rituals practised by this group were therefore meant to be seen. To the south, the edge of the Heathrow terrace is marked by the sharp break in slope of the Taplow/Kempton Park gravel interface and it is likely the cursus terminated at this break. Extending eastward from the cursus was a barrow/ring-ditch cemetery or complex. These small monuments were not placed at the top of the ridge, but along a false crest midway down the slope. Once again, the ring-ditch/barrow complexes and the ceremonies they encompassed, were meant to be viewed from the lower ground, looking northwards onto the Heathrow terrace and framed by the skyline. In other words, the construction of a string of small monuments along the more steeply sloping southern edge of the terrace provided a similar effect to that achieved by the architectural device of the Stanwell cursus on the gently sloping side of the Colne Valley. Other ring-ditches in the Heathrow area occupy similar, less dramatic prominences: slight rises in the underlying gravel (eg the horseshoe enclosure at Perry Oaks, Fig 11.2) and gentle breaks of slopes (the sites excavated by Canham (1978)).

If one excludes the Mayfield Farm double-ditched enclosure (variously dated to the earlier Neolithic or late Bronze Age (Cotton *et al* 1988; Lewis 2000, 73), large henge monuments, which are exclusive in character, are absent from the area. The monumental architecture of the Neolithic was thus concerned with both defining the space for and displaying in as dramatic a way possible the ceremonies practised by small groups of individuals to the population in the wider landscape, indicating an essentially 'open' society. It is possible that the openness of local Neolithic societies prevented the rise of conspicuous individual display which typifies the early Bronze Age elsewhere. The lack of 'rich' burials, and Beaker deposits in particular, contrasts with the amounts of material being deposited in the River Thames throughout the period.

Thus, by the late Neolithic/early Bronze Age, the monuments in the Heathrow area can be seen as ceremonial and sacred structures in their own right, but they also served to define the landscape as a large monument within which people worshipped and lived. In the succeeding middle Bronze Age, the landscape was transformed into a vast system of fields and enclosures, indicating new concepts of land tenure and underlying changes within society.

Acknowledgements

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Table 12.1 Continued

Site	County	Number of articulated inhumations	MNI from dis-articulated inhumed bone	Cremations	Excavation date	Notes and references
Other sites						
Brightlingsea	Essex	–	–	1	1995	Cremation in central pit within a ring work which likely represents a ploughed-out round barrow; N Lavender *pers comm* 2000
Halling; TQ705644	Kent	1 (M)	–	–	1912	Burial eroded out of Medway river terrace; Keith 1914; Oakley *et al* 1967
Nethercourt Farm, Ramsgate	Kent	2 (1M, 1U)	–	–	1949	Isolated find of two burials in a large pit; Dunning 1966 (bone by Wells)
Whyteleafe; TQ335584	Surrey	1 (M)	–	–	1905	Isolated find of a burial in a large pit; Hogg 1906 (includes notes on bones)

Key. In columns 3–5: M = male adult; ?M = adult, probably male; F = female adult; ?F = adult, probably female; U = unsexed adult; J = juvenile (c. 2–16 years); Inf = infant (up to c. 2 years). Heading, column 4: MNI = minimum number.

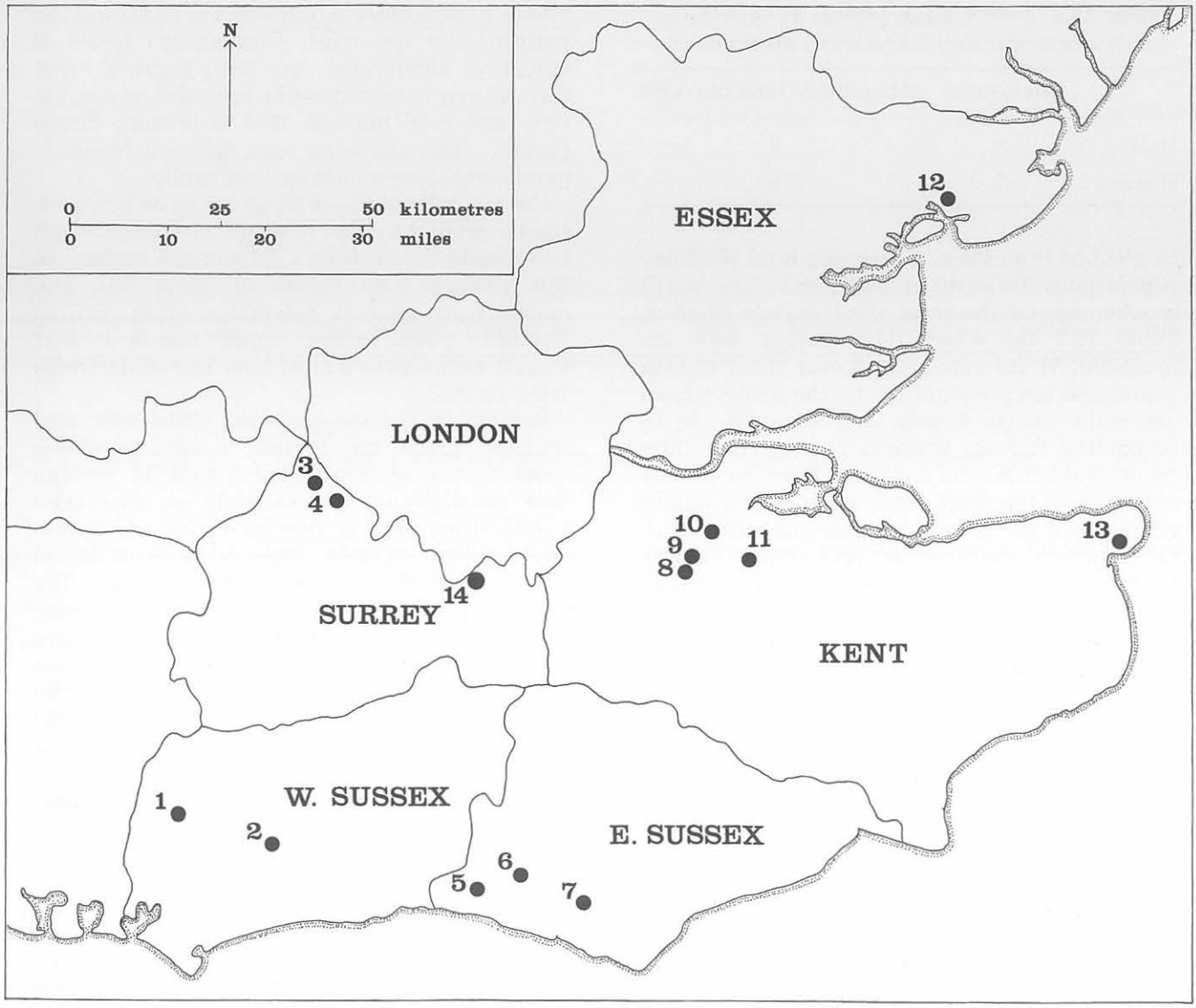

Figure 12.1 Location of sites listed in Table 12.1. North Marden; 2. Bury Hill; 3. Staines; 4. Shepperton, Staines Road Farm; 5. Whitehawk; 6. Offham Hill; 7. Alfriston; 8. Chestnuts, Addington; 9. Coldrum; 10. Halling; 11. Smythe's Megalith; 12. Brightlingsea; 13. Nethercourt Farm, Ramsgate; 14. Whyteleafe

prolonged burial unless it had been burnt prior to deposition (indeed the only unburnt human remains at the site were teeth, which are more resistant to destruction in hostile soils). It is likely that Chestnuts was used as a repository for cremated as well as inhumed remains; the lack of further inhumed material probably reflects local soil conditions.

At Alfriston, an oval barrow was raised over an articulated burial, but no burial was found beneath the oval mound at North Marden, although some disarticulated material was recovered from the flanking ditch fills suggesting either disturbed burials or use of bones in funerary activities (Drewett 1986). At Brightlingsea, a cremation burial accompanied by a fine Mildenhall-style bowl was found within a ring-ditch, probably all that remained of a ploughed-out round barrow.

At Nethercourt Farm, Ramsgate, two inhumations were found in a large pit. There was no trace of a barrow, and the feature was interpreted as a large storage pit, which had been reused for burials (Dunning 1966). Another isolated inhumation burial in a large pit was found at Whyteleafe, Surrey (Hogg 1906). In the South East, deposition of human remains in the Neolithic was not confined to enclosures and barrows.

Neolithic populations

The small quantity of human remains available from south-east England severely limits what can

Table 12.2 Sexed adult burials at enclosures and megalithic long-barrows in SE England

	Enclosures	Megalithic long barrows
Males	2	9
Females	5	5

be gleaned from them concerning local Neolithic populations. However a few points are worth mentioning. Of the total of 61 burials listed in Table 12.1 for which demographic data are available, 51 are adults (aged over about sixteen years) and ten are children. Of the adults fifteen are male, twelve female, and 24 could not be sexed. The full age range is present from older adults down to neonatal infants. However, at only about 7% of the total, infants are clearly underrepresented given the high rates of infant mortality which characterise populations lacking modern sanitation and medical care. This dearth of infants is typical of British Neolithic sites as a whole (Brothwell 1972). It is tempting to interpret this as indicating that infant remains were treated differently from those of older children and adults, and often disposed of in such a way as to leave no trace archaeologically. However given that many Neolithic assemblages were excavated prior to the advent of modern field techniques, it is just as likely to be a result of deficient archaeological recovery of tiny infant bones.

Overall, the sex ratio among those adults for whom sex could be determined, is approximately 1:1. This matches Brothwell's (1972) finding for pooled Neolithic human remains. When one separates the burials by monument type there appears to be a suggestion of a pattern by sex (Table 12.2). Although numbers are small and the pattern does not reach conventional levels of statistical significance ($p = 0.14$, Fisher's exact test), it may nevertheless be regarded as suggestive, and may indicate that a broader demographic study of burials from different Neolithic monument types would be worthwhile.

Cranial indices, where these can be determined, cluster around a value of about 71–73 (although two female crania from Coldrum are outliers to this pattern with values of about 78). The material in general resembles other British Neolithic crania in this respect and is distinct from Bronze Age and most later material (Brodie 1994, fig 9.6).

Recent stable isotope work (Richards and Hedges 1999) on British human remains suggests an abrupt abandonment of marine food resources in the Neolithic, so that even burials from coastal sites yield largely terrestrial dietary signals. This work was based almost entirely on remains from outside the present region, and contra the above, some commentators (eg Drewett *et al* 1988, 60) have suggested that wild foods such as marine resources continued to be important in the Neolithic of the South East. It would be useful to address the question of the contribution of marine resources to diets in the Neolithic South East by nitrogen and carbon stable-isotope analysis of skeletons from sites near the coast.

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13 Causewayed enclosures: monumentality, architecture, and spatial distribution of artefacts–the evidence from Staines, Surrey

by Philippa Bradley

Introduction

After almost one hundred years of intensive investigation the form and range of causewayed enclosures is very familiar. Their dating has been changed by the acquisition of numerous radiocarbon determinations, which show that these monuments no longer belong to the primary stage within the Neolithic. Recent extensive work including a survey undertaken by the former Royal Commission for Historic Monuments of England (Oswald *et al* 2001) has provided much new information and enclosures are still being discovered (Horne *et al* 2001). The publication of a number of important sites such as the recent work at Windmill Hill and Etton (Pryor 1998; Whittle *et al* 1999) has provided fresh impetus into causewayed enclosure studies, and builds upon a large body of existing data. At the time of writing the important Neolithic complex at Hambledon Hill is also nearing publication (Mercer and Healy in prep). Extensive excavations at numerous sites including Staines, have produced a huge body of material culture, as well as details about their construction and use. Excavations in and around causewayed enclosures, most spectacularly at Hambledon Hill (Mercer and Healy in prep), but also at Radley (Barclay and Halpin 1999), Robin Hood's Ball (Richards 1990), and Maiden Castle (Sharples 1991) have provided insights into the activities carried out in the vicinity of these monuments. The distribution of material culture from enclosures has also been studied extensively. At Staines and Briar Hill, for example, a number of distribution plots are presented in the publications (Bamford 1985; Robertson-Mackay 1987), and the more recent publications of Windmill Hill and Etton devote much of the individual reports and discussion sections to this area (Whittle *et al* 1999, 355–67; Pryor 1999, 357–8, 361–3). A study of the distribution of material culture in relation to the general architecture of the Staines enclosure was undertaken (Bradley 1994) in order to investigate further and clarify the patterns presented in the published report. This paper summarises the findings of the study, and presents some general conclusions about spatial patterning and causewayed enclosure design.

Staines causewayed enclosure

The site was discovered through aerial photography in 1959, and rescue excavations in advance of gravel extraction, directed by R Robertson-Mackay, were carried out between 1961 and 1963 (Fig 13.1 Robertson-Mackay 1987, 23). The enclosure was located on the southernmost tip of the largest gravel island in the Colne Valley delta (*ibid*, 25, fig 2). The site is low-lying, *c* 16m OD, and seasonal flooding may have limited access to the site (*ibid*, 24). The enclosure was sub-circular in shape, defined by two concentric ditches. Both ditches have markedly flatter south-eastern sides (Fig 13.2). This flattening, together with the entrance suggested by the inturning of inner ditch segments 52 and 53, and the distributions of material culture, would suggest that this is the main 'aspect' of the monument. Evidence for planning and architecture has been noted at other causewayed enclosures, for example Haddenham (Evans 1988). Artefacts and features are widely distributed throughout the enclosure although there is a noticeable concentration towards the back of the monument.

The position of the Staines causewayed enclosure is of some interest given the great wealth of Neolithic sites in the area (Field and Cotton 1987; Needham 1991, 385, fig 135), including Runnymede on the south side of the River Thames (Needham 1991). To the north lie the Stanwell (Heathrow) cursus and related activity (O'Connell 1990; Elsden and Rayner in prep), and an oval barrow with placed deposits was excavated at Horton 2.5km north-west of the Staines enclosure (Ford and Pine 2003). At Staines Road Farm a Neolithic ring-ditch also produced placed deposits (Jon Cotton pers comm). Contemporary lithic scatters and numerous river finds add to the picture and perhaps indicate special depositional practices (Holgate 1988, 238–9, 251, 283, 307–10). Special artefacts including a jadeite axe (Field and Woolley 1983) have been recovered from near the causewayed enclosure.

Spatial patterning of material culture at Staines

The spatial patterning of artefacts within causewayed enclosures has been widely discussed

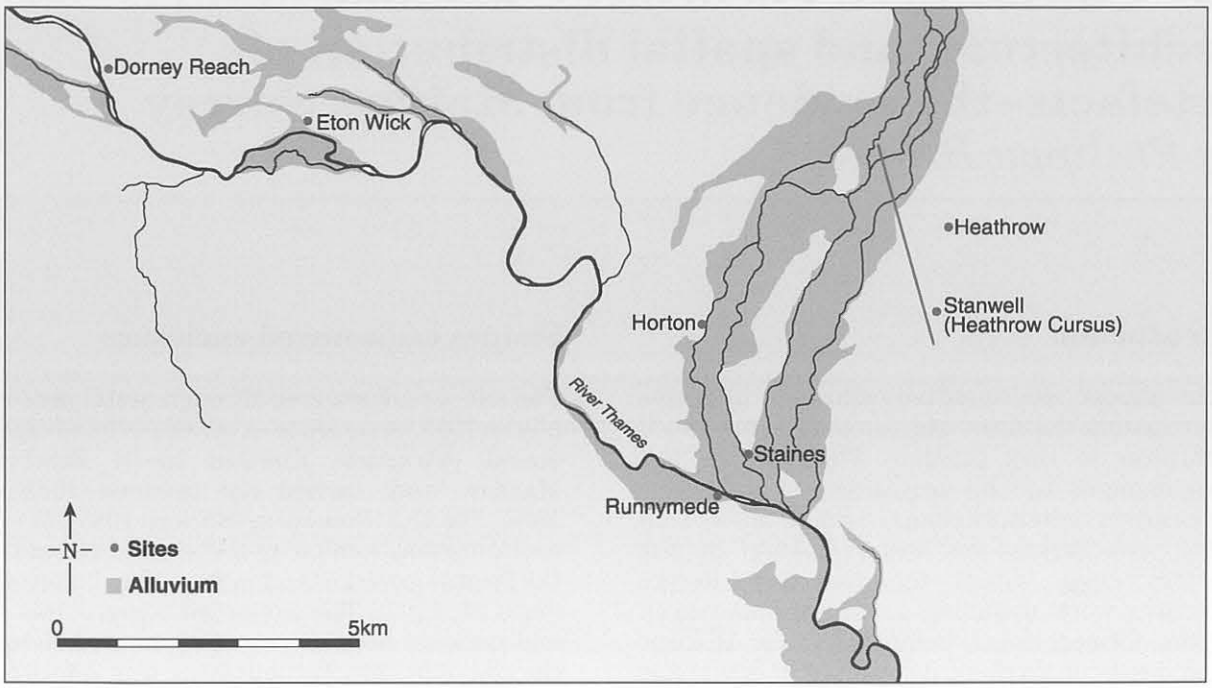


Figure 13.1 Location of Staines causewayed enclosure (after Needham and Trott 1987)

although sometimes in rather general terms. The publication of Briar Hill and Staines (Bamford 1985; Robertson-Mackay 1987) with their extensive artefact distributions provided an opportunity to look at spatial patterning within enclosures that had been extensively excavated. Patterning was discernable both at Briar Hill and Staines (Bamford 1985; Bradley 1994). Reanalysis of the Windmill Hill material and the publication of the extensively excavated waterlogged site at Etton have produced much more information on artefact distributions (Whittle *et al* 1999; Pryor 1999). From the publication there appeared to be considerable potential for further work with the Staines artefact and ecofact assemblages. Unfortunately it was not possible to look at the distributions from Staines stratigraphically but some very interesting patterns do emerge from the resulting distributions. The recurrent nature of many of these patterns suggests that they are more than merely the product of excavation sampling. The limited evidence for both earlier and later activity (Healey and Robertson-Mackay 1987, 95) meant that the assemblages could be used for spatial analysis with relative confidence. The large, varied assemblages (for example 24,562 worked flints, 20,506 pieces of burnt unworked flint, 5658 pottery sherds, representing some 1448 vessels, were recovered (Robertson-Mackay 1987, 67, 95)) provided ample opportunity to study patterning in relation to the structure of the monument itself. Unfortunately due to soil conditions the preservation of organic remains, including animal bone, was limited but some patterns are discernible.

Although artefacts could not be plotted by layer at Staines, distinct spatial patterns of deposition within the ditches and interior emerge. There are patterns between the inner and outer ditches, the front and the back of the monument and within the interior. Both struck flint and pottery and some other materials show patterning. Animal bones and sarsen occur most frequently at, or near the butt-ends of ditches, sometimes apparently in association. Animal bones are more common in the outer ditch, including small numbers of wild species. Despite the lack of contextual information these patterns are informative and coherent, implying recurrent depositional practices rather than a coincidental distribution produced by post-depositional or other factors. Deposition within the ditches took place over a period of time given the restricted distribution of the Ebbsfleet Ware and the decorated early Neolithic pottery (see below), implying a continuation of ritual practice through time.

Several interesting patterns emerge when the distributions of earlier Neolithic pottery are studied. Very little pottery occurs in the outer ditch at the front of the enclosure. The main concentrations occur in the inner and outer ditches at the north and north-west sections of the monument. Some butt-ends seem to have been selected for artefact deposition although interestingly these are not paired; that is, artefacts are frequently concentrated in one ditch end only (Robertson-Mackay 1987, 61–6, 68–71, figs 27–36). This is too common an occurrence to be merely the product of excavation sampling.

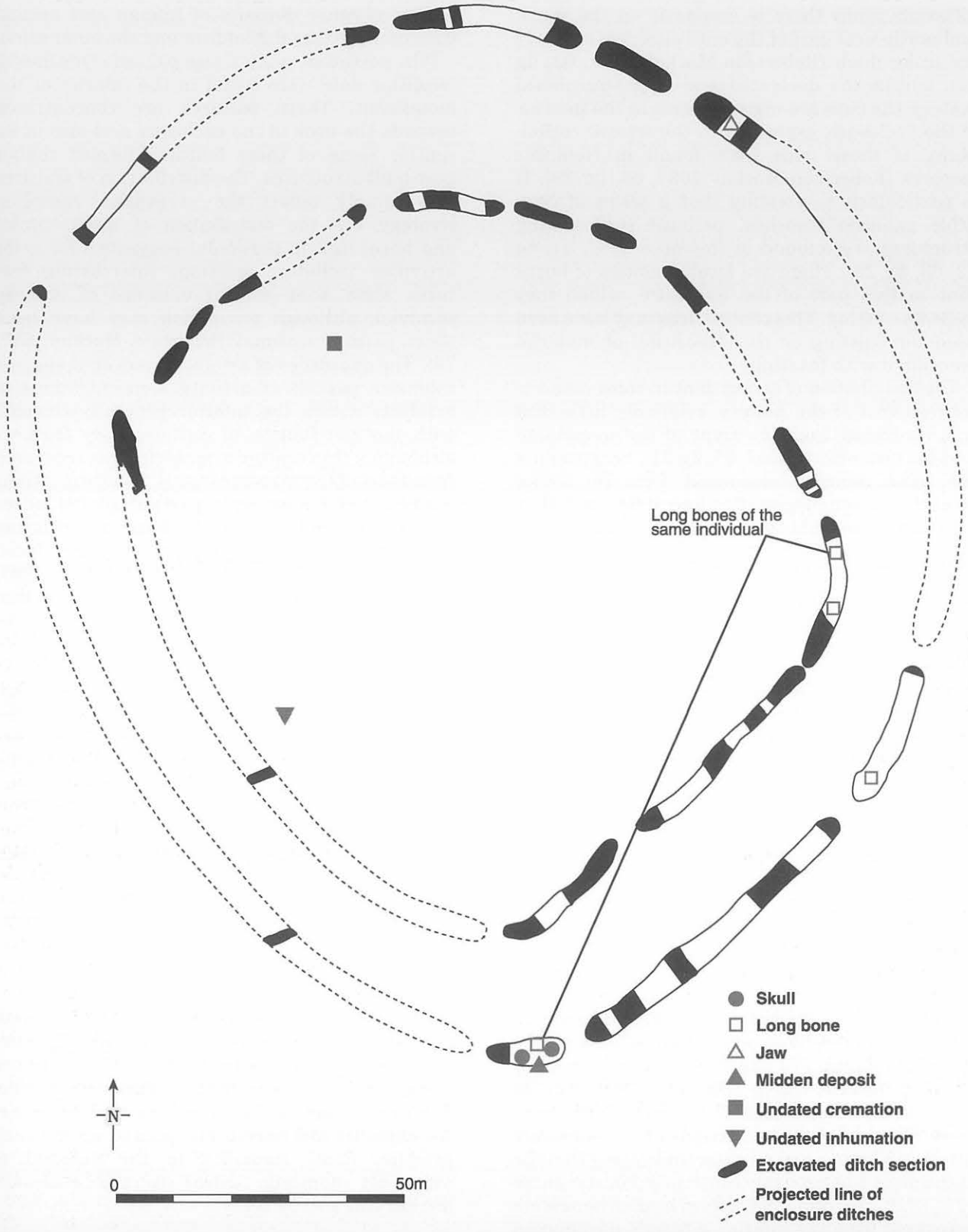


Figure 13.2 Detailed plan of the Staines causewayed enclosure showing excavated sections and distribution of human bone (after Robertson-Mackay 1987)

The decorated and ripple-burnished pottery have complementary distributions. Very little of either type was recovered from the interior of the enclosure (*ibid*). The majority of the decorated pottery occurs in the north and north-west part of the outer ditch. The ripple-burnished pottery is a fairly small component of the ceramic assemblage, but a significant proportion of it occurs in the north and north-west part of the inner ditch. The cups, however, have a slightly wider distribution

although again there is emphasis on the north and north-west part of the enclosure, particularly the inner ditch (Robertson-Mackay 1987, 63, fig 29). Unlike the decorated and ripple-burnished pottery, the cups are more common in the interior of the enclosure, especially in the central region. Many of these cups were found in Neolithic features (Robertson-Mackay 1987, 63, fig 29). It is particularly interesting that a series of Neolithic palisade trenches, perhaps representing structures, were found in this area (*ibid*, 41, fig 12, 63, fig 29). There are local densities of burnt flint in this part of the enclosure, which may indicate cooking. This central area may have been used for feasting or the deposition of material associated with feasting.

The distribution of struck flint in some respects mirrors that of the pottery; relatively little flint was recovered from the front of the monument and the outer ditch (*ibid*, 65, fig 31). Scrapers are the most common retouched form in earlier Neolithic assemblages (Bradley 1994) and they have a wide distribution at Staines. Other everyday retouched forms such as notched flakes, knives, and edge-dressed flakes have a similar distribution to the scrapers (*ibid*, 59). 'Complex' artefacts (leaf-shaped arrowheads, laurel leaves, and axes) share a similar distribution, which emphasises the rear portion of the enclosure ditches and also the back of the interior.

Human bone, however, has a noticeably frontal distribution, mainly occurring in the outer ditch (Fig 13.2). The skeletal parts represented include crania, mandibles, and arms. All of this material is confidently sexed, perhaps erroneously so in view of the body parts represented. There is evidence for excarnation and one individual appears to have died from wounds to the head; after death the head was severed from the body (Robertson-Mackay 1987, 38). All of the human bone is in the primary silts of the enclosure ditches and is often accompanied by midden-like deposits (*ibid*, 37, fig 10). A comparable deposit, which had been deliberately backfilled and consisted of human bone, animal bone, flint, and a reworked Group IVa axe was found in the outer ditch of Maiden Castle (Sharples 1991, 52). At Staines, two fragments of the same arm bone were found in separate sections of the enclosure ditches (37 inner and 43 outer) indicating that the monument was probably constructed in one phase (Fig 13.2). Two other deposits of human bone were recovered from the interior, a female inhumation from excavation box 133 and a token cremation deposit from box 26. Both of these deposits were unaccompanied and are undated, although the excavator believed them to be Neolithic (*ibid*, 51). The human bone in the outer ditch may have served to reinforce the boundary of the enclosure as at Hambledon Hill (cf Mercer 1980). The patterning of the human bone is unlikely to have been produced by sampling or preservation biases as other deposits of human and animal bone occur within the interior and the inner ditch.

Pits, postholes, gullies, and palisade trenches of Neolithic date were found in the interior of the monument. These features are concentrated towards the back of the enclosure and also in its centre. Some of these features formed timber post-built structures. The distribution of features may simply reflect the excavation sampling strategy, but the distribution of the ceramics and burnt flint in particular suggests a focus for activities including feasting. Intercutting features show that several episodes of activity occurred, although occupation may have been short, possibly seasonal (Robertson-Mackay 1987, 24). The quantities of artefacts recovered suggest intensive periods of activity. Concentrations of artefacts within the interior generally coincide with the distribution of contemporary features although a thin scatter of material was recovered from most of the area excavated. Some exceptions can be noted. For example, parts of box 194, boxes 89–94, 105, and some of the boxes towards the rear of the monument, appear to have produced relatively few finds (Robertson-Mackay 1987, 61–71, figs 27–36). Differential deposition within the interior features is suggested by table 4 in the published report (*ibid*, 42).

Continuation of depositional practice seems to have been occurring at Staines, as the distribution of Ebbsfleet pottery virtually mirrors the distribution of decorated earlier Neolithic pottery in the outer ditch (Robertson-Mackay 1987, 64, fig 30), perhaps implying continuity of use and social practices. Similar patterns were noted at Briar Hill where serrated flakes, axe fragments, and other retouched forms were deposited throughout the ditch fills, particularly in the north-western part of the inner enclosure, implying continuity of depositional practices (Bradley 1994, 106–07). At Haddenham, Cambs, continuity of depositional practice between primary and secondary fills was also identified (Hodder 1992, 232).

Undoubtedly some activities at Staines were domestic; the sheer quantity of artefacts, the structural evidence in the centre of the enclosure and the concentrations of burnt flint attest to this. Some non-domestic activities were also occurring; the exposure and burial of corpses being one such practice. Some formality in the disposal of ostensibly domestic debris in the enclosure ditches can also be seen.

Monumentality, architecture, and design at Staines

The general appearance of the causewayed enclosure at Staines with its flattened 'aspect' may have some importance for the distribution of the artefacts within the monument (Fig 13.2). Several specific points can be made about the finds

distributions and enclosure architecture. The inner ditch is less substantial, both in width and depth, than the outer; more artefactual material was recovered from the inner ditch although comparable lengths of each were excavated. The relative distribution of selected finds from the ditches shows the greater emphasis on the inner ditch (Robertson-Mackay 1987, tables 1, 3). Some artefacts have relatively restricted distributions, for example, the Ebbsfleet pottery was confined to the outer ditch and ripple-burnished pottery was only found in the inner ditch. The enclosure's back and the north-west part seem to have been special zones of deposition. Contemporary structures within the enclosure also seem to be more numerous towards the back. However, this distribution may be simply the product of excavation strategy. Deposition within the ditches seems to have been selective. For example, very few finds were recovered from sections 46–48 (inner ditch) or section 10 in the outer ditch although many artefacts were found in the adjoining sections of ditch.

The emphasis on the inner ditch of the enclosure may reflect activities occurring within the enclosure or depositional practices between the inner and outer portions of the monument. The deposition of material culture in certain butt-ends of ditches might suggest that objects were being deposited as people moved around and through the monument: from the outer to inner space. Although interestingly these deposits are often in one butt-end and not paired unlike other notable deposits, for example, at Etton (Pryor 1999). The concentration of deposits of human bone in the outer ditch may serve to emphasise the boundary between the inner and outer spaces of the enclosure. Although the quantity of material is relatively small, the extensive nature of the excavations suggests that the distribution is a true reflection of depositional practice at the monument. This use of material culture and human remains as boundary markers can be seen at other enclosures, perhaps most graphically at Hambledon Hill (Mercer and Healy in prep). The boundary may be to distinguish the wild from the domestic worlds: the outside of the enclosure or the chaotic, uncontrolled world versus the inner domesticated and controlled space (cf Hodder 1990).

The position of enclosures within the landscape may also serve to emphasise this point. Enclosures are frequently in marginal places: Staines and Etton being good examples as they would have been physically inaccessible for parts of the year due to flooding (Robertson-Mackay 1987; Pryor 1999). The choice of location for these and other enclosures is deliberate and may emphasise the controlled nature of access to the sites both physically and by the material culture representations deposited at these sites.

Causewayed enclosure architecture, deposition, and patterning

The evidence for spatial patterning of material culture linked with the architecture of the monument at Staines prompted a study of a selected range of other enclosures in order to look for other types of patterning (Fig 13.3). Various authors have discussed the apparent planning of enclosures (eg Bamford 1985; Evans 1986; Evans 1988). At Staines the link between deposition of material culture and the physical architecture of the monument is strong (see above). Patterning in relation to elements of causewayed enclosures can be seen at numerous other sites. At Briar Hill, for example, deposition of particular types of artefacts was occurring over time within the same ditch segments (Bradley 1994). When one looks at particular enclosures, in terms of architecture and planning, some interesting points emerge. Briar Hill and Staines are at the smaller end of the spectrum, but there is evidence for 'planning' and architectural complexity at both of these enclosures (Fig 13.3). Planning in this context is not taken as far as the advanced geometry that has been proposed for Briar Hill in the publication report (Bamford 1985, 57). Instead, it is possible to see a formality in the layout of ditches which suggests forethought. It is likely that consideration of enclosure layout was an active process during the construction of the monument and not entirely conceived as one action and carried out as another (cf Evans 1988). The Haddenham enclosure, for example, seems to have undergone several stages of re-alignment before the 'correct' ditch pattern was achieved (*ibid*). Again it is important to remember that these monuments were not static in either form or function. If it is assumed that Briar Hill began life as a small enclosure (the 'spiral arm' contra Bamford 1985) and that the two outer ditches are later additions, it may be possible to see a shift in orientation from east to west. However, the evidence is far from clear and it is possible that the smaller, 'spiral arm' enclosure was added to the two larger circuits at a later stage (cf Oswald *et al* 2001, 77).

The size and complexity of causewayed enclosures is instructive. Table 13.1 summarises minimum and maximum areas, numbers of circuits, and a range of other attributes for selected causewayed enclosures. Smaller enclosures tend to be simple in layout; the larger enclosures are frequently more complex, involving more circuits and associated features such as outworks. This may reflect the multi-phase nature of the larger sites. A notable exception here is the large (8.5 ha) single-ditched and palisaded enclosure at Haddenham (Evans 1988; Hodder 1992). It does, however, seem to have been 'planned', and a flattening of the west side has been interpreted as a façade (Evans 1988, 131, fig 7.2; Holder, 1992, 225, fig 3). Table 13.2

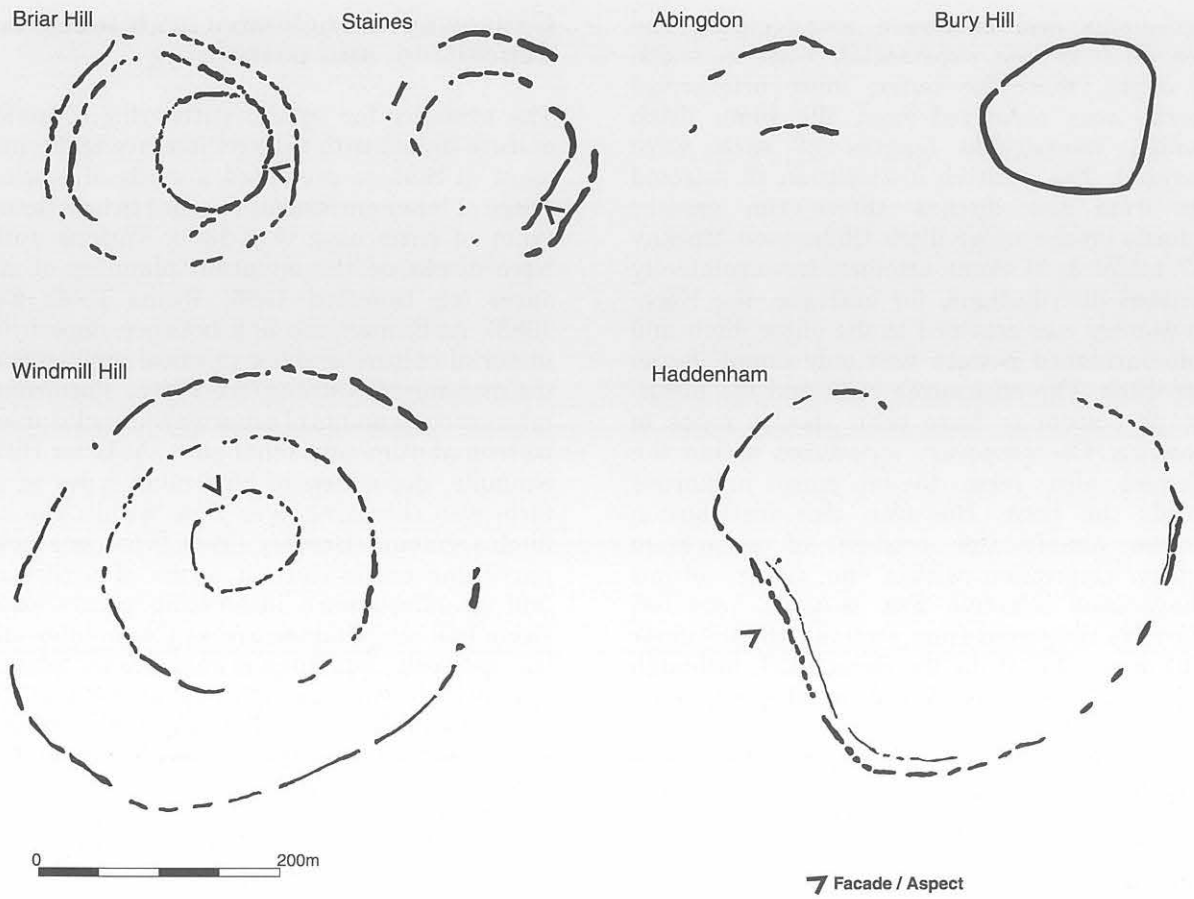


Figure 13.3 Selected enclosures showing various forms and architectural traits (various authors)

summarises selected enclosures where the inner ditches are less substantial than the outer ditches. Although this is somewhat tentative, the slighter nature of inner ditches at sites such as Briar Hill, Abingdon, Staines, Maiden Castle, and Windmill Hill, may argue for initial construction, followed by a more monumental phase. Constructional phases may not have been separated by any particularly lengthy episode. The two ditches at Offham Hill, for example, were not contemporary, the outer ditch being added later (Drewett 1977). The evidence from Windmill Hill may be important here. Smith (1965) argued that all three ditches, or segments of those ditches, were open at the same time, as conjoining sherds of pottery were found in them. Recent reexamination of the archive and radiocarbon determinations suggest that the ditches were laid out as one, or in very quick succession (Ambers and Housley 1999, 120). The more substantial nature of some outer ditches may simply be a statement reinforcing the concept of enclosure upon the landscape. The conjoining fragments of a human arm bone from Staines would suggest that if there was indeed a time lapse between the initial construction of the two ditches it was not particularly lengthy. Some enlargements can be specifically related to a phase of unrest and even warfare (Mercer 1980; 1988; Bradley 1986; Dixon 1988). Oswald *et al* (2001, 76–77, fig 4.26) have shown that several of the larger, more complete enclosures began life as more simple circuits that were enlarged over time.

The larger and more architecturally complex sites frequently have assemblages including 'complex' artefacts (leaf-shaped arrowheads, polished and flaked axes, laurel leaves, carved chalk and bone, beads, marine shells, fossils, flint sickles, and axe-polishing stones). However, many of the simpler enclosures possess some of these complex artefacts (Table 13.1). The size of assemblage may reflect simply the size and complexity of the monument, the length of occupation, and the types of activities carried out. Some differences may be connected with the way in which certain monuments were perceived in the landscape. Sussex enclosures, for example, fall into two categories: complex with large artefact assemblages and smaller, simpler enclosures with fewer artefacts, although some of these smaller enclosures have the characteristics of the larger both in terms of artefacts and architecture (see Tables 13.1 and 13.2). There is a difference of location between these larger enclosures and the smaller ones, perhaps emphasising a separate function. The available radiocarbon determinations suggest

Table 13.1 Causewayed enclosure complexity: structural elements and artefacts – relative frequency (selected sites)

Site	Minimum area (hectares)	Maximum area (hectares)	Number of circuits	Recutting	Human bone	'Placed' deposits	'Complex' artefacts
Windmill Hill	0.50	9.60	3	***	***	***	***
Maiden Castle	8.00	8.00	2	–	**	***	***
Hambledon Hill (MCE)	7.55	7.55	1 + outworks	***	***	***	***
The Trundle	1.33	7.07	3 or 4	?	*[3]	***	***
Carn Brea	*c* 1	*c* 6[4]	1+	–	A	?	***
Whitehawk Hill	0.64	5.50	5 + outworks	?	***		***
Briar Hill	0.71	3.15	1 + 2 or 3	***	A	**	**
Abingdon	1.50	3.00[1]	1 + 1, 2 or ?3	**	***[2]	**	**
Barkhale	2.84	2.84	1	?	A		*
Whitesheet Hill	2.39	2.49	1 + outworks	P	–	**	*
Knap Hill	2.40	2.40	1	–	*	*?	-
Staines	0.95	2.40	2	**	***	*	**
Orsett	0.79	2.27	2 + 1 + palisade	**	A	*	*/**
Combe Hill	0.75	1.77	2	?	–	*	*
Bury Hill	*c* 1	*c* 1	1	–	*	*	*/**
Offham Hill	0.44	0.95	1 + 1	–	*	*	*
High Peak	?	?	1	?	A	?	*/**

[1]Maximum area if the streams did not form the other boundaries of the enclosure
[2]If all of the human bone from the site is Neolithic
[3]Some of the human bone may be later in date
[4]The small enclosure on the eastern summit is set within a larger enclosure complex of approximately 6 hectares.
A – bone did not survive; P – present but no further details available

that both types of enclosure are broadly contemporaneous.

It is also noteworthy that some of the smaller, less complex sites were also suitable contexts for funerary and ritual activities. Within these contexts the division between 'ritual' and 'domestic' is blurred. At Maiden Castle, for example, core-tool production was carried out alongside a variety of processing tasks and the burial of human bone (Edmonds and Bellamy 1991, 227; Sharples 1991, 151). At Etton a range of domestic tasks was carried out alongside highly structured depositional practices, which included the burial of skulls, pottery vessels, and other artefacts (Pryor 1999). At Staines the quantity of finds would indicate some domestic activities were being carried out but these seem to have been undertaken against a background of structured or ritualistic practices. The very deliberate nature of deposition at enclosures like Staines together with the apparent planning of the monuments argues for the special nature of these places.

Entrances and façades or 'aspects' are generally very visible in terms of the overall layout of causewayed enclosures (Fig 13.3). These were achieved by inturning of or out-turning of ditches (eg Staines, Haddenham, Windmill Hill, and Briar Hill) or creating substantial or longer ditch segments or larger than usual causeways. Major entrances were also defined by artefactual deposits in the butt-ends of ditches (see for example, Pryor 1999). At Staines whilst the butt-ends of ditches were used for complex deposition, these do not seem to have been paired as at Etton. Although causewayed enclosures often have many possible entrances, only particular causeways may have been used. Restriction and channelling through the use of fences and palisades is well known in north-west Europe. For example, at Sarup (Anderson 1997, 29, fig 17) fences and palisades seem to have been used to screen-off sections of the enclosure, particularly the entrances (*ibid*, 343, 353, pl 18.VI). Similar evidence for fences from British enclosures is slight, perhaps reflecting the often small-scale nature of excavation but includes possible fencelines around ditches, postholes within

Table 13.2 Causewayed enclosures: structural elements – relative frequency (selected sites)

Site	Less substantial inner ditches	'Aspect'/entrance features	Palisade	Internal features
Windmill Hill	*	*	–	**
Maiden Castle	*	?	–	**[1]
Hambledon Hill (MCE)	–	?*	–	**
The Trundle	? 'spiral arm'	? fences around ditches	–	**
Carn Brea	–	*	–	**
Whitehawk Hill	*	fences/revetted passages; gate structure; ?Fences around ditches	*	**
Briar Hill	*	*	–	–
Abingdon	*	–	–	*
Barkhale	–	–	–	–
Whitesheet Hill	–	–	–	**
Knap Hill	–	–	–	?
Staines	*	*	–	**
Orsett	–	*	*	*
Combe Hill	?	–	–	?
Bury Hill	–	*	–	–
Offham Hill	–	?* NE side	–	–
High Peak	–	–	–	*[1]

[1] Features also outside enclosure ditch

banks, gate-structures, and fenced or revetted passages (Smith 1971, 95), which may have been used to channel or restrict access. Oswald *et al* (2001, 46–9) summarise the current British evidence for timber structures associated with causewayed enclosures.

Whilst many people may have had access to causewayed enclosures there may have been some formality about the way in which the monument or certain parts of it were approached and used. Access to monuments may have been related to social position, gender, age, or the temporal division of events within the ritual cycle (*ibid*, 225). The position of these monuments in the landscape is important. The separation of places where the dead were defleshed and buried and other ritual activities occurred, reflects how these acts were perceived within society. The liminal physical position of the monuments matches the type of activities occurring. These liminal spaces may have been used at certain times of the year for ritual activities or for celebrating rites of passage or other liminal states. The burial of females and children (polluted or dangerous) may have been more appropriate within enclosures; long barrows having a more restricted access for the burial of adult males. Physical restrictions to access can be seen at particular sites at Staines and Etton, for example, the low-lying nature of the sites would mean that they were flooded for part of the year (Robertson-Mackay 1987; Pryor 1999).

Conclusions

This paper has attempted to show the complexity of the patterning of material culture at the Staines causewayed enclosure. It has been suggested that the patterns found in relation to the architecture of the monument are of a deliberate and ordered nature, and emphasise the boundaries and space within the enclosure. As can be seen from Tables 13.1 and 13.2 the larger, more architecturally complex enclosures tend to have more complex depositional patterns. This may simply reflect the longevity of these sites. However, some of the smaller, simpler enclosures do show elements of planning and architecture. Some of these sites have also produced 'complex' artefacts and were also used for the burial of human remains. This implies that complex activities could be carried out in the smaller, simpler enclosures alongside more everyday activities.

In a wider context the 'planned' nature of enclosures has been examined and several

consistent points emerge: the use of architecture and material culture to define features such as entrances and 'aspects' of the monuments, the use of material culture to define space and act as symbols, and the often repeated nature of deposition. Control and access to space and hence the activities occurring within causewayed enclosures seem to have been an important factor. Although there is slight evidence in the British Isles for physical controls (through the use of fences and gates etc) there is compelling evidence to suggest that the location of causewayed enclosures and the use of material culture played a crucial role in the restriction of access to these sites. As noted this control may sometimes have been entirely physical and natural due to the location of the monuments. If enclosures were representations of the world in microcosm, as has been suggested for Etton (Pryor 1999), then controlled access, deposition of material culture, and the planned nature of these monuments becomes more explicable. The uncontrolled, wild, outside world is controlled with the domesticated inner area of the enclosure. The movement between these worlds was potentially dangerous being liminal zones. The material culture deposited at these enclosures, and the formal layout of the monuments, may have acted as markers to control and understand the movement between the liminal and the everyday worlds.

The evidence from Staines, and a number of other enclosures, indicates that domestic activities were occurring at these sites. Alongside these everyday practices more complex and ritualistic activities were also occurring, including the treatment and eventual burial of selected pieces of human remains, the highly structured and symbolic burial of material culture, and in some instances the renewal or remodelling of the monuments themselves.

Acknowledgements

Alistair Barclay and Jon Cotton kindly commented on earlier drafts of this paper, and Peter Lorimer drew the figures.

14 The Chelsea club: a Neolithic wooden artefact from the River Thames in London

by Mike Webber, with Helen Ganiaris

Introduction

In the summer of 1996 a wooden artefact (MoL accession number 99.119) was found eroding out of the northern foreshore of the River Thames at Chelsea. The site lies immediately in front of residential moorings at the downstream end of Chelsea Harbour, an inlet on Cheyne Walk, London SW10 (TQ 2680 7739). The artefact measures 640mm long and consists of a blade and handle of equal length with a pronounced pommel. It is made of alder (*Alnus glutinosa*, Sophie Seel UCL pers comm) and has been radiocarbon dated to the Neolithic.

Description

The artefact consists of three basic elements; the blade (320mm long and consisting of tip, striking face, and shoulder), the handle (250mm long) and the pommel (70mm long) (Fig 14.1). It is in five pieces but in good condition, apart from a small area of damage to one side of the blade, sustained during lifting. Tool marks are clearly visible, giving the surface a faceted appearance in places, particularly on the handle. It was crafted from a single piece of alder, roughly hewn and finished using a stone axe (Damian Goodburn pers comm). (A replica based on detailed measurements and produced using the same techniques, tools, and materials as the original was manufactured by Damian Goodburn and funded by the Environment Agency.)

The roughly shaped blade has a flat face, convex back, and rounded sides. The tip is 60mm long and has been shaped so that it tapers irregularly (from 100mm wide and 75mm thick to 30mm wide and 30mm thick). This gives the end of the blade a rounded appearance. The striking face is 165mm long and broadens slightly between the tip and the shoulder (from 100mm wide to 115mm wide) but it remains consistently 75mm thick. The shoulder is 60mm long and narrows from the blade to join the handle (from 115mm wide to 90mm wide). The shoulder is not perceptible in longitudinal section, where the taper of the handle continues until it meets the striking face. The handle is of oval cross-section and tapers inwards from the shoulder towards the neck (from 90mm wide and 65mm thick to 50mm wide and 30mm thick). The neck is 30mm long and tapers sharply into the pommel (from 50mm wide and 40mm thick to 40mm wide and 30mm thick). The flat-topped pommel is of roughly ovoid form (80mm wide and 60mm thick).

Discovery

During 1996 the Thames Archaeological Survey recorded the piles of a mid-Saxon fish-trap and the remains of prehistoric woodland (Milne *et al* 1997; Webber 2000). The artefact was discovered, like so many other 'river finds', by accident. It was only when the tide did not recede far enough to permit the examination of the Saxon structure, that attention was focused on the prehistoric remains.

On close examination it was found that timbers, recorded earlier during the season as a vertical stake and horizontal root, had been revealed by erosion to be the rounded pommel and long blade of a wooden artefact, apparently of prehistoric date. It was the last day of a run of low tides and the site would not be exposed again for several weeks. It seemed unlikely that the artefact would survive so, minutes before the site was submerged by the tide, the author took the decision to lift it.

The conservation team at the Museum of London was informed of the plan and a makeshift support was made from available materials; drawing boards, plastic bags, masking tape etc. The wet organic clays in which the artefact laid provided adequate environmental conditions and packing in which to transport the artefact back to the Museum.

Conservation *Helen Ganiaris*

The artefact had survived burial because it had been sealed in a stable, wet environment. The wood, though heavy and dense, had a soft surface and was therefore relatively fragile.

On arrival at the lab the soil was removed with water and soft brushes retaining all residual wood fragments, and examined carefully for associated evidence that may have indicated its use. None was found. Detached fragments, required for radiocarbon dating and species identification, were stored in a freezer. After cleaning, the object was stored in tap water within sealed tubs until recording and photography were completed. Detailed record photographs were taken of each section in addition to the object as a whole (John Chase, MoL) and the artefact was drawn in detail

Figure 14.1 Alder wood 'beater' or club from the Thames foreshore at Chelsea, overall length 640mm © Museum of London

15 Two decorated Peterborough bowls from the Thames at Mortlake and their London context

by Jonathan Cotton, with Rosemarie Johnson

Introduction

In 1998 the Museum of London embarked on an ambitious series of 'blockbuster' temporary exhibitions, designed to catch media and visitor attention and raise the Museum's public profile. The first of these was *London Bodies*, subtitled *The changing shape of Londoners from prehistoric times to the present day*, which ran from October 1998 until February 1999.

In the continuing absence of much direct physical evidence for prehistoric human remains (such as burials) from the London region, the present writer began to seek out alternative, indirect, sources with which to help illustrate the early sections of the exhibition. One obvious source was the Museum's collection of prehistoric ceramics, the latter incorporating a number of examples of fingertip and fingernail-decorated pottery of Neolithic Peterborough Ware.

Attention soon concentrated on one of the subjects of this paper, a large fragment of a heavily decorated bowl from the Thames at Mortlake, accession number A13667, that bore particularly well-defined horizontal rows of fingernail impressions on the rim and body and deep pits in the neck. The original intention was to display this as an example of characteristically decorated prehistoric pottery, making the simple point that its surface had been impressed with a series of moon-shaped crescents formed by the finger or thumbnail of an 'early Londoner'.

However, at a late stage in the run-up to the exhibition, and too late to be incorporated in the book that accompanied it (Werner 1998), cleaning of the dust-filled pits in the neck of the bowl in the Museum's conservation laboratory revealed a further and potentially more interesting set of impressions. These proved to have been created by the tip of a slender finger with a long fingernail, the latter complete almost to the base of the cuticle. Furthermore, traces of a possible fingerprint were identified using a scanning electron microscope. This unexpected discovery provided the Museum with a useful opportunity for media exposure, which intensified following collaboration with fingerprint officers of the City of London Police ('Museum helps police with enquiries') (Fig 15.1). Later, during the preparation of this paper, a cast was taken of one of two deep pits in the neck of a second Peterborough Ware sherd in the Museum's collection, accession number A13666, coincidentally also from the Thames at Mortlake. In this instance the impression proved to have been made by the rounded, whittled tip of a stick or twig.

This paper is split into two main sections. The first deals in detail with the two sherds from Mortlake and the impressions they retain. The second attempts to place the sherds within their wider regional ceramic context. Details of the discovery of the impressions in the conservation laboratory and the methods used to obtain and study the casts are contained in an Appendix.

The sherds

Description

1 A13667 comprises two large conjoining sherds with a combined weight of 685.6g forming a substantial part of a deep bowl some 280mm in diameter with profuse decoration on the internal rim bevel, collar, and external body wall (Fig 15.2). The fabric is laminated in fracture and has a clean, dense clay matrix with little quartz sand (Louise Rayner pers comm). The matrix has been opened with a moderate amount of poorly sorted, angular, crushed, burnt flint of white colour up to 6mm in size, some fragments of which project through the surfaces of the vessel walls, the latter a uniform 10–11mm thick. Several unburnt fragments of crushed flint filler include a small struck spall.

The vessel appears to have been coil built though, a few horizontal contraction cracks apart, there is little sign (such as differential wall thickness) to mark the coil-junctions. A short inward-tilted and slightly externally concave collar with a marked internal bevel is succeeded by a shallow concave neck below which the vessel wall is nearly upright, giving the pot a deep voluminous feel. The vessel is well formed and finished and interior and exterior surfaces have been carefully wiped prior to decoration.

The decoration comprises methodically impressed horizontal rows of fingernail impressions on the internal rim bevel, on the collar, and on the exterior wall just above and below the neck. Particular care was taken over the decoration of the collar, and areas of blank space between the four main rows of long oblique fingernail impressions were carefully infilled with two additional opposed rows of shorter fingernail impressions. Compared with the precision of

Figure 15.1 Michael Crockett, Fingerprint Officer attached to the City of London Police, holds up a cast of one of the fingertip impressions obtained from the sherd from Mortlake

the decoration evident on the collar, less attention was paid to the spacing and positioning of the eleven surviving rows of oblique nail impressions that cover the exterior surface. Furthermore, these appear to have been impressed with a different digit, possibly the thumb. A few random fingernail impressions and the uppermost row of fingernail impressions apart, the neck area was reserved for a series of evenly spaced and deeply impressed pits, five of which are complete. These penetrate some 8–10mm into the vessel wall, causing a corresponding bulge on the inner wall surface, and were made by the tip of a slender finger with a long fingernail (Fig 15.3). Traces of a possible fingerprint were also identified using a scanning electron microscope (Fig 15.4). The pits themselves appear to represent the last stage in the decorative scheme, as they impinge on several of the adjacent nail impressions.

The vessel is well fired, and external surfaces are of a uniformly dark, leathery brown/black colour. Traces of a calcareous deposit ('Thames race') and of modern white plaster adhere to the broken edges of the sherd; the latter are the result of an earlier attempt at reconstructing the vessel for display purposes.

2 A13666 comprises a single sherd weighing 170g belonging to a bowl some 250mm in diameter with profuse decoration on the internal rim bevel, on the externally expanded collar and on the interior and exterior surfaces (Fig 15.2). The fabric is laminated in the fracture and has a dense, clean clay matrix with virtually no quartz sand (Louise Rayner pers comm). The matrix has been opened with a moderate amount of poorly sorted, angular, crushed, burnt flint of white colour up to 7mm in size. Several unburnt fragments of crushed flint filler include part of a small struck spall.

The vessel appears to have been coil built and has an internally bevelled rim, and a thickened rounded collar above a shallow neck, below which the vessel wall is up to 12–13mm thick. The vessel is well finished and has been wiped inside and out prior to decoration.

The decoration has been applied with a range of different tools, including a sharpened bone or, more likely, a flint point/blade, the distal end of a small animal or bird bone, and a roughly whittled stick or twig with a rounded point. As with A13667 attention was focused on the expanded collar, the latter decorated using a sharp implement such as a bone or flint point. Four main rows of impressions were arranged herring-bone fashion and gaps infilled with an additional row. A single row of similar oblique impressions on the neck just above the shoulder gives way to rows of 'bird-bone' type impressions on the

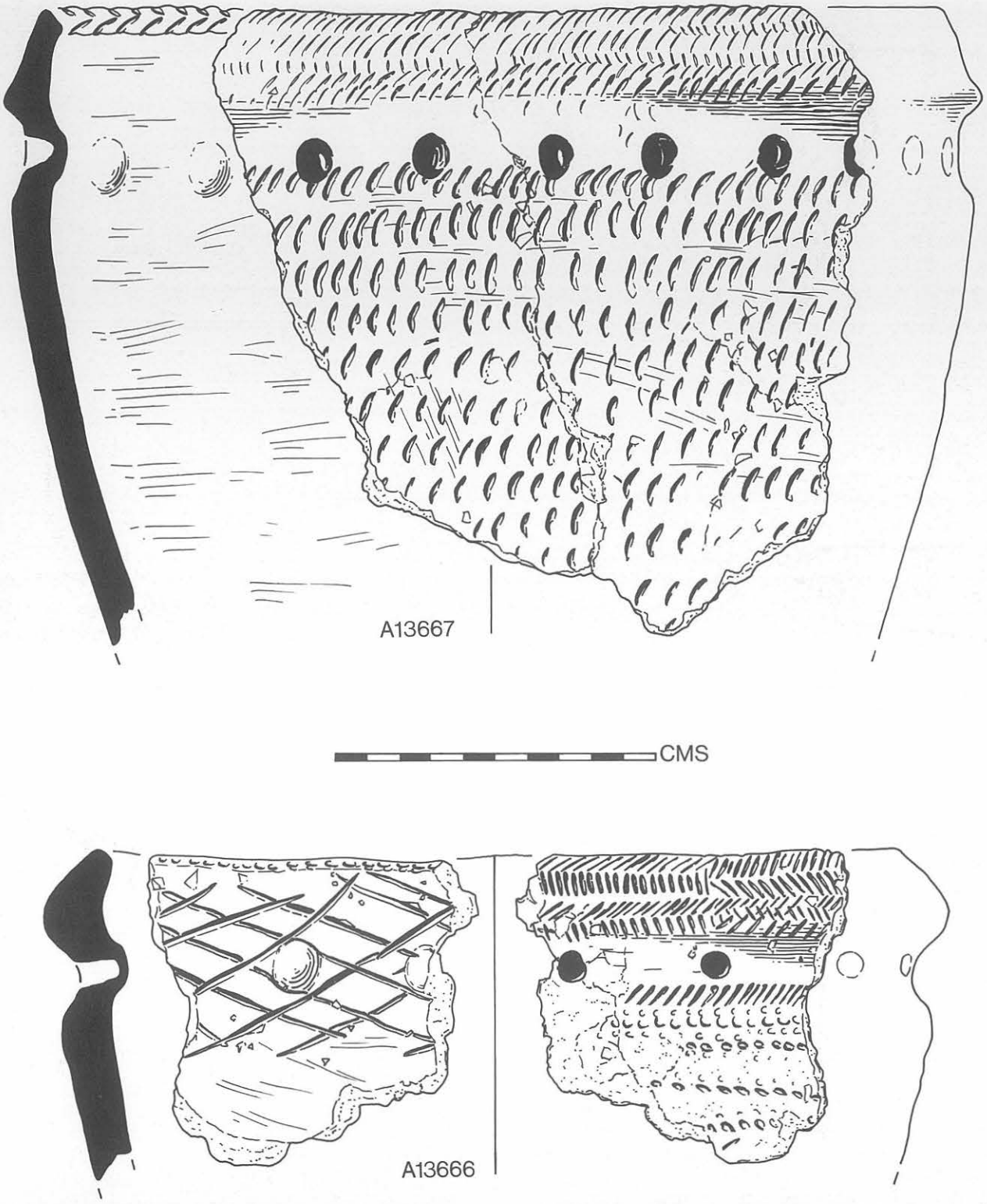


Figure 15.2 The two sherds from the Thames at Mortlake. A13667 is the upper and A13666 the lower. Scale in centimetres

external wall. Internal decoration comprises a single row of shallow 'bird-bone' type impressions on the rounded bevel of the rim, below which is a rough latticework pattern extending some 60mm below the bevel and composed of short opposed oblique strokes made with a sharp bone point or perhaps a flint blade. The latter impressions were firmly applied and are sharply defined, with rolls of displaced clay at the sides of several individual strokes. These strokes appear to have been executed prior to the creation of the deep pits in the neck, as several of the former had been

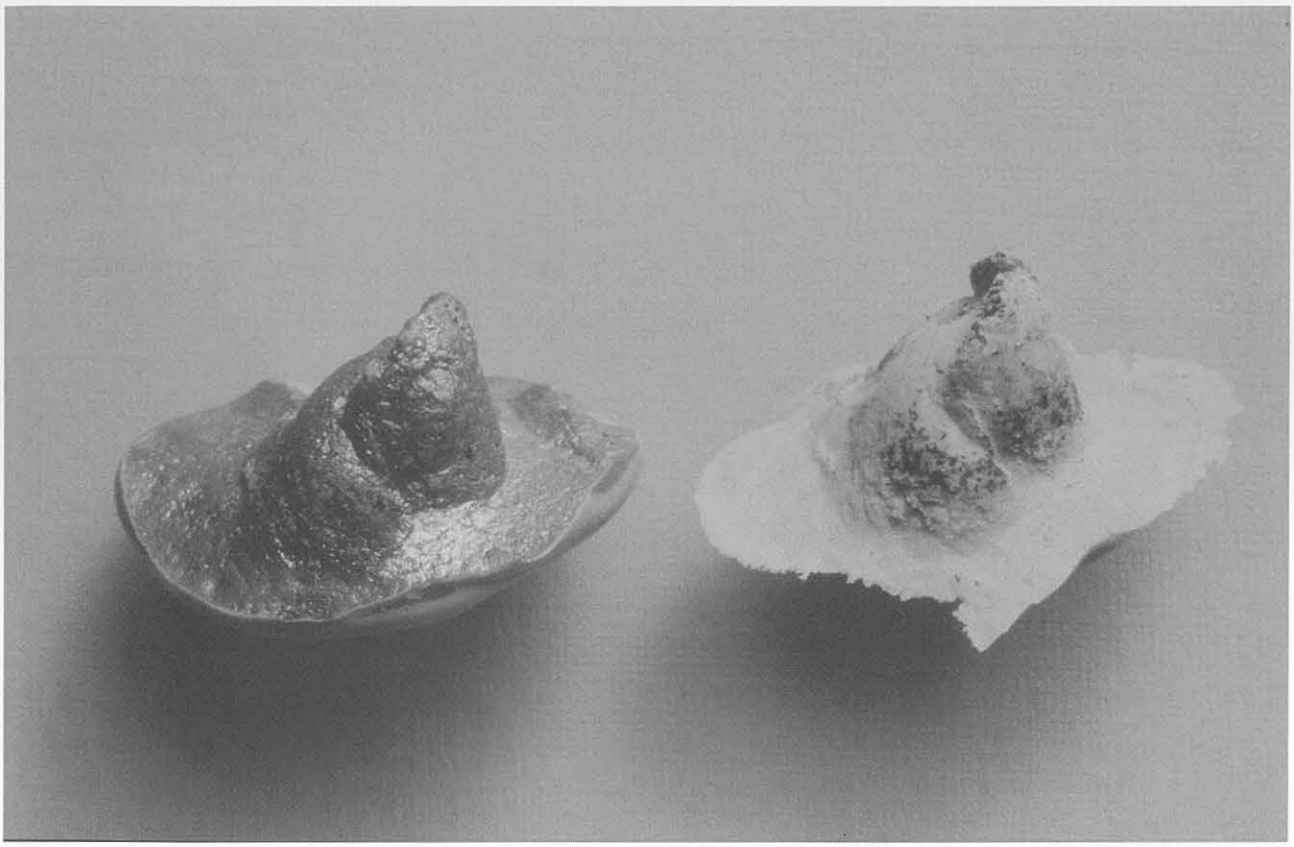


Figure 15.3 Casts of the fingertip impressions taken from A13667, showing the fingertip and long fingernail

distorted by the corresponding bulging of the inner wall. The pits themselves were formed by pressing the rounded point of a stick or twig some 7mm in diameter up to 13mm into the external wall of the vessel.

The vessel is well fired, and external surfaces are of a uniformly leathery brown/black colour. Traces of a calcareous deposit ('Thames race') adhere to the broken edges of the sherd.

Documentation

Both A13667 and A13666 form part of a group of ten prehistoric sherds purchased by the London Museum (Acc nos A13662–A13671, inclusive), almost certainly from the Wandsworth antiquities dealer G F Lawrence. The original entry in the Accessions Register reads: 'Ten fragments of decorated Vases. Late Stone Age. Thames, Mortlake. Bought June 1914'. The entry is slightly misleading, however, in that strictly speaking only half of the sherds, nos. A13666, A13667, A13668, A13670 and A13671 are of Neolithic date. (Of the remainder, A13664 comprises two conjoining Beaker sherds, A13665 is a large fragment of Collared Urn, while three other sherds, A13662, A13663 and A13669, belong to vessels of later prehistoric date.)

G F Lawrence supplied a wide range of institutions and individuals with London antiquities from the 1880s until his death in 1939. He purchased artefacts at source from the mudlarks and dredger crews, occasionally accompanying them out onto the river for this purpose. From 1911 to 1926 he was employed by the London Museum as 'Inspector of Excavations' (Sheppard 1991, 47–8; Macdonald 1996, 245), and was clearly giving his employers first pick of the material that passed through his hands during this period. The Museum had previously purchased three other groups of prehistoric pottery from Mortlake in 1912 and several more in 1914, all very probably from Lawrence. Prior to this, he had also certainly supplied the British Museum with prehistoric ceramics from the same locality on at least two occasions in April 1909, including the complete eponymous 'Mortlake' bowl itself (Gill Varndell pers comm).

Sherd A13667 was first illustrated in a paper Lawrence published following his retirement from the London Museum (Lawrence 1929, 83, fig 1, no 3). In it he provided a useful summary of the many river finds reported to him in the course of some 40 years' work. The same paper makes it clear that the complete 'Mortlake' bowl was the first vessel to have been brought to him from this locality, followed immediately

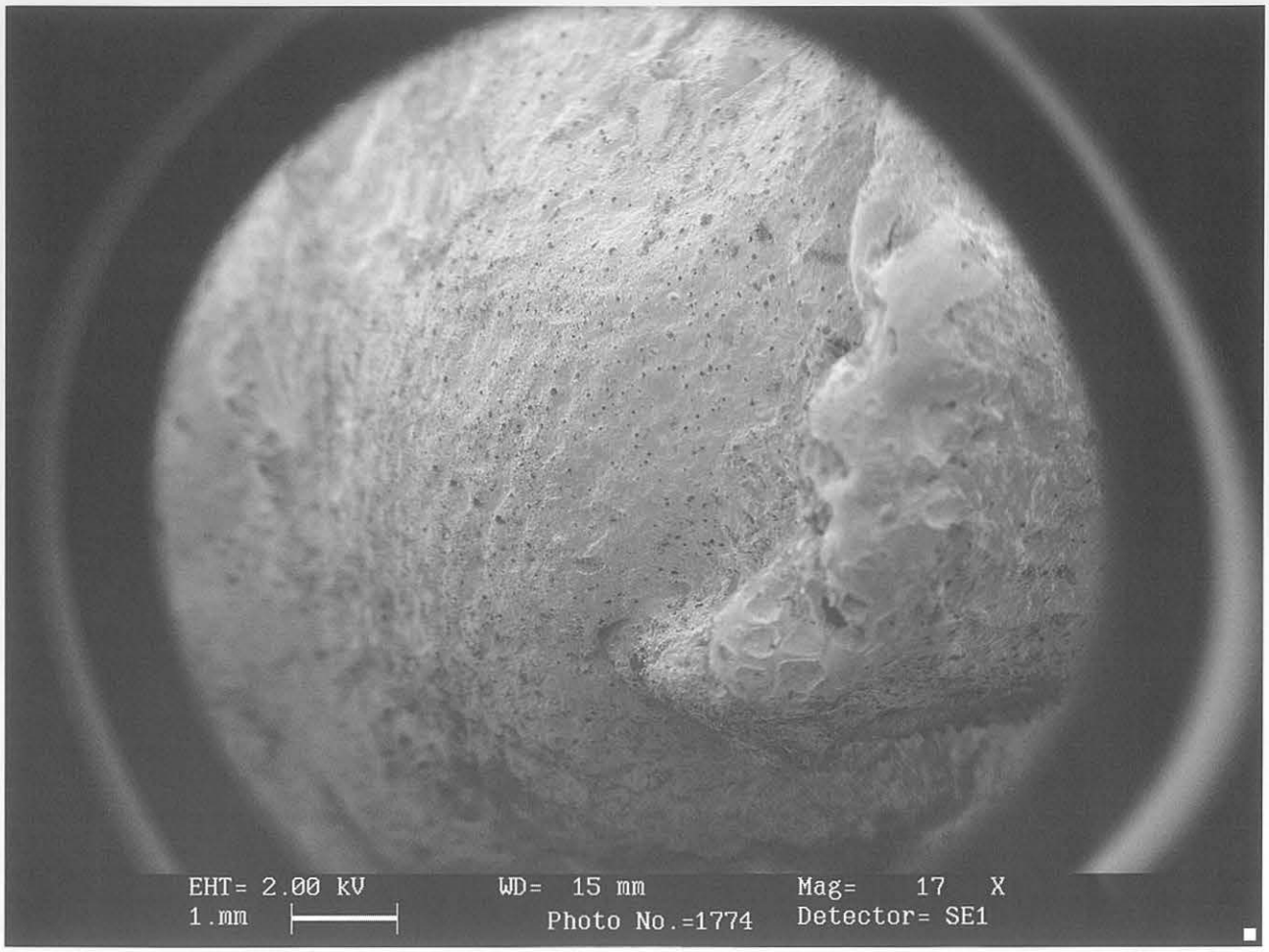


Figure 15.4 SEM of possible fingerprint impression from the fingertip cast obtained from A13667

afterwards by a complete Beaker and 'a small vase with knobs on the sides of the Late Bronze Age' (Lawrence 1929, 82). All three had apparently been recovered from 'the same hole' (letter from GFL in BM correspondence files, Gill Varndell pers comm). The finds quickly attracted the attention of Reginald Smith who incorporated them in his pioneering paper on 'The Development of Neolithic Pottery' (Smith 1910, 340, pl XXXVII, nos 2 and 3). Sherd A13667 was itself subsequently reproduced in studies by Vulliamy (1930, 82, pl III) and Isobel Smith (1956, II, fig 97).

The exact whereabouts of the findspot(s) from which the Mortlake material was recovered remain somewhat elusive, though, on balance, it is likely that they had been dredged from a point in front of or just above The Ship Hotel towards the Surrey side of the river (Lawrence 1929, 82). Moreover, in their respective publications, both Lawrence and Smith drew particular attention to the context from which the various complete vessels had been extracted. From their descriptions it is clear that these vessels, and by implication the other sherds, were lying in and below a thin, hard calcareous layer in the river bed, 'that seems to have sealed up some early deposits of flint and human bones as well as pottery' (Smith 1910, 340). This calcareous tufa deposit, known locally as 'Thames race', had become cemented 'into a sort of concrete which has to be broken into with an iron-shod pole, as the iron hoop of the leather dredging-bag or 'spoon net' merely glides over...' (Lawrence 1929, 82). The tufa comprises calcium carbonate derived from a chalk geology that has precipitated out through a drop in water pressure caused by local turbulence or possibly algal growth (Martin Bates pers comm). The deposit is present on a number of the sherds from Mortlake in the Museum of London's collection, including both of the sherds described above. Similar tufaceous deposits have been encountered in both main and tributary river channels elsewhere within the Thames catchment, as at Runnymede (Needham 1991, 223), Kingston (Serjeantson *et al* 1991–2, 87) and West Drayton (Lewis 1990 and pers comm), for example.

The gravel underlying the calcareous tufa layer was found to contain numerous shells of the large bivalve freshwater mussel *Margaritifera auricularia* (Lawrence, 1929). Indeed, the latter are likely to owe their preservation to the tufaceous deposits that sealed them. *M. auricularia* is now extinct in Britain, but live specimens have been recorded in several large southern European rivers, though apparently not in recent years (Preece *et al* 1983, 249). Jackson and Kennard (quoted in Preece *et al* 1983, 249) record that a large number of shells had been dredged up at Mortlake 'well out in the river, and at a fair depth in the gravel bed, not near the surface'. One of these specimens, collected around 1910, and held in the Kennard Collection at the Natural History Museum, produced a radiocarbon date of 4140±50 BP (BM-1800: 2880–2570 cal BC) (Preece *et al* 1983, 253; Jane Sidell pers comm). Other shells, dredged from the river at Hammersmith and Barn Elms further downstream, were also said to have been associated with Neolithic implements including polished stone axes (Kennard 1923).

Affinities

It is not the purpose of this note to dwell on the detailed ceramic affinities of the present sherds, though both vessels can be accommodated comfortably within Isobel Smith's (1974) Mortlake/Fengate sub-styles of the Peterborough series. Diagnostic features include the expanded collars, the deep pits in the concave necks, and the profuse surface decoration that extends down the body of the vessels (eg Smith 1974, 112). The upright voluminous form of A13667 in particular suggests that the vessel was probably furnished with a wide sag base rather than the disproportionately narrow plug-like form characteristic of some Fengate vessels. Parallels have previously been drawn with the deep Fengate vessel from West Kennet (Piggott 1962, 40, fig 12, no P15; Macdonald 1976, 25). Pots of broadly similar form have been noted elsewhere within the London region, as at Heathrow, for example (Grimes 1960b).

Viewed simply as ceramic containers, the two vessels from Mortlake share a number of features. Both appear to have utilised similar clay sources containing little naturally included quartz sand, opened with comparably sized and sorted filling agents in the form of angular fragments of burnt white crushed flint. Unburnt flint was present as an occasional filler too and its use has been noted elsewhere (eg Russell 1989, 14); it is possible that it represents recycled debitage from flint knapping (as Cleal 1995, 187; Woodward 2002, 107). The projection of the filling agents through the vessel walls does not appear to have worried the makers of either pot unduly, as Smith (1956, 94) noted long ago with regard to Mortlake pots. In Wales, Gibson (1995, 29) has suggested that the very visible quartz filling agents may even have had a magical significance and it is conceivable that the white burnt flint inclusions of the present vessels somehow 'stood in' for quartz. Furthermore, Cleal (1995, 191) has argued that the contrast between the dark colour of the vessels and the white temper was deliberate and of symbolic significance.

The approach adopted regarding the external decorative schemes on both vessels was also similar, in that attention was clearly focused on covering every part of the expanded collars with unbounded horizontal bands of decoration. The lower parts of both vessels were less carefully treated and apparently of secondary importance, while the concave necks were deliberately reserved to receive the deepest impressions. Though present on a majority of Peterborough Ware vessels (eg Smith 1956), internal decoration is absent on A13667. Vessel A13666 is more typical, and bears a robust latticework motif. The media used to decorate the pots are also worthy of note: many seem to have been drawn from the 'natural, organic world' to use Thomas's phrase (1991, 101), and 'may not have been selected at random' (Woodward 2002, 114). Furthermore the use of fingertips and fingernails in particular represents the employment of a uniquely personalised 'signature'.

Dating

Recent assessment of available radiocarbon dates for Peterborough Ware has suggested that the internal stylistic succession of Ebbsfleet–Mortlake–Fengate 'is a matter of typological perception and cannot be supported by associations, stratigraphy or C14' (Gibson and Kinnes 1997, 70). The same assessment suggested that Peterborough Ware could be bracketed between *c* 3400–2500 cal BC (*ibid* 67), though a somewhat tighter range of *c* 3500–2800 cal BC is perhaps possible, the latter subdivided into an 'early Ebbsfleet' phase (*c* 3500–3300 cal BC), and a 'Mortlake-Fengate' phase (*c* 3300–2800 cal BC) (Barclay 2002, 90). Clearly, though, all three styles of Peterborough Ware had been fully developed by 3000 cal BC (Gibson 2002, 78–80). The few dates yet available for Peterborough Ware from the London region (eg Lower Horton and Staines Road Farm, Shepperton) appear to fall towards the earlier end of the range. The late date available for the Mortlake *Margaritifera* shell is perhaps worth recalling here too, though there are difficulties in applying this uncritically to the Peterborough sherds, not least among them being the presence of Beaker pottery.

Discussion

Nail care and gender

Affinities and dating apart, sherd A13667 preserves a small detail of individual human physiognomy that is seldom present in the archaeological record except in the most exceptional circumstances. Such circumstances usually encompass the preservation of complete human bodies in peat bogs, frozen tombs, or through deliberate or accidental mummification (eg Cockburn and Cockburn 1980). Even here, though, most such remains are of later date (Glob 1969; Brothwell 1995), and small elements like finger and toenails are often missing (eg Brothwell 1986, 87–8), although nail clippings were occasionally deliberately retained (eg Rudenko 1970, 287). Closest in date to the Mortlake vessel A13667 is the iceman from the Hauslabjoch in the Tyrolean Alps, all but one of whose finger and toenails had disappeared (Spindler 1994, 81, 162).

Allowing for some shrinkage during drying (eg Gibson and Woods 1990, 240–1), the curvature of the fingernail and the slenderness of the finger suggest that it was the smallest digit or 'pinky' that was employed in making the deep pits in A13667, rather than one of the larger fingers such as the index. Comparison of the three different casts indicates that the same finger was probably employed on each occasion. Furthermore, use of the little finger here contrasts with the decoration on the vessel wall below the neck, which appears to have been executed with a thumbnail. The length and symmetry of the nails could perhaps suggest two things. Firstly, that active care was taken of them (specifically to facilitate pottery decoration?); and/or secondly that the individual concerned was otherwise unused to arduous physical tasks (see Brothwell and Dobney 1986 for general discussion of related points with regard to the later Lindow Moss fingernails).

It is often assumed, on ethnographic grounds, that prehistoric pottery-making was a domestic concern and undertaken primarily by women (eg Varndell and Freestone 1997, 37). Indeed, a survey of 50 technological activities in a worldwide sample of 185 societies (Murdock and Provost 1973, 207, quoted in Arnold 1985, 102) demonstrated that only the gathering and preparation of wild vegetal foods, dairy production, spinning, laundering, water fetching, and cooking had more female participation than potting. It is accepted that other elements of the potting process such as the digging and preparation of the clay may have been tasks shared between the sexes, and that men may have formed and decorated pots too (Rice 1991; Wright 1991, 198–9). However, the balance of probability suggests that A13667 was made – or at least decorated – by an individual with slender fingers and long fingernails, possibly a child but most likely a woman. There is of course no way of knowing whether the same applies to A13666.

Contexts and meanings

The generally low numbers and restricted depositional circumstances of pots in the Neolithic seem to indicate that their use was reserved for special occasions. Indeed, following Thomas's earlier lead (1991; 1999), Woodward (1998–9, 4) has recently suggested that middle and late Neolithic pottery styles were 'totally *non-domestic*' (her italics). With this in mind, the contexts of Peterborough Ware in the London region have been gathered together (Table 15.1) and their distribution mapped (Fig 15.5).

Although the writer cannot claim that the data contained in Table 15.1 is totally comprehensive, it is likely to be broadly representative – at least in terms of the range of depositional practices recorded. There are a number of observations that can be offered. Firstly, as it stands, the distribution is clearly uneven across the region, with the south and particularly the west well represented, especially in terms of the minimum numbers of vessels present in the latter, but the north and east poorly so. It remains to be seen whether this is a true reflection of the situation or merely indicative of the sorts of sites examined, and/or the methods used to examine them, and/or the accuracy of the identifications and completeness of the subsequent reporting (Nigel Brown pers comm). In recent months, for example, Peterborough Ware has come to light on several sites in the City of London (Plantation Place and Gresham Street), and within the Thames floodplain east of the City – both locations historically bereft of finds.

The database has certainly benefited from PPG16 work, though not perhaps as much as might have been anticipated. For, by and large, new finds have tended to reinforce previously suspected distribution patterns along the rivers and across the expanses of terrace gravels; no finds have been recorded from the Tertiary sands and clays, for example. This pattern is particularly marked in the Heathrow area of west London, and in the upper Wandle Valley at Beddington/Mitcham. As might be expected, the west London Thames has produced its share of material too, including several complete vessels (eg Curle 1924), the eponymous 'Mortlake' bowl notable among them. Recent finds from the river foreshore have been few, however, and barely extend the distribution away from these well-known reaches (but see Cotton and Merriman 1991, 43, fig 7 no 14); this presumably reflects both the fragility of the material and the lack of recent river dredging.

As far as depositional practice is concerned, the regional pattern conforms to the picture

Table 15.1 Peterborough Ware from the London region: context and associations

Ref	Site	Context	Pottery	Associations	References
1	Iver, Bucks TQ 0245 8025	7 pits	M/F (30+) (minimum 11 vessels inc one almost whole plain shallow dish)	Small struck flint assemblage including a scraper and hammer-stone, also a clay lump.	Lacaille 1937
2	Packet Boat Lane, West Drayton (PBL89) TQ 053 812	River channel	PW ('fragments')	Animal bone, principally cattle, and struck flint from a thick tufaceous layer over a basal peat containing twigs and larger wood frags.	Lewis 1990; Thompson *et al* 1998, 83
3	'Yiewsley'	?	E (1) M (1)	In box in former London Museum marked 'pottery found at Yiewsley with the flints'.	Celoria and Macdonald 1969, 32
4	Stockley Park, Dawley (SPD85) TQ 083 808	Pit [1614]	F (50)	Small struck flint assemblage (14 pieces) including 1 core.	Thompson *et al* 1998, 84
5	Prospect Park, Harmondsworth (PPK93) TQ 057 780	Residual in pit [1494]	F (1)	Sherds of Grooved Ware, no lithics recorded.	Andrews and Crockett 1996, 30, fig 22, no 10
6	Home Farm, Harmondsworth Lane, Harmondsworth (HOM98) TQ 0670 7740	[249]	E/M (2)	No information.	Maloney and Holroyd 1999, 14; Louise Rayner pers comm
7	Sipson Lane, Sipson (WGF79/81/83) TQ 077 782	8 pits: '79: [116] [121] '81: [131] [142] [143] [145]'83: [1] [2]	E (7+) (minimum 6 vessels) M (127+) (minimum 16 vessels)	Small struck flint assemblage (57 pieces) including 1 transverse arrowhead with Ebbsfleet sherds, scrapers, ground flint axe frags and in one pit charred hazelnut shells. Sherd cross-joins were noted in two adjacent pits ('81 [142] and [145]).	Richardson 1982, 164; Thompson *et al* 1998, 88

(*continued*)

Table 15.1 Continued

Ref	Site	Context	Pottery	Associations	References
8	Imperial College Sports Ground, Harlington (IMC96) TQ 0825 7765	10-15 pits, inc 7 in two groups. Mortuary enc and double ring-ditch	M (419) (minimum 20–25 vessels)	At least 4 pits produced rich assemblages of sherds associated with struck and burnt flint and frags of ground axes in non-local (as yet un-identified) stone. Other finds limited but include low levels of charred weeds and cereal grains from pits and the mortuary enclosure.	Wessex Archaeology 2000a; Lorraine Mepham pers comm
9	RMC Land, Victoria Lane, Harlington (SIE00) TQ 0850 7826	2 post holes and 1 pit	E/M (33) (minimum 3 vessels)	32 sherds from two adjacent postholes, plus one sherd from a pit. Associations comprise two worked flints. One of the postholes produced a few charred grain frags and weed seeds inc hazelnut shells.	Wessex Archaeology 2001; Lorraine Mepham pers comm
10	Caesar's Camp, Heathrow TQ 084 766	2 pits	M/F (62+) (minimum 20 vessels inc two nearly whole, one a shallow oval dish)	Small struck flint assemblage (20 pieces) including several scrapers, misc retouched pieces and a ground flint axe frag.	Grimes 1960b, 186–97
11	Cranford Lane, Harlington (CFL94) TQ 0920 7740	Pit [17] and cremation [2233]	M/F (11)	Struck flint and fragments of cremated human bone.	MoLAS 2000
12	Perry Oaks Sludge Works, Heathrow Airport (WPR98) TQ 0550 7555	Unstrat	M? (1)	Unstratified rim sherd.	Lorraine Mepham pers comm
13	Perry Oaks Sludge Works, Heathrow Airport (PSH02) TQ 052 754	Inter-cutting pits	PW (186) M	From middle fills of pits adjacent to the terminus of a small 'cursus' monument. The lower pit fills contained sherds of undecorated open bowls (32), and the upper fills sherds of Grooved Ware (4).	John Lewis pers comm

14	North of Park Road, Stanwell TQ 053 745	'Cursus' ditch	E (1) M (4)	Several struck flints.	O'Connell 1990, 28–9
15	Cargo Distribution Service Site, Sealand Road, Heathrow Airport (CDS95) TQ 0727 7450	Pit [216]	PW (1)	None recorded.	Greenwood and Maloney 1996, 12
16	Terminal 4, Remote Stands, Heathrow Airport (TFR97) TQ 0750 7485	Residual in ditch	PW (3)	Sherds of MBA pottery and burnt flint.	Maloney and Gostick 1998, 88; Louise Rayner pers comm
17	Manor Farm, Lower Horton, Bucks TQ 018 749	Ring-ditch	E/F (many sherds) (inc 1 whole M/F hybrid)	Large assemblage of struck and burnt flint, animal bone including red deer antler and sewn birch bark containers. Radiocarbon date of 4520 ± 80bp (OxA-3578) from burnt residue on inside of M/F hybrid vessel.	Steve Ford pers comm and in prep
18	Yeoveney Lodge, Staines TQ 024 726	Causewayed enc ditch	E (17) (minimum 11 vessels)	Struck flint.	Robertson-Mackay 1987, 90 and fig 52
19	Runnymede Bridge, Egham TQ 018 718	River channel	E ('a very few sherds')	Pile-driven timbers, ground stone axes, struck and burnt flint, animal bone and worked bark.	Needham 1991, 158
20	Petters Sports Field, Egham TQ 015 714	Pit [F470]	M (1)	None.	O'Connell 1986, 9
21	Thorpe Lea Nurseries (TLN92) TQ 018 699	Residual in MBA ditch	PW (6) (4 vessels)	Sherds of MBA pottery.	Jackson *et al* 1997, 209; Phil Jones pers comm
22	Mixnam's Pit, Thorpe TQ 040 690	Old ground surface	E (126) (minimum 7 vessels)	Complete ground flint axe in adjacent late prehistoric ditch.	Grimes 1960a, 181–5
23	Hengrove Farm, Staines (HFS01) TQ 053 721	2 pits [240] [727]	E (9+) (70% complete vessel) M (10+) (1 vessel)	Pot lay on its side in base of shallow pit, with no other finds. The 2 pits were c 50m apart.	Howe et al 2000, 195; Phil Jones pers comm
24	Woodthorpe Road, Ashford (ASH01) TQ 053 715	Hengiform ditch and from two pits cut into it	E/M (133+)	No information.	Tim Carew pers comm

(*continued*)

Table 15.1 Continued

Ref	Site	Context	Pottery	Associations	References
25	Home Farm, Laleham (HFL97) TQ 059 689	Pits and residual	PW (30+) (minimum 15 vessels)	No information.	Jackson et al 1999, 230; Howe *et al* 2000, 192-3; Phil Jones pers comm
26	Staines Road Farm, Shepperton (SRFS89) TQ 076 683	Hengiform ditch	E/M (many sherds) (minimum 20+ vessels including substantial parts of 5)	Struck and burnt flint including leaf and transverse arrowheads, scrapers, ground flint axe fragments, pottery including carinated and open bowl types, animal bone including wolf and red deer antler, human bone and ochre. Associated radiocarbon dates *c.* 3640–3100 cal BC.	Jones 1990; Phil Jones pers comm and in prep
27	Thames, Weybridge	River	M (1)	None recorded.	Anon 1925, 431–2
28	Wey Manor Farm, Addlestone (WMF94) TQ 058 634	?	PW ('sherds')	No information.	Phil Jones pers comm
29	Byfleet and Pyrford sewage works, Wisley TQ 059 596	Pits	M/F (4)	No information.	Smith 1924, 40–2
30	Hurst Park, East Molesey (W7977) TQ 1450 6890	Pit [278]	E/M (7)	Struck flint.	Andrews and Crockett 1996, 81–2, fig 51, 2–4
31	Kingston Power Station (KPS96) TQ 179 698	Alluvial silts	PW ('a few sherds')	'A few flint flakes'.	Greenwood *et al* 1997, 49
32	Eden Walk I, Kingston, 1965 TQ 1800 6925	River channel	E? (5) (1 vessel)	Sherds of open bowls, struck and burnt flint, burnt sarsen frag and animal bone inc worked red deer antler.	Penn *et al* 1984, 213–5 and fig 3 no 4
33	Eden Walk II, Kingston, 1977 TQ 180 692	River channel	M (6) (1 vessel)	Waterlogged wood.	Serjeantson *et al* 1991–2, 83 and fig 10, a–d
34	The Bittoms, Car Park Site, Kingston (BIM90) TQ 1800 6855	River channel	PW (2+)	Struck flint inc Mesolithic microlith, pottery of LBA date.	Thompson 1991

35	Thames, Mortlake, perhaps south bank and centred on river off and above The Ship Hotel, c. TQ 204 762	River, beneath calcreted gravels	E (7) M (5) (inc whole 'Mortlake' bowl) M/F (2) (inc whole bowl) F (4) PW (1) (19 vessels)	Sherds of Early/Middle Neolithic bowls, Beaker (inc whole vessels) and Collared Urn. Ground flint and stone axes and shells of *Margaritifera auricularia* also recorded by Lawrence (1929, 82) and others.	Smith 1910, 340 and fig 3; Curle 1924, 149; Lawrence 1929, 82–4; Piggott 1931, 153. BM: 72 3–29 11 (whole bowl*) 1909 5–18 17, 1909 5–18 19 1909 5–18 21, 1909 6–25 1 (whole 'Mortlake' bowl 'found below a natural bed of cemented stones') POA 8–10 74 158–60 MoL: A10213; A10215; A10573; A13666; A13667; A13668; A13670; A13671; A13693; C953; C954; C955 *NB Clarke (1970, 499) has this as a beaker bowl
36	Valor Works, Corney Reach, Chiswick (VCR95) TQ 2150 7725	Pit [022]	F (2) (1 vessel)	Struck and burnt flint, charcoal.	Lakin 1996, 68–9
37	LEP Depot, Corney Reach, Chiswick (LEP89) TQ 2153 7763	Pit [260]	M (1)	'Flint tools'.	Lakin 1996, 68–9; Thompson *et al* 1998, 96
38	Chiswick Eyot, off NE tip TQ 2199 7800	River foreshore	F? (1)	Struck flint, single sherds of open bowl and Beaker.	Rivett-Carnac Coll, Gunnersbury Park Museum
39	Thames, Hammersmith, perhaps south bank upstream of Hammersmith Bridge, c. TQ 227 782	River	E (4) (4 vessels)	Lawrence (1929, 86) records a range of flint, stone and bone artefacts, inc complete axes and stag's horn implements in goodly numbers.	Lawrence 1929, 85–6; BM 1891 3-20 5 MoL C940, C941 and C944
40	Thames, Hammersmith, north bank 'opposite the 'Crab-Tree' near Ranelagh' c. TQ 234 773	River	E (2) PW (2) (4 vessels)	Lawrence (1929, 88) records ground axes, a flint knife and three stag's horn picks.	BM 1906 7–2 9, 1906 7–2 10* 1906 7–2 11, 1906 7–2 *NB Clarke (1970, 487) has this as a Beaker
41	Thames, Putney/Barn Elms TQ 23 76	River	M/F (whole bowl)	'Found on the site of a pile-dwelling in the Thames... Fortunately, it rolled down the gravel into the punt when found, and was uninjured'.	Curle 1924, 150; Lawrence 1929, 89; Piggott 1931, 153 MoL 50.10* *NB Clarke (1970, 499) has this as a Beaker bowl

(*continued*)

Table 15.1 Continued

Ref	Site	Context	Pottery	Associations	References
42	Thames, Putney	River	M(1)	No information.	Horniman Museum 8.91 (purchased from G F Lawrence)
43	38-46 Sefton Street, Putney TQ 232 760	Orange sand, Layer 3	M/F (1)	Struck and burnt flint.	Warren 1977, 9; Greenwood 1987, 19 and fig 8
44	Bemish Road, Putney BEM III/WM 972-01 TQ 2385 7570	RB soils	M/F (2)	Struck flint.	Bloice 1973, 42; Greenwood 1987, 20
45	The Platt, Putney GAY X/WM 966-03 TQ 2392 7566	RB soils	M/F (1)	No information.	Greenwood 1987, 20
46	Walled Garden, Fulham Palace TQ 2414 7599	?	PW (1)	No information.	Richardson 1977, 37; Keith Whitehouse pers comm
47	Thames, ?Wandsworth	River	F (1) (30% whole bowl)	None recorded.	Smith 1918, 10–11 MoL P21
48	Kings College Sports Ground, Western Road, Mitcham (KCG89) TQ 2720 6980	Linear ditch junction	M (1)	No information.	Bazely 1989, 16 and fig 7a; Thompson *et al* 1998, 163
49	Wandle Meadows, London Road, Hackbridge (WAS90) TQ 2850 6620	Pit Tr 2 [6]	M/F (3+)	Struck flint (32 pieces) and 3 large flint nodules (one containing a fossil sea urchin).	Saxby 1990, 5; Thompson *et al* 1998, 233
50	Beddington Lane, Croydon (BDN92) TQ 290 660	Linear ditches [1403] [1409] and 3 pits	PW (14) (fragments 'small and fragile') M (40)	Struck and burnt flint, fired clay. Part of a ground flint axe and burnt/unburnt animal bone from the pits, together with charred seeds (not grain) and hazelnut shells.	Heaton and Hearne 1992, 22; Wessex Archaeology 2000b; Lorraine Mepham pers comm
51	Beddington Lane, Croydon TQ 2984 6662	?	PW (? whole bowl)	Reference to a bowl associated with reddened earth, smashed by workmen in 1912. Same as next entry?	OS Records; Adkins 1979, 13
52	Beddington Lane, Croydon	?	M (1)	? See above.	Anon 1925, 432

53	Valley Park, Purley Way, Croydon (VAP89) TQ 3050 6625	Pit [3016]	M (1)	No information.	Bazely 1990, 12; Thompson *et al* 1998, 50
54	Carew Manor Garden, Beddington (CMG2001) TQ 297 653	Topsoil	M/F (1)	Rim sherd with fingernail impressed collar and small hole in neck made before firing.	John Phillips and John Ede pers comm
55	14 Progress Way and 222 Purley Way, Croydon (PWP93) TQ 3088 6508	Posthole [29] and soil layer [9]	M (1) F (4+)	Large assemblage of struck flint from associated soil layer [9] (975 pieces), including 19 scrapers, 2 transverse arrowheads and fired clay.	Tucker 1996, 14–17; Steve Tucker pers comm
56	Floral Street, Covent Garden (FLR00) TQ 3031 8104	Saxon grave-fill [1197] and redeposited brickearth dumps [1187] [1194]	M (4) (1 vessel)	No information.	Louise Rayner pers comm
57	Lambeth Palace, North Garden (L582/86) TQ 3074 7931	Soil horizon	PW (1)	Struck flint inc scrapers, several ground flint axe frags, two transverse arrowheads and a barbed-and-tanged arrowhead.	Thompson *et al* 1998, 156
58	4-10 Lower Marsh, 126-162 Westminster Bridge Road (L107/79) TQ 3105 7955	Water-laid sand	PW (1)	'Decorated rim sherd'.	Richardson 1981, 48; Thompson *et al* 1998, 137
59	29 Addington Street (Waterloo Site B), Lambeth (WSB90) TQ 3091 7970	Pit [114]	M (2+)	Struck and burnt flint, sherd of ?Collared Urn.	Thompson *et al* 1998, 129; Sidell *et al*, in prep
60	Blossom's Inn, 20–30 Gresham Street, City (GHT00) TQ 3241 8125	Pit [12078] and residual	M/F (1+)	Body sherds (undecorated) from several residual contexts, together with a few struck flints.	Bruce Watson and Louise Rayner pers comm
61	Plantation Place, Fenchurch Street, City (FER97) TQ 3316 8088	-	PW ('a few sherds')	Residual flints.	Louise Rayner pers comm
62	Skinmarket Place, Bankside (SIP88) TQ 3217 8045	Sands over sand eyot	PW (1+)	Struck and burnt flint.	Webber 1989, 4–5; Thompson *et al* 1998, 216
63	11 St Thomas's Street, Southwark (11STS77) TQ 3280 8017	Over natural gravels	M (1)	Sherds of MBA pottery.	Thompson *et al* 1998, 193; Sidell *et al*, in prep

(*continued*)

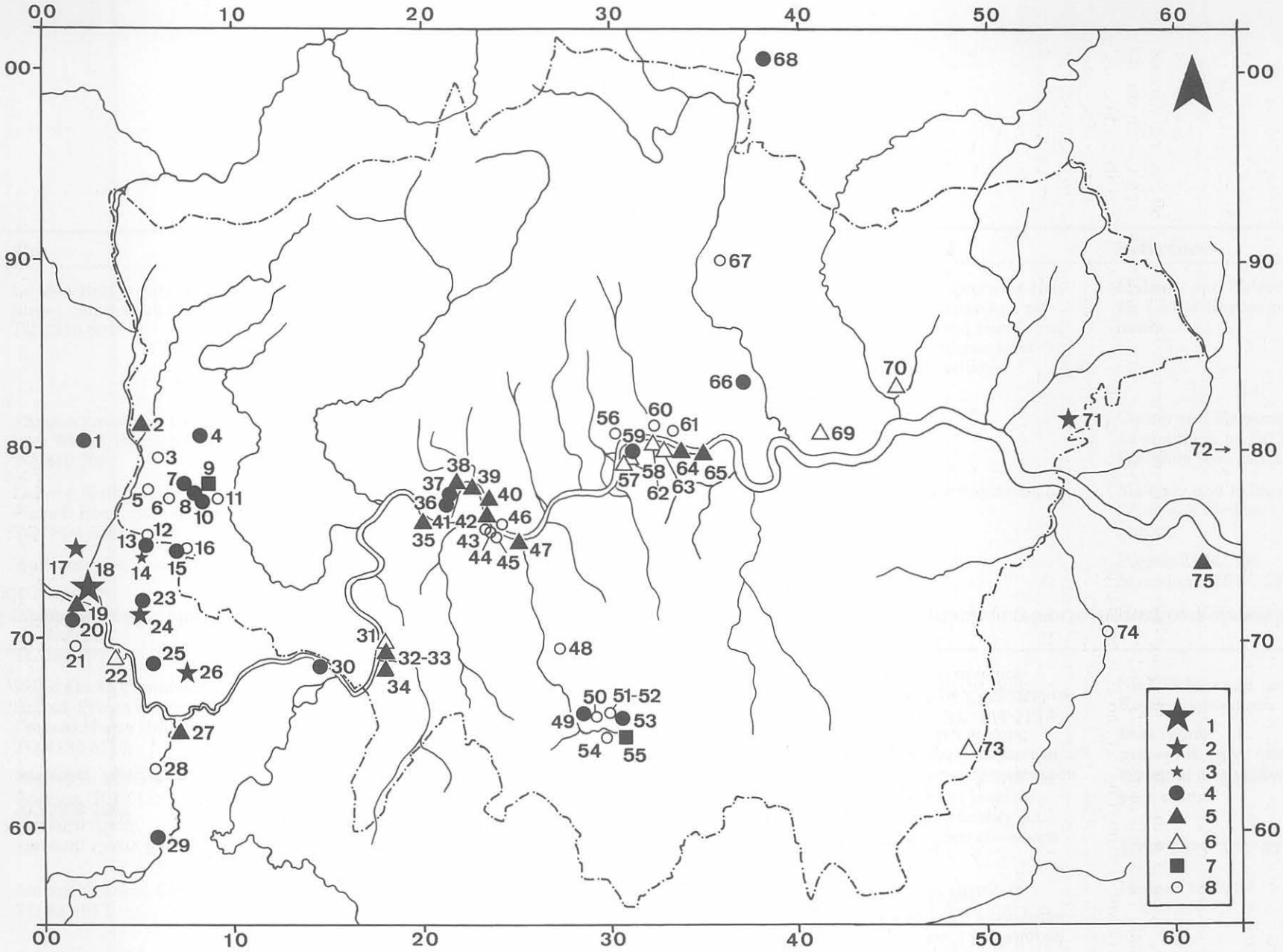


Figure 15.5 Distribution of Peterborough Ware across Greater London and ajacent areas, by context type. Numbers against the various symbols refer to Table 15.1. Key to the symbols employed: 1) Yeoveney Lodge causewayed enclosure; 2) ring-ditch / hengiform; 3) Stanwell 'cursus' 4) small pits; 5) river channel / modern foreshore; 6) 'soil horizons'; 7) 'postholes' 8) unstratified / unknown / residual contexts. Two of the Peterborough sub-styles were defined on finds made within the area: the Mortlake finds are no 35, and the Ebbsfleet finds no 75

established by Thomas (1991, 90–2, fig 5.9; 1999, 109–11, fig 5.11) and others. Thus, broadly speaking, Peterborough Ware occurs in secondary contexts on established monumental sites, in low-lying and/or wet places, and in small pits, the latter far and away the most numerous context type (Fig 15.6). However, a number of important distinctions lie behind these bald statements. Firstly, there is a dichotomy emerging between the small, finds-rich monuments such as Manor Farm, Lower Horton (Fig 15.5, no 17) and Staines Road Farm, Shepperton (Fig 15.5, no 26) on the lower terrace gravels, and the generally 'cleaner' sites on the higher terraces (Cotton 2000, 18). Moreover, it may be no coincidence that it is on the higher terraces that the bulk of the small pits have been located, occasionally clustered and usually (but not always) at some remove from monuments like the Stanwell 'cursus'. The fills of these pits often contain large decorated sherds and perhaps mark the sites of memorable places, events, or ceremonies enacted within the landscape (eg Thomas 1999, 72–3). Away from the river complete and semi-complete pots are rare, although parts of two unusual shallow dishes were recorded from Iver (Fig 15.5, no 1) and Caesar's Camp, Heathrow (Fig 15.5, no 10) (Lacaille 1937; Grimes 1960b; see also Ford and Taylor this volume). Furthermore, a single 70%-complete vessel was recovered from a pit at Hengrove Farm (Fig 15.5, no 23), while a virtually whole Mortlake/Fengate hybrid was placed in the ring-ditch at Lower Horton (Fig 15.5, no 17) (Ford and Pine 2003, fig 2.16).

Occasionally, as at Corney Reach within the modern intertidal zone (Lakin 1996), pits containing scraps of Peterborough Ware were dug into, and sealed by, fluvial deposits (Fig 15.5, no 36–37). A similar occurrence is suspected further downstream at Chamber's Wharf, Bermondsey (Fig 15.5, no 65). Elsewhere, as at Movers Lane/River Road along the A13 (Fig 15.5, no 70), at Custom House (Fig 15.5, no 69), or on various sites across north Southwark, small worn sherds were located within alluvial deposits and/or 'soil horizons' overlying sand or gravel eyots. This may carry implications for the finds from the river at Mortlake further upstream, whose depositional contexts are otherwise unclear. At Corney, for example, it is perhaps possible to envisage a range of activities taking place adjacent to active river channels on surfaces that were at least seasonally dry (see Bates and Whittaker this volume, for detailed discussion).

Associated finds from the pits are generally restricted in quantity and type. At Sipson Lane (Fig 15.5, no 7), for example, none of the eight pits produced more than a handful of lithics (although a separate series of pits contained large groups of lithics but no pottery). Here, diagnostic artefact types comprised a single transverse arrowhead and a fabricator with Ebbsfleet sherds, and the odd scraper and ground flint axe chip with Mortlake sherds. Elsewhere, transverse arrowheads and ground flint and stone axe fragments represent recurrent associations, and have been noted across a range of context types both within the region and beyond. Likewise charred hazelnut

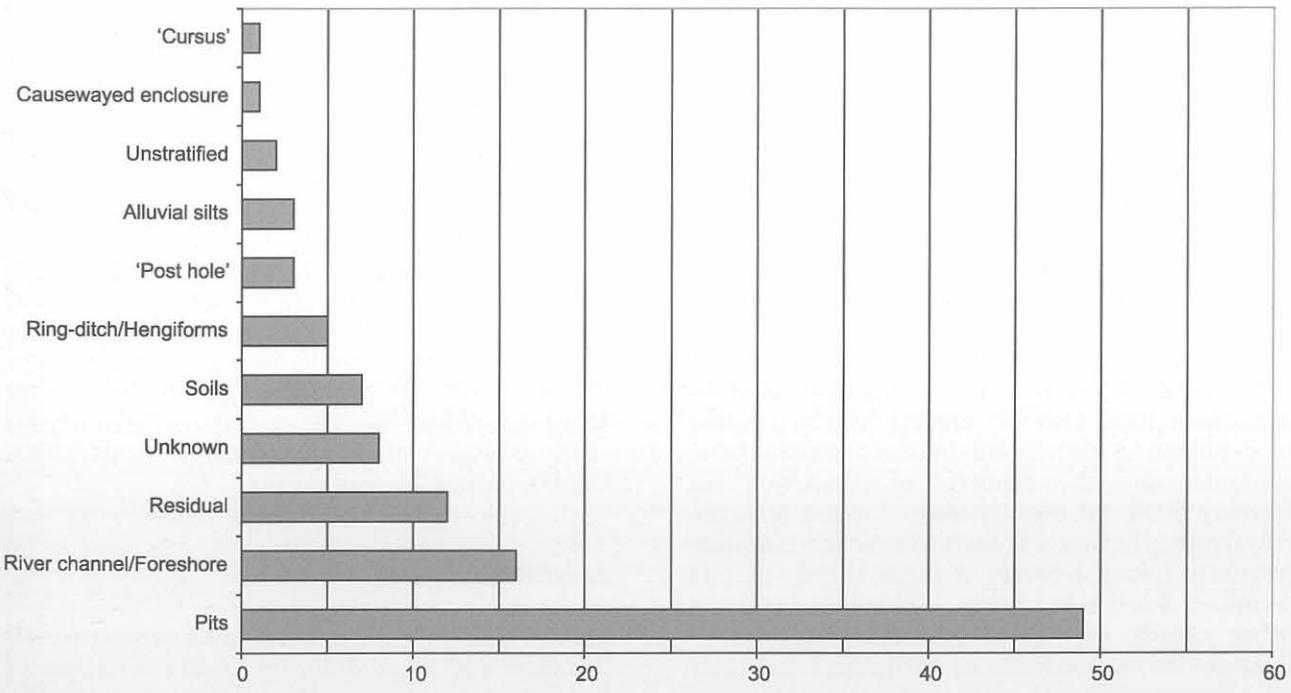


Figure 15.6 Peterborough Ware from the London region: contexts of deposition

shells and weed seeds. Moreover, at Wandle Meadows, Hackbridge (Fig 15.5, no 49) (Saxby 1990, 5), there are references to the placement of large flint nodules (one containing a fossil sea urchin) in a pit with Mortlake/Fengate sherds. It is unfortunate that the soil conditions prevailing on the free-draining brickearths and terrace gravels preclude the preservation of meaningful bone assemblages, a situation repeated further upstream at Eton Wick (see Allen *et al* this volume). However, cremated human bone was reportedly found with a small group of Mortlake sherds at Cranford Lane, Harlington (Fig 15.5, no 11) (Nick Elsden, pers comm), though it is possible that these were residual. A somewhat wider range of usually complete objects such as flint and stone axes has been recovered from the west London Thames at Mortlake and Hammersmith (eg Lawrence 1929, 82–8), but direct association with the Peterborough pottery cannot be sustained despite earlier assumptions.

Many of the assemblages outlined in Table 15.1 above await detailed analysis and publication. Completion of this task is of the first importance, likewise the provision of further radiocarbon dates to add to the meagre regional record. The presence of carbonised residues on the interior of various sherds can be expected to provide new dates, as at Manor Farm, Lower Horton, and to help elucidate the uses to which the vessels were put. It is to be hoped that similar scrutiny will be given to some of the issues touched on in this paper: issues that revolve around gender, context, and meaning, for example. Did various taboos and habitual observances surround the digging and preparation of the clay and the provision of fillers, and might these be approachable through close fabric analysis (as Gibson 1995, 29)? Did the white burnt-flint filler have a (magical) significance analogous to white quartz, for example? How widespread and significant is the largely quartz sand-free fabric noted at Mortlake, and might it be traceable to source? What does the decoration on the vessels signify? Was it simply representative of woven containers of basket type (as Piggott 1931, 120), or was there an underlying 'decorative grammar' that asserted ownership, status and identity (amongst other meanings) to those capable of decoding it (eg Thomas 1999, 97; Woodward 2002, 114–18)?

What did the various vessels originally contain (eg Gibson 1999, 112–20), and might it be possible to establish a correlation between size/volume, contents, and the contexts of deposition (as Barclay 2002, 92, fig 9.2 lower)? What was the relationship between broken sherds and complete pots? Do token deposits of large sherds in pits 'stand in' for whole vessels, and where were the other sherds deposited? Are there any sherd linkages *across* contexts, as at Sipson Lane, and/or between different sites and localities (John Lewis pers comm)? (If parts of bodies can be moved around the landscape why not fragments of pots too?) And can we identify the products of individual potters - perhaps through study of fingertip impressions and/or even fingerprints? Can whole pots be 'read' as equivalent to skulls or even, as in modern West Africa, 'wombs, bellies, rectums' (eg Barley 1994, 85)? Are *all* Peterborough pots likely to have had special significance (as Woodward 1998–9), or are some purely 'domestic'? Here, close attention will need to be paid to the evidence for signs of use and repair; at least one Mortlake vessel from Sipson Lane has been repaired, for example (see also Allen *et al* this volume). Is there a meaningful distinction to be drawn between 'rich' assemblages of large decorated sherds and assemblages of smaller, 'plainer', worn and/or repaired sherds (Lorraine Mepham pers comm), and was this a distinction that would have been understood by members of Neolithic communities (eg Thomas 1999, 70)?

Conclusion

In modern Africa, Barley (1994, 17) notes that pots provide models for thinking about 'the human body, the seasons of the year, processes of procreation and reincarnation'. His study, and others like it (eg Sterner 1989), is not 'a counsel of despair for the prehistorian', but rather, 'an encouragement to the realisation of the sheer diversity of any human enterprise' (Kinnes 1995, 52). Close study of the decorative schema on prehistoric ceramics and perhaps more particularly the means of their application, as here, offers one possible way of addressing the tangle of motivations, emotions, and customary observances that presumably lay behind the prehistoric pots filling the pages of countless archaeological reports.

The deep pits in the necks of Peterborough Ware vessels in particular provide a hitherto untapped resource that warrants further investigation. To this end, the impressions in the neck of a bowl from Pit II at Caesar's Camp, Heathrow (Grimes 1960b, 189–91, fig 76, no 7) were reexamined as this paper neared completion. This exercise revealed a further clear set of impressions created by a smaller, still more slender little finger (with long fingernails) than the one used to decorate pot A13667 from Mortlake. What are the chances of identifying other products of either of these, presumably female, potters by this means ...?

Acknowledgements

Special thanks are due first and foremost to Jill Barnard and Rose Johnson of the Museum of London's Conservation Department for identifying the fingertip impressions and taking the casts,

and to the latter for contributing a report on the casting methodology.

Thanks are also due to: Ian Kinnes and Gill Varndell for information concerning material held by the British Museum and Jean Macdonald for help with material held by the Museum of London. Ros Cleal and Alex Gibson discussed the impressions with me and Louise Rayner of the Museum of London Specialist Services commented on the vessel fabrics. Martin Bates allowed me to pick his brains concerning tufa deposits and Barbara Wood provided useful guidance regarding references to female potters. Michael Crockett, Fingerprint Officer attached to the City of London Police, Wood Street, is thanked for commenting on the fingerprint impressions; likewise Justine Bayley of the Ancient Monuments Laboratory for sanctioning the use of the AM Lab's SEM photograph. As far as the second part of the paper is concerned I am grateful to a number of people for freely providing information prior to publication. These include Nigel Brown (Essex County Council Archaeology Section), Steve Ford (Thames Valley Archaeological Services), Pamela Greenwood (Wandsworth Historical Society), Frank Meddens (Pre-Construct Archaeology), John Lewis, and particularly Lorraine Mepham (Wessex Archaeology), Phil Jones (Surrey County Archaeology Unit) and Louise Rayner (Museum of London Specialist Services).

Appendix: The fingertip casts

(Rosemarie Johnson)

A chance request during the preparation for the Museum of London's 1998 *London Bodies* exhibition has led to an interesting area of enquiry. A cast was made of one of the deep pits in the neck of a Peterborough vessel (A13667) while it was being treated for display. Unexpectedly the impression was that of the tip of a finger with details of the nail. Several casts were made to investigate other similar deep pits on this and on a second sherd (A13666).

Method

Vessel 1 (A13667)

The indentation was carefully cleaned to remove dust and dirt. A thin coating of an acrylic resin was brushed into the indentation and the surrounding area to form a barrier layer. A dental moulding material designed to leave little or no residue, set quickly, and be easily removed was applied to the indentation. Once set, the impression was gently removed from the hole. Two further indentations were tested; the others were not disturbed. The acrylic resin was then removed from the test areas.

Vessel 2 (A13666)

A similar procedure was carried out on one of two deep pits in the neck of a second vessel.

Results

Recognisable impressions of a small fingertip complete with a long nail were recovered from three of the five complete deep pits in Vessel 1. Using a microscope it was possible to see that the pad area of the finger was ridged in what appeared to be the peaks and troughs characteristic of a fingerprint. One of the casts was prepared so that it could be examined using a Scanning Electron Microscope (SEM).

The cast of the deep pit taken from Vessel 2 appeared to comprise the tip of a thin uneven cylindrical object.

Conclusions

A small finger with a long nail had made the deep pits in Vessel 1. Michael Crockett (Fingerprint Officer, City of London Police) examined the cast and the SEM prints and confirmed the presence of characteristics of a fingerprint. The deep pits in Vessel 2 had been made by a thin, cylindrical implement, most likely a stick.

Discussion

This relatively simple methodology using a low cost and non-toxic material produced some interesting results. However a cautionary note is necessary. Any freshly excavated or untreated ceramic should be approached with care. It is unwise to introduce any chemical into pottery, as this could compromise future analysis, for example of food residues. Both vessels examined here have been in the Museum's collections since 1914 and as their treatment histories are unknown, they are probably disqualified from any such analyses. If the fabric is porous or if there are deep undercuts, taking the impression might damage the pot and trap moulding material. These factors should be considered before cleaning any similar deep pits or taking impressions – it is probably wise to seek professional conservation advice.

The method used will be published with technical details in due course (further details available from the author).

16 A bone 'scoop' and Grooved Ware vessel from a pit in the Lower Colne Valley, Surrey

by Phil Jones and Kathryn Ayres

Introduction

Lower Mill Farm in Stanwell, Surrey, lies along the eastern edge of the Lower Colne floodplain 2.3km north of its current outflow with the Thames, and Greenham Sand and Ballast Ltd operated a quarry there during the late 1980s and early 1990s (Fig 16.1). Surrey County Archaeological Unit (SCAU) undertook intermittent monitoring as the quarry progressed, and, prior to the discoveries reported below, had previously been able to plan and sample two Iron Age ring-ditches and other features in a salvage operation (Jones and Poulton 1987).

During a site-watching visit by the author in 1991, a discrete scatter of worked flints was found along the soil-stripped edge of the then quarry edge at TQ 035739, and a cleaning of the adjacent

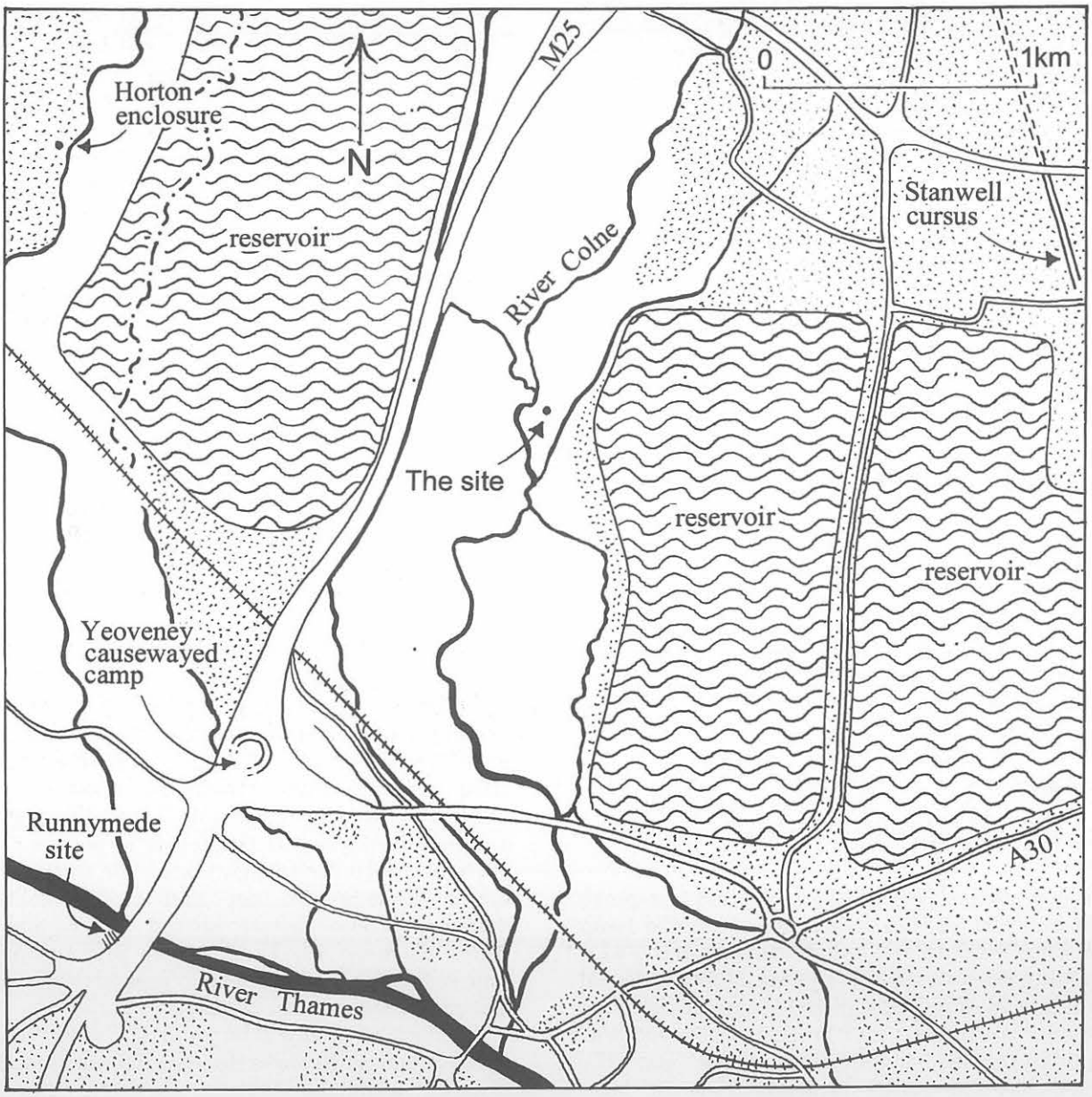


Figure 16.1 Lower Mill Farm: Site Location Map

exposure revealed several features that cut early Holocene river clays that lay over the lower terrace gravels and sands. The cleaning of the section dislodged struck and burnt flints and animal bone fragments from these features, and a worked bone 'scoop' was disturbed from what appeared to be the earliest of them.

The quarry contractor allowed time for the area immediately north from the discovered features to be excavated, and this soon followed under the direction of Graham Hayman of SCAU. The section features and many more were sampled or fully excavated, and all seemed to be of late Neolithic date, although it is suspected that a ditch observed in the original section to the east of the other features may have been considerably later. Full details of the excavation will be published in due course, but the 'scoop pit' seemed unique enough to warrant early publication in its own right. The 'scoop' was only returned to SCAU in 2000, in time to be included in this monograph.

Pit 22

The feature was a small oval pit, 0.8m by 0.6m across and *c* 0.3m deep (Figs 16.2 and 16.3). Covering its gently rounded base was a layer of dark grey/black charcoal-rich soil, 22C, only 50mm thick where deepest over the centre of the pit. The bone 'scoop' had lain flat within this primary deposit, but had not obviously been resting upon the base of the feature. The small amount of 22C below it, however, might have been introduced by hydrological or biological processes at a much later stage. Seventy-five unworked animal bone fragments, 41 struck flints, and several calcined flints were recovered from the layer.

Sealing the basal layer was an even thinner band of charred material, 22B/C, which also contained many burnt fragments of a Grooved Ware vessel. Its sherds were so friable that it was not possible to be certain whether the remains of a whole vessel was present or just a large sherd or sherds. It was accompanied by 36 animal bone fragments, 24 struck flints, and a few calcined flints.

A layer of less dark-grey clayey soil above 22B/C may have been the sealing fill of the pit, 22B. Although thicker, it included fewer artefacts, with 25 animal bone fragments and 16 struck flints. There was a higher context above 22B, but its profile and composition suggest that it represents the fill of a subsidence hollow that had developed over the pit. This was 22C, which was comprised of the same orange/brown overbank clay through which the pit had been cut, and which probably represents a local reworking of the parent clay as a result of flooding. That part of it over the earlier fills of pit 22 contained a single bone fragment and 16 struck flints, and although these may derive from subsequent Neolithic occupation of the site, they might have been worked up from 22B below.

In all, 137 animal bone fragments, 81 struck flints, many calcined flints and much charcoal debris, the bone 'scoop', and the burnt pot (or part of one), were recovered from this single small pit.

Animal bone

Most identified fragments from the pit are of cattle (35), but a few are from sheep/goats (3) and pigs (5) (Hamilton-Dyer 1991). This might suggest an overwhelming dominance of cattle, but if the numbers of positively identified fragments are added to those said to be of cattle size, or of sheep/goat or pig size, the counts are of 62 and 54 respectively, ie 54% and 46%. These percentages contrast with those based on the 558 identified fragments of the rest of the site collection, however, in which cattle or cattle-sized pieces account for 90% and sheep/goat and pig make up the remainder. The positively identified fragments from the pit, therefore, may truly reflect the relative proportions of domesticated animals. This, despite the nine cattle fragments of 22B probably being from a single horn core, and with another represented by nine pieces of horn core in 22C. Two cattle ribs in B/C and C display some fine incisions from being cut with struck flints, and a pig metacarpus from the basal layer shows signs of canid gnawing.

Struck flint

Forty-one were recovered from the basal layer, 24 from the burnt horizon 22B/C and 16 from the probable sealing fill 22B (Underwood 1991). Most are fashioned from gravel flint, although some might be of chalk flint; but the identified exceptions include four made from the basal flint pebbles of the Reading Beds, which outcrop a little upstream on the Colne (15km) and the Thames (6km). Since only 14 struck flints of this material were identified amongst the whole site collection of 1214 pieces, their numbers in Pit 22 may be significant. They include two blades, a concave scraper, and a retouched flake.

In all other ways the pit assemblage is remarkably similar to the site collection as a whole, especially in regard to the relative proportions of struck types. The tools include four convex scrapers made on flakes, with examples that have end and side working in both 22B/C and 22C. One from 22C is of the Reading Beds flint. The other five tools include a bifacially retouched flake (of Reading Beds flint) and two utilised flakes from 22C, and both a serrated flake and a serrated blade from 22B/C. The only core is a single platform A2 type from 22B/C.

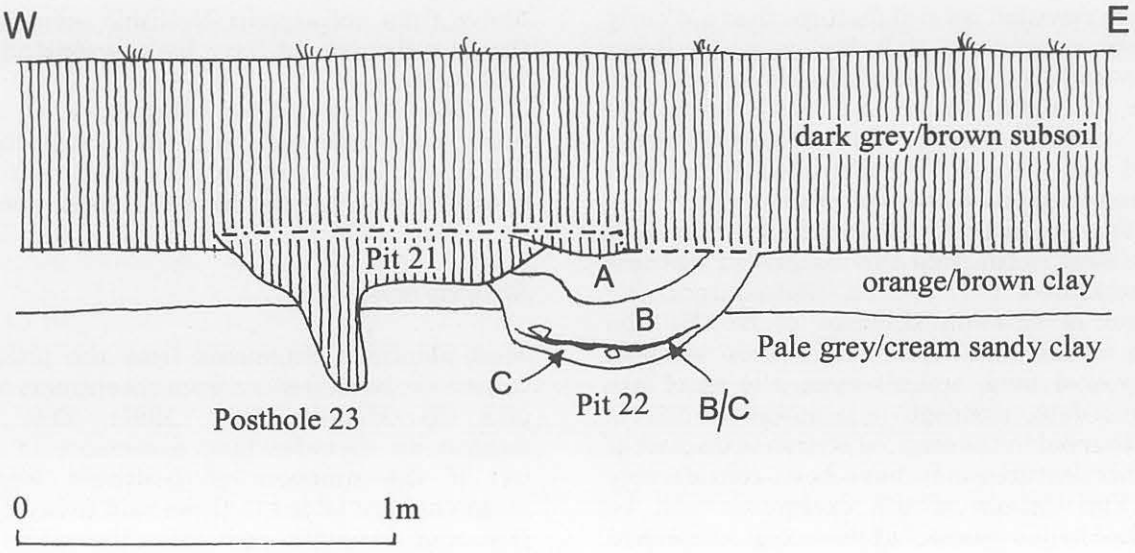


Figure 16.2 Lower Mill Farm: Part of the quarry edge exposure showing late Neolithic features

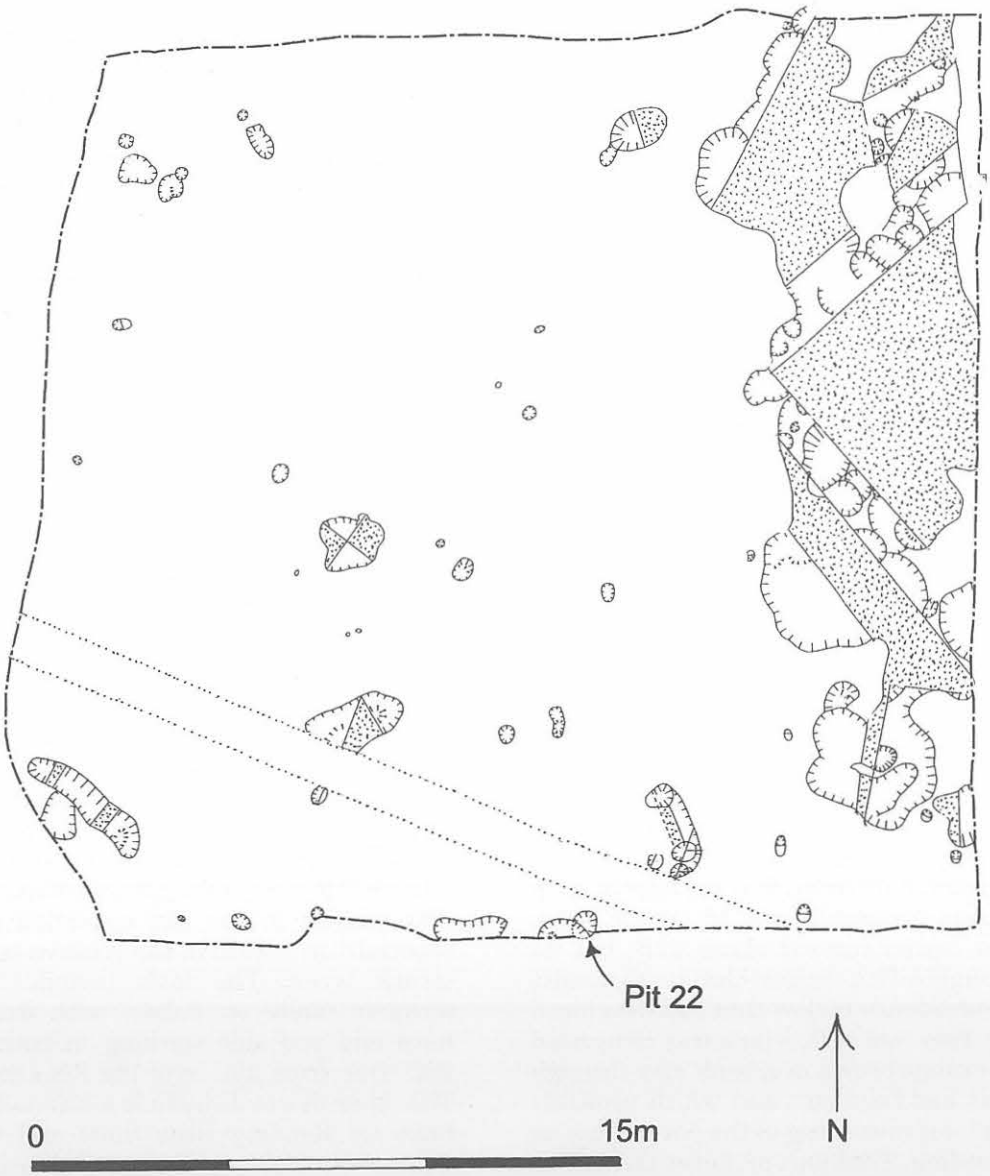


Figure 16.3 Lower Mill Farm: Plan of excavated features

The bone 'scoop'

The shallow scoop had been formed from a limb bone of an aurochs (*Bos primigenius*), the much larger ancestor of domestic cattle (Fig 16.4). These were common during the Mesolithic and Neolithic periods in Europe, and although the date of their extinction in Britain is not known for certain, they probably died out in the Bronze Age (Grigson 1982, 47).

The scoop was probably formed from the proximal medial area of a tibia. Both ends have been worked to a broad chisel edge, and all surfaces are worn smooth or polished, with the concave inner surface showing longitudinal grooves or scratches. It measures 150mm long, and tapers from 70mm to 50mm wide.

Similar shallow scoops have been noted in other finds assemblages of Neolithic and early Bronze Age date (Piggott 1954, 85; 1962, 50), and they are thought to have been a common tool type (Montague 1995, 410). No others were formed from an aurochs bone, however.

Four 'gouges' from Windmill Hill (Smith 1965, 128, fig 54, B2–4) closely resemble the Lower Mill Farm scoop. They were made from cattle limb bones, with each end ground to a smooth rounded edge, which had then been polished. Similar objects were identified at Stonehenge (Montague 1995, fig 228 nos 2 &4, pl 8), and one was made of antler and shaped into a spatula with a slightly dished profile (WA 25). It is flatter and wider than that of Lower Mill Farm, but may have been used in a similar way. The other, a closer match, was described as a 'chisel-like tool', and was probably made from a cattle radius (WA 23). Two objects from Armstrong's excavations at Grime' Graves are smaller, having been made from cattle metapodials, but their appearance suggests they may have had a similar function, and are labelled as 'spatulae' (Legge 1992, fig 23, A21–22).

Other examples have been found in the secondary filling of the chambers at West Kennet (Piggott 1962, fig 17, 1 & 2), from chambered cairns of the Cotswold group and the Temple Bottom chambered tomb in Wiltshire (Piggott 1962), at Skara Brae and Poles Wood East (Montague 1995, 411), and in association with a burial in the Upper Swell chambered long barrow in Gloucestershire.

Their exact function has not been determined but one opinion is that they were used as skinning tools (Smith 1965, 128).

The Grooved Ware vessel

Very many sherds of a single vessel were found scattered through the band of charred material, 22B/C, but their friable nature was such that it is uncertain whether a complete vessel or large sherd or sherds are represented, or whether these were already crushed, or had become crushed, when first introduced into the pit (Fig 16.5). Reasons for their unstable nature are because the vessel had been insufficiently fired, and because the clay had been mixed with organic material that had partly burnt out, leaving voids and crumbling, blackened particles. It was not possible to wash the sherds, and only a few could be brushed clean.

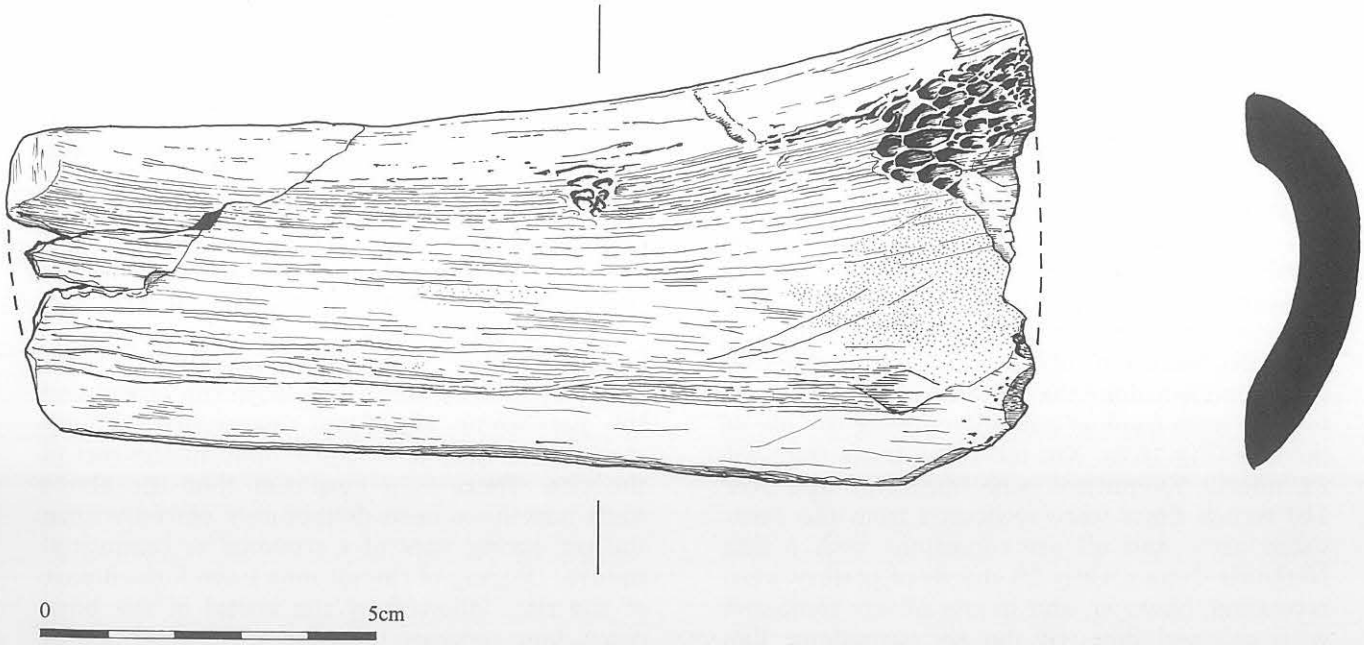


Figure 16.4 Lower Mill Farm: The aurochs bone 'scoop'

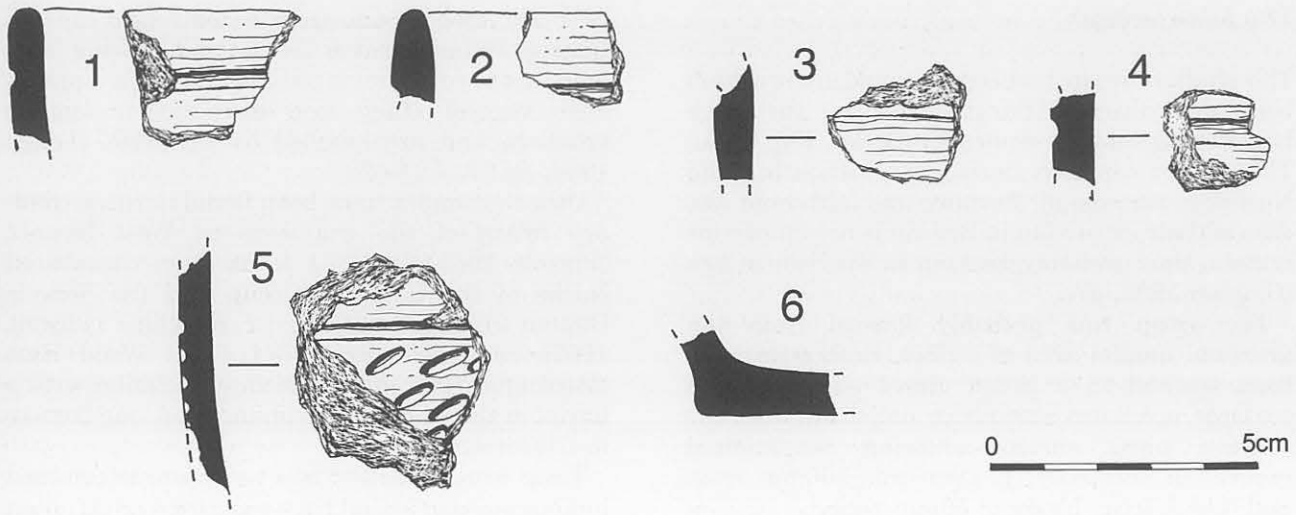


Figure 16.5 Lower Mill Farm: The Grooved Ware vessel

A few larger sherds that had survived include two from the rim, several from the base, and a few from the body that are decorated.

The rim is upright and has a rounded end, and there is a groove 10mm from the top of the vessel on one sherd (no 1) and 15mm on another (no 2). The diameter, as measured from the first of these, was between 180 and 220mm. Other sherds that display decoration include one with an apparently horizontal groove (no 3) and another with two grooves that is uncertainly orientated (no 4). The largest decorated sherd to have survived has a profusion of short grooves on one side of a longer continuous groove, but this, too, is uncertainly orientated (no 5). The vessel had a flat base, and some base angle sherds are slightly splayed (no 6), but others are not. The base diameter was about 160mm.

The impression is of a tub-shaped vessel profusely decorated with linear grooves and panels of shorter grooves, and which tapered slightly down to its flat base.

Note on the excavations

North from the originally exposed section, a rectangular area of nearly 600m^2 in area was excavated to reveal several disparate pits and postholes and a zone of shallow pitting and/or tree throw hollows along the eastern side which seems to have been used as a midden during the use of the site (Fig 16.3). Not including those from Pit 22, nearly 800 animal bone fragments and over 110 struck flints were recovered from the excavated area, and all are consistent with a late Neolithic dating. Only 29 sherds of pottery were recovered, however, and nearly all are tempered with calcined flint. Of the six exceptions, five contain calcined flint as well as some organic material or quartz sand, but there is only one sherd that is similar to the Grooved Ware vessel in being friable, black, and tempered with a profusion of organic fragments.

Discussion

Most finds from the pit may represent the detritus from one or more episodes of flint knapping and food preparation during the late Neolithic. The proportions of struck-flint types and of the species of bone fragments, for example, are much the same as in the assemblage from the site as a whole.

At least two, and possibly more, objects from the pit, however, might indicate that it had a special function. It is hard to resist the notion that the bone 'scoop' – a rare but typical object of the period – had been deliberately placed there, and that the pottery vessel, or large parts of one, had been fired in the pit or close by, and then left, or placed within the pit, a little above the 'scoop'. It might also be significant that four flint scrapers were in the basal and burnt layers B/C and C – two with side working and two with end working. Possibly also of significance was the presence of two cattle horn cores in 22B and 22C, although they were too fragmentary to decide whether they had been a pair. Their presence in close association with the 'scoop' and the pot seems significant, especially as only three other such cores were found in the rest of the site. There is a suspicion that the above finds may have been deliberately placed within the pit during rites of a personal or communal nature. Digging of the pit may have formed part of the rite, followed by the burial of the horn cores, four scrapers used for the preparation of hides, a special pot that might have been burnt *in situ*, and the bone 'scoop'. As to the function

of the latter, it has previously been noted that it was Smith who first suggested these objects might have been used as skinning tools (1965, 128), and this explanation might explain the polished surfaces of the Lower Mill Farm example. Flint scrapers could have been used for primary skinning, with these 'scoops' employed for finishing.

The pit is also important because its stratigraphical circumstances and finds suggest it had been dug and filled second in a sequence of four possible phases of late Neolithic activity and environmental changes at the site. If dug as a special pit for the burial of the above-mentioned objects, then the other animal bone fragments and struck flints might represent residual detritus of an earlier use of the site (Phase 1) that had become incorporated in its fills (Phase 2). These were then sealed by the river clay of an episode of flooding (Phase 3), and finally, part of the west side of the pit was subsequently cut away by the digging of another pit of late Neolithic date (Phase 4).

Pit 22 may be regarded as a small addition to the growing number of ritual features of Neolithic date that have been found in the Lower Colne Valley and on its adjacent gravel terraces. Most are monumental and earlier than the pit, however, such as the causewayed camp at Yeoveney (Robertson-Mackay 1987; Lewis & Welsh this volume), the cursus at Stanwell (O'Connell 1990), and the ring-ditch at Horton (Ford and Pine 2003), all of which lie less than 2km from Lower Mill Farm (Fig 16.1). A comparison of similar scale and date may be represented by a pit found at Holloway Lane, Harmondsworth, that also contained parts of a Grooved Ware vessel, but it is uncertain whether the principal function of that feature had been ritual (Cotton *et al* 1986, 36).

17 Sacred geographies in the Neolithic of south-east England *by David Field*

Introduction

During the earlier part of the 20th century most research into the Neolithic and Bronze Age of southern Britain focused on the Chalk downland. In part this was a response to the survival and visibility of earthwork monuments that remained in those areas, though even there such monuments were threatened by intensified cultivation. Little more than 30 years after Lane Fox demonstrated the antiquity of the extant flint mines at Cissbury (Lane Fox 1869a; 1869b), there was serious concern that such monuments would not survive. Fortunately, the Earthworks Committee of the Society of Antiquaries convinced the Revd Downman and others of the importance of recording such sites before they disappeared and in some cases this very process ensured their survival. As in other regions, the early surveys in the South East were monument oriented and focused on the more dramatic examples, particularly the hillforts and castles (Gould 1908). However, a valuable plan of the Whitehawk causewayed enclosure appeared in the *Victoria County History* for Sussex (Clinch 1905, 458) even though its Neolithic nature was not revealed until excavations by Curwen 25 years later (Curwen 1930). It was this work together with that of Lane Fox at Cissbury that was to set the research agenda in the South East and until quite recently much of our knowledge of the Neolithic came from the excavation of monuments on the Chalk of the South Downs.

The greater part of the South East comprises what Christopher Taylor once described as the 'zone of destruction' (Taylor 1971). By this he was referring to areas where earthworks had received successive phases of levelling at times in the past, particularly those areas where agriculturally rich soils predominate, the favoured positions along river terraces etc. Aside from the South Downs, monument visibility in the South East appears to be pretty low, and although it has its fair portion of soils responsive to air photography, overall the picture remains poor. Some of this is due to the flying restrictions imposed around the major London airports: the Thames Estuary, for example, lies on a major flightpath for Heathrow, while Gatwick is responsible for a lack of air photograph cover of the Weald. That is not the sole reason, however, for even where flying is unrestricted there remain vast areas of unresponsive soils, and it is necessary to turn to other methods to elucidate the true measure of activity.

Even during the 1930s, however, there were hints of a different scenario. Museum stores bulged with Neolithic material from the River Thames, the result of many years of collecting by G F Lawrence (1929) and others, while published distribution maps of discoidal axes (Clark 1931) and flint daggers (Grimes 1931, 343) emphasised the importance of the London area. Other well-drained areas such as the Surrey Greensand, presented a similar picture (summarised in Field and Cotton 1987), although then as now, much of this was ignored in syntheses of the activities of Neolithic Britain.

As archaeological response to development during recent decades has revealed new evidence, the riparian focus of Neolithic occupation has become clearer. Neolithic occupation has been revealed at Eton Rowing Lake (Allen *et al* this vol), Runnymede (Needham 1985; Needham and Trott 1987), Twickenham (Sanford 1970), Kingston (Penn *et al* 1984; Serjeantson *et al* 1991–2), Corney Reach, Chiswick (Lakin 1996), and Putney (Warren 1977). Causewayed enclosures have been discovered at Dorney, Bucks (Carstairs 1986), Eton Wick, Berkshire (Ford 1986), Orsett, Essex (Hedges and Buckley 1978), and Sheppey, Kent (Dyson *et al* 2000, 471–2), and possibly at East Bedfont, Greater London (Cotton *et al* 1986, 34), to supplement that previously known at Staines (Robertson Mackay 1987). Other discoveries include one of the longest cursus in the country at Stanwell (O'Connell 1990), and a number of ring-ditches, some at least of which, eg Staines Road Farm, Shepperton (Lewis 2000), Heathrow (Canham 1978; Cotton *et al* 1986, 38), Manor Farm, Lower Horton (Digby quoted in Lewis 2000), are dated to the Neolithic. Perception of the location of major centres of Neolithic activity has thus changed dramatically and much greater emphasis has been placed on major river valleys as centres of occupation.

Methods of considering the archaeological landscape have changed too (eg Tilley 1994; Bradley 2000), and this essay steps aside from a purely utilitarian interpretation. Invariably recent hunters and pastoralists consider themselves to be an integral part of nature and to desecrate the land, or to impede circulation or movement by constructing barriers, would be anathema to their belief system. To such people all features of the natural world are sacred (Kelley and Francis 1994; Humphrey 1995; Sundstrom 1996; papers in Ashmore and Knapp 1999). Their world may be four-dimensional, vertical space being as important as horizontal, and the spirit world being

indistinguishable from the living. Thus places that spirits inhabit are as important a component in the landscape as those occupied by the living, even though they may be utilised in different ways.

The forest

It is widely accepted that the Mesolithic landscape was completely covered in forest, an Amazon Basin-like landscape, with unbroken forest canopy relieved only by meandering rivers and streams. In the South East this has been reinforced by the traditional view of the heavy Weald and London Clays having been impossible to cultivate in prehistory and holding oakwoods well into the medieval period. The environmental data certainly indicates an abundance of tree species, although there is by no means even or comprehensive coverage of the region and much must be extrapolated from the few available pollen and mollusc diagrams. However, browsing and debarking by animals during the Mesolithic may have inhibited initial tree growth or even preserved clearings, and the degeneration of Brown Earth soils on sandy heathland, in part thought to be a result of ancient deforestation (Dimbleby 1962), is also widely held to have begun during the Mesolithic (eg Jacobi 1981; Holgate 1988). Soils beneath Bronze Age round barrows in Deerleap Wood, Surrey (Barrett 1976), and West Heath, Sussex (Drewett *et al* 1988, 81), for example, appear to have been podsolized before the mounds were constructed. The degree to which the Mesolithic landscape contained 'wildwood' is therefore unclear and it may have consisted of a variety of woodland types ranging from relatively dense regenerated areas to quite open 'wood pasture'.

The firing of woodland to control grazing patterns, a process observed in North America has also been proposed here (Mellars 1976), although Rackham (1986, 71) doubts this and points out that the only native tree that can be burnt *in situ* is pine. Natural cycles of forest fire, however, invariably burn the understorey rather than the canopy (Moore 1997) and need to be taken into account, certainly on the extensive heathlands of south-east England. Burning of the brushwood and understorey, would increase both the mobility and visibility of hunters (Mellars and Reinhardt 1978, 256) and such action would not only influence the passage of animals, but also have a secondary benefit in encouraging the growth of certain plant foods. Much of the region, therefore, may have been more open than formerly imagined, perhaps more akin to the wood pasture of the historic period (Rackham 1986, 120). Such firing, particularly if intentional, may have changed perception of the forest: the potentially hostile 'wildwood' was effectively tamed and domesticated (Tacon 1999, 51).

Whether, as Ellaby (1987, 66) suspects, only small numbers of people were present before the fourth millennium BC is not clear, though we might expect the population to be increasing towards the approach of the traditional Neolithic. While the Greensand, where much of the evidence for Mesolithic occupation is located, with its well-defined geographical and topographical limits, presents itself as a natural 'home range', it is not clear whether it was this deposit alone that was favoured or whether others were also utilised. Certainly Mesolithic artefacts also occur on the Weald Clay (English 1990), and Chalk (Johnson and Wright 1903), as well as London Clay (Carpenter 1958; 1961). Mellars and Reinhardt (1978, 281–2) point out that 'ecotones', positions where two or more ecological zones might be exploited appear to be the most favoured locations. If anything this tends to support Rankine's view (1949) that settlement was greatly influenced by the topography. On the Greensand a variety of different geological beds and soil types can be exploited within a short distance of four miles or so and it might be rarely necessary to travel greater distances. It is even conceivable that this led to increasing sedentism in such areas.

The camp sites alongside the River Thames at places like Ham (Lacaille 1966; Field 1983), and the clusters of tranchet adzes found in the river in west London (Field 1989), indicate that the Thames Valley also supported a reasonable population. Sites like Southwood Manor Farm, Weybridge (Field and Cotton 1987), suggest that the tributaries too – the Wey, Mole, and Colne (Lacaille 1963) – not only provided subsistence but channels of communication into the hinterland.

Whatever the size of the population, the landscape is likely to have been fully utilised by the late Mesolithic population and, rather than continuous forest, the vegetation may have been a mosaic of small glades, coppiced trees, overgrown camp sites, and cleared or regenerating cultivation plots, where certain fruit trees or plants had been formerly encouraged. In antiquity such differences in vegetation are likely to have had meaning for inhabitants: just as areas modified by natural processes such as forest fires would be recognised, so too would areas formerly modified by human behaviour. When encountered such places might be considered the territory of ancestors and legitimately reoccupied, recleared, or redug, or, depending on spiritual belief, perceived as occupied by spirits and considered taboo and to be avoided (see also Toren 1995, 166). In the Amazon forest, the produce of old overgrown cultivation plots is often utilised by others, but as long as memory or legend survives it is linked to the labour of the original cultivators (Gow 1995, 43). The number of sites in southern

Britain with evidence of reoccupation – most flint scatters on the Greensand are multi-period, for example – suggests that once transformed from the wildwood there may have been a tendency to refocus on such sites. While occasional Mesolithic sites are devoid of later material, many are mixed, not only with successive phases of Mesolithic material but frequently Neolithic and Bronze Age as well. Despite the opportunity of occupying 'green field' sites, most are in areas where there was previous activity. It is as though it was important to locate camps in the same 'place' as those of the ancestors. In these circumstances it is not clear whether it was the natural locale itself, with its modified vegetation, that was important, or the presence of ancestral artefacts already scattered on the surface. In all probability it was both, the presence of ancestral artefacts symbolically adding to the significance of the 'place'.

Just as in Amazonia, but depending on the nature of the vegetation, living enclosed within the forest of south-east England is likely to have encouraged beliefs of an enclosed world (Gow 1995, 47). Hemmed in by trees, the world would have been enclosed and dark, even though such enclosure may be comforting. In contrast, recent perception of forest has considered it dark and foreboding, a dangerous place inhabited by wild animals and populated by spirits (eg Gow 1995, 54; Schama 1995). Perception of the extent of the world can only come from the experience of journeys through it. The great expanse of sky could only be glimpsed through gaps in the canopy and rarely could hunters catch a glimpse of the horizon, except perhaps from the edge of escarpments or from hilltops. In these circumstances such glimpses and vistas might take on extra significance (Bloch 1995, 65–6) as might the position from which the view was taken. Where wood pasture prevailed, greater opportunities for perceiving landscape features both near and distant would present themselves, and no doubt inform a different perception of the world. Given the importance of the tree not only as utility but as landscape feature, it must have figured large in the belief system, and as Hirsch (1995, 2) has indicated there may have been a chronological layering of the forest, not only of visible secondary woodland and utilised plots, but also the strata linking these with memories of historical events and of tradition, mythology, and legend.

How soon the Mesolithic forest disappeared is far from clear. While the presence of adzes and axes in the archaeological record might be indicative of clearance activity, Mesolithic find spots both along the Thames and on the Greensand are matched in the Neolithic, and it may be that clusters of such finds represent activities other than clearance. In the Weald, the light, sandy, well-drained Greensand soils, and particularly those beneath the chalk escarpment are considered ideal for early cultivation (Wooldridge and Linton 1933). However, there is little evidence of agriculture anywhere in the South East until much later in prehistory. The occasional cereal grain recovered in excavation may represent small-scale cultivation in garden plots, grown as a supplement to diet, or for special occasions or offerings, rather than be indicative of fields of waving corn (Thomas 1999, 23–6). The cereal recovered from Eton Rowing Lake and dated to the fourth millennium BC was evidently not grown in sufficient quantities to register on pollen diagrams from the same site (Allen *et al* this volume).

Pollen profiles from Staines Moor, close to both Staines causewayed enclosure and the Runnymede riverside occupation site in west London reveal no *major* clearance until the Bronze Age (Keith-Lucas 2000). Clearance had certainly taken place by the end of the Neolithic (eg Field and Cotton 1987) at Wingham and Frogholt in Kent (Greenfield 1961; Godwin 1962); while hillwash at the Devil's Kneadingtrough, Brook, in Kent, is thought to have resulted from a significant clearance episode associated with Neolithic artefacts and is dated to 4540±145BP (Burleigh and Kerney 1982; see also Preece 1998), although there may have been partial clearance at an earlier date (Burleigh and Kerney 1982, 36). Forest clearance is also inferred from hillwash bracketed by deposits with OSL and TL dates around 5000 years BP at Pegwell Bay, Thanet (Murton 1988, 26). Significant amounts of tree cover certainly remained in the Thames Valley at, for example, Kingston, where despite the incidence of a cluster of tranchet axes, pollen associated with earlier Neolithic material indicates a tree-dominated landscape (Penn *et al* 1984, 218–9). Even on the Chalk evidence for clearance comes relatively late. Causewayed enclosures and flint mines appear to have functioned within woodland clearings (Evans *et al* 1981, 106–7; Thomas 1982). Recent work at Mount Caburn, near Lewes, East Sussex, tends to confirm this overall picture even though components of the typical Downs grassland flora may have been present to some degree (Waller and Hamilton 1998, 119). Caution needs to be applied to the data, however, as samples come from sites adjacent to scarp slopes rather than the dip slope: even today these areas are atypical in terms of land use, often supporting wooded hangers and may have always been utilised in a different manner to more level ground.

Evidence of dramatic clearance is slight until a developed period in the Neolithic. When it does come, as at Brooks, it may hint at no more than a lateral shift in economic activity. Regeneration occurs too, particularly visible in the late Neolithic. The formerly open area around the Thames Estuary and Essex coast developed submerged forest.

Given the almost ubiquitous forest environment for the earlier part of the Neolithic it follows that occupants of the South East were, perhaps predominantly, forest-dwelling people who obtained a living from the woodland and its resources rather than as farmers or cattle herders. Thomas (1991, 20–1) has suggested that subsistence may have continued to rely heavily on traditional economies throughout the earlier Neolithic. Certainly the incidence of red deer antler recovered from Neolithic contexts right across the area, and there are particularly large numbers from sites on the South Downs, implies a close relationship with this animal. Normally deer eat their antlers soon after shedding them, and in order to collect them there may have been processes involving luring, beating, driving, and entrapment in clearings, or even herding. Unshed examples may represent controlled slaughter.

Aside from the ubiquity of red deer, cattle are numerous on many middle Neolithic sites and it would be interesting to investigate whether one declined at the expense of the other. Cattle, which can be grazed in woodland, were certainly present at the Thames-side sites in Neolithic levels at Kingston (Penn *et al* 1984, 216), and accounted for half of the faunal assemblage at Runnymede (Needham 1985, 133) and three quarters at Staines (Robertson-Mackay 1987). Similar profiles come from sites on the Chalk, eg Whitehawk (Jackson in Curwen 1934, 128).

Perhaps the most intriguing find of all, however, comes from Holloway Lane, Harmondsworth, where just above the base of a large oval, vertical-sided pit, was the dismembered, but partly reassembled carcass of an aurochs. Six barbed-and-tanged arrowheads were recorded from the various parts (Girardon and Heathcote 1988, 412; Cotton 1991, 153–4; Brown and Cotton 2000, 86). Today the bison of Bialowska, Poland, often used as a comparanda, live in small groups subsisting on grass on the forest floor where canopy allows no understorey or where small clearings exist. For the aurochs, in an increasingly deforested landscape, safe environments must have been at a premium as an increasingly competitive human population sought the fabulous beast. Here, however, unlike many a medieval hunting lodge with heroic tales and trophies abounding, the animal was not eaten or displayed, but reconstructed and hidden away in the earth.

The coast

Throughout the period considerable changes in coastal morphology were taking place (summarised in Gibbard 1995, 33–4). The impact of the changing sea levels recorded by Devoy (1979), d'Olier (1975), Nunn (1983) and others, and now refined by the LOIS project (Long 1995; Pye and Allen 2000) is likely to have been considerable. Phases of transgression and regression in the Thames Estuary and along the Kent and Essex coasts show that in certain places, whether waterlogged as a result of successive transgressions eg Romney Marsh (Long and Waller 1998), or erosion eg Lympne, Kent (Hutchinson 1998), the coastline was constantly shifting. Belle Tout, Eastbourne (Bradley 1970), now on the cliff edge, may have been as much as 500m inland during the Neolithic. Inundation around the Essex coast in the later Neolithic swamped regenerated woodland together with structures and activity areas nearby. The nature of the pits and cooking holes described by Warren (1912a; 1912b; Warren *et al* 1936) are uncertain but their proximity to the regenerating woodland suggests dependence on it. A place of great economic opportunity (Clarke 1976) – besides the opportunity of off-shore fishing etc – inlets and the marsh grasses of river estuaries would not only be perfect for grazing but also home to waders and waterfowl. It could also sponsor initiatives where surplus suddenly declined. However, in more ways than one it presented the ultimate boundary.

Probably the greatest coastal change would have derived from the breaching of the Straits of Dover, which not only separated the two landmasses but also introduced a new tidal regime with important consequences. Before the breach the funnelling effect on the tides produced by the Straits would have almost certainly have ensured a high tidal range and possibly a bore similar to that of the Severn (G Mumber pers comm). Such a range will have ensured a perfect environment for shellfish, waders, waterfowl, etc, and the high biological potential might be expected to encourage human subsistence based largely on the exploitation of marine resources. Much depends on the speed of the breech and how quickly the fresh water Rhine/Thames/Channel river was flooded with seawater, but an immediate effect must have been that the tidal range was dramatically reduced and activities based on the formerly extensive foreshore/mudflats were no longer tenable. In addition the changed tidal regime would destroy the plankton, which thrive on a stable environment, and once the base of the food chain was disturbed, crustaceans, fish, and waterfowl would be in much shorter supply, and a marine-based economy would be much more difficult to sustain. Thus environmental events might force movement of people reliant on coastal subsistence. In this case, the focus might turn inland, perhaps up river. Resource rounds that had depended on coastal resources might be forced to search elsewhere to compensate, resulting in pulses of movement in response to each successive transgression.

In contrast to the forest environment, however, here one could actually see for enormous distances, especially when the vista was perceived

from the top of cliffs. Land on the other side of the channel was visible and may have encouraged legend to explain why the land between the two was otherwise inexplicably inundated. As now, the sea itself was extremely dangerous, however, and a place to be respected, although apart from a find of a wooden paddle from Lion Point, Clacton, Essex (Warren *et al* 1936, 184; a second was recently found in a Bronze age context – see Wilkinson and Murphy 1995, 152–6), there is still no *direct* evidence for sea-going or coastal craft. Undoubtedly tidal currents were experienced and utilised both at sea and along the rivers, even if not fully understood. Like the wind these would be difficult to explain and probably be considered the movement of spirits.

Chance finds of ground axes in the Worthing area concentrate on the coastal plain and indicate that domestic activity might focus on the lower ground, rather than around the tree-enclosed monuments on the Chalk Downs. Surface finds from the present Essex shoreline are equally dense and include over 40 leaf, 130 barbed-and-tanged and 100 petit-tranchet-derivative arrowheads, a dozen plano-convex knives, a dozen sickles some of them fragmentary, and over twenty ground axes from Walton on the Naze alone (Warren 1912a; see Hedges 1980, 36–7, for axe distribution in Essex). Numbers of structures, pits, and hearths have been found around the Essex foreshore, notably at Walton-on-the-Naze, Clacton, Dovercourt, and The Stumble (Warren 1912a; 1912b; Warren *et al* 1936; Wilkinson and Murphy 1995)

The rivers

Aside from the coast, the major influence on the area is undoubtedly the River Thames. Its nature through the changing climatic conditions and sea levels of the fourth to second millennia BC is of paramount importance for interpreting the nature of Neolithic activity in much of south-east England. In terms of landforms the South East comprises two separate basins, and drainage patterns within these areas provide natural corridors of communication as well as foci for subsistence activities. The Thames is the largest and most penetrating of these, much of its silt load emanating from outside the area of study. Its tributaries with sources in the Chilterns and North Downs join it at well-spaced intervals, and provide access to and a means of exploiting the hinterland. The Thames itself may have moved considerably both laterally and downstream with meanders cutting into riverside deposits and leaving oxbow lake cut-offs alongside the main channel that in turn provide superb traps for cultural debris (Penn *et al* 1984). The general view is of a wide braided stream, with constantly shifting eyots. The effect of overbank floods on archaeological deposits is little studied. Aside from the erosion of banks, on one hand the sorting of material may occur with accumulations of material caught in vegetation traps and beaver dams, on the other silt deposits coupled with the weight of floodwater may modify deposits.

The Thames, in particular, was (and is) massive and powerful, not to mention dangerous. A huge natural boundary that not only made contact across it awkward, but conversely provided a distinctive barrier should people on the other side be hostile. At one and the same time a natural focus and a potential territorial boundary. The clusters of tranchet and ground axes mentioned above occur at over twenty locations along the London reaches of the Thames (Adkins and Jackson 1978; Field 1989; Field and Woolley 1984). These could indicate the position of shallows where the river might be forded, but also extreme carelessness if they were all dropped accidentally. Lewis (2000, 66) observes the significance of these clusters by contrasting them with finds on land, which are relatively rare. Such concentrations occur, however, in the same locations as clusters of bronze implements and any explanation for the concentration of one artefact type needs to account for the others. A ceremonial or ritual function might now be preferred (see Bradley 1990).

Water with its life-giving, cleansing powers, is considered of spiritual importance in many cultures, and springs, the places where it interfaces with the earth, are particularly revered. Good numbers of archaeological sites are recorded from such places although they are usually given an economic explanation. The powerful river may also be revered, it can be seen as deriving from the sacred hills or mountains and ultimately the sky (Humphrey 1995, 145), and in another context one need only note the events that take place alongside the River Ganges, or in biblical accounts, to acknowledge the range of beliefs concerning such features.

While the elusive and inaccessible sky, and animals that flew through it, or lived in it, might be considered with awe, the same may have been true of such inexplicable natural phenomena as flowing water. In some parts of the landscape – the permeable sands and chalk where water might disappear quite quickly – absence must have been particularly noticeable and may have engendered a concern to ensure knowledge of the nearest source of water whilst on the move. Springs, in particular, the interface of the inner earth with the surface, provided unexplained (super) natural places that might be revered for spiritual reasons as much as being a pleasant place to drink.

It may be, therefore, that certain places within the natural landscape became imbued with belief and myth and were used or avoided according to spiritual rather than utilitarian criteria. Potential interfaces with the spirit world, notably high

places where it is possible to approach the sky, such as the summit of the Chalk or Greensand escarpments, springs that issue from within the earth, and streams, may have been highly charged symbolically. Though values may change (Bradley 1998) such places might transmit their status from generation to generation, being recognised as symbolically important by successive inhabitants of the area (Sundstrom 1996, 187). Sandy Meadow, Surrey, may be one such site, located by a spring at a geological fault, where the artefact record indicates regular, if intermittent, interest through the Mesolithic to the Bronze Age (Winser 1987). The Mesolithic pit-dwelling sites at Bourne Mill, Farnham (Oakley *et al* 1939, 67–80), and Abinger (Leakey 1951), for example, may be others.

Discussing the riverine distribution of floodplain barrows in the US, Buikstra and Charles (1999, 215) suggest that water may have been central to spiritual belief and was important as an entry point into the underworld. Monuments are similarly attracted to the Thames and its terraces and to other rivers. Henges have long been considered to be closely related to rivers and low landscape positions, and once sites on the Chalk are discounted, other monuments, causewayed enclosures and barrows, can often be seen to be integrally related to water as well. On the terraces of the middle Thames around Heathrow, in an area dense in finds from the river, the Stanwell cursus binds the rivers Colne and Thames together and provides a focus for three other cursus-like monuments as well as a linear group of a dozen ring-ditches (Cotton *et al* 1986; O' Connell 1990).

Rivers and streams provided refreshment but also harboured fish for nourishment and attracted other animals to the bank. Activities of both animals and human populations coupled with natural phenomena such as overbank floods may have conspired to encourage floodplains relatively free of trees. Certainly small clearings were present at Kingston (Penn *et al* 1984). Brown (2000) has suggested the possibility that early clearings were revered and subsequently became arenas for ritual activity (Brown 2000). As Austin (2000, 77) points out 'to clear woodland would have been to remove history' and clearances may have become symbolic arenas (*ibid*, 74–5). It is a small step to formalising them. Clearance of the edges may result in coppices. Edmonds (1999, 101) draws attention to the amount of timber used in palisades at places like Orsett (Hedges and Buckley 1978, 200), and Whitehawk (Williamson 1930; Curwen 1934; 1936). The uncertainty of disturbing the natural world may result in causeways to allow animals, insects, and spirits to pass unhindered through the landscape.

The irregular spacing of causewayed enclosures along the South Downs (Drewett 1978) is almost mirrored in those situated alongside the Thames. From Abingdon to Orsett, aside from the recently discovered site on Sheppey, these are located on the northern bank. Invariably they are positioned on slightly elevated knolls above the surrounding floodplain and they essentially hug the valley. The position of Thames Valley enclosures is also interesting in that as well as their proximity to the Thames itself, they invariably have other local relationships with water. Orsett is situated immediately adjacent to a valley of a former tributary of the Thames; in fact with a higher water table the spring may have been immediately adjacent to the enclosure. The Abingdon enclosure surrounds a spring, a spring arises close to Crofton, Wiltshire (Lobb 1995, 18), and at Eton Wick an adjacent stream may form part of the boundary. Staines is located on a low gravel knoll at the confluence of the River Colne with the Thames and in fact the Colne cuts, or provides one arm of the enclosure. It is surrounded by low-lying ground, probably marshland, which was possibly difficult of access (Robertson-Mackay 1987, 23–4) and it is likely that the gravel knoll itself supported trees. Certainly some woodland existed nearby (*ibid* 24). In general these might be considered prime positions for settlement, though as at Staines the access problems would make it awkward for exploiting all but the surrounding marsh. Assuming such spacing represents something close to the true numbers of monuments it would indicate an extremely small population and instead it is better to see these as foci at which people might gather for economic, spiritual, or ceremonial activities or all of these.

The well-constructed banks at Orsett and Whitehawk help support the view that the circuits were each part of an integral design, and the well-planned arcs of the inner circuits would be difficult to achieve if ditches were dug on a piecemeal basis (Topping and Field 1995). However, the contrast in plan between the inner and outer pairs of circuits at Whitehawk suggests that the layout of these elements need not be contemporary. As already noted, the oval shape and slight earthworks of the two inner circuits contrast with the more angular outline and prominent earthworks of the outer circuits. The inner circuits are very closely spaced, with little more than a few metres between ditches, and the fact that the second circuit has its bank *outside* the ditch is of interest. There are two points here: while both inner banks provided important barriers, if a bank had been placed inside the second ditch circuit there would have been little or no space between it and the inner ditch, and there is a hint here that the space between the ditches was of considerable importance. The flattened nature of the two inner circuits may suggest constraints within the landscape, perhaps even of vegetation, while Edmunds suggests that the manner in which

ditches are recut at, for example, Staines indicates that the plan of the ditches was of importance (Edmonds 1999, 103).

Long barrows are quite rare in the South East. Numbers exist on the South Downs, but the only example on the North Downs is at Farnham where the side ditches of a small example were excavated (Oakley *et al*1939). This is separated by over 110km from the group around the Stour in Kent: Julieberries Grave (Jessup 1937; 1939), Boughton Aluph, and Elmstead (Anon 1970). In Essex one possible example at Grange Farm, Lawford (Erith 1971, 38) some 50m long by 1m in height corresponds with Wessex examples, though a number of rectangular and oval potential mortuary enclosures of between 75m and 100m in length have been recorded (Hedges 1980, 27). They are too long for typical long barrows (West Kennet itself is atypical) and approach the length of small bank barrows or cursus, however excavation of one example at Rivenhall failed to cast light on its function (Buckley *et al* 1988).

A series of short long barrows occur on the South Downs and have been interpreted as later in date than the longer mounds and as filling in the landscape (Drewett 1986). Examples include the newly discovered example at Chalkpit Lane, Lavant, which is surmounted by a later ring-ditch (Kenny pers comm) and a further possible example within the Whitehawk enclosure (Topping and Field 1995). These short long barrows occur in the Thames Valley too, for example at Radley where one forms part of a barrow cemetery adjacent to the Abingdon enclosure (Bradley 1992), with possibly another at Eton Wick (Ford 1986, 319) variously described as oval (Ford 1986) or a double ring-ditch (Lewis 2000). Oval barrows also occur on Thanet (Perkins this vol).

A small group of megalithic tombs cluster in the Medway valley where even now Sarsen Chalk boulders lie in abundance on the Chalk hills either side of the Medway gap. Sarsen occurs abundantly on Bluebell Hill. Evans (1950, 69) suggests that sarsens were once more common in the area, identifying clusters in Westfield Wood, and around the Tottington and Cossington springheads. In other contexts such natural rocks are seen as marking places of ancestral importance, that develop mythologies invariably concerning people or animals turned into stone (eg Van de Gochte 1999, 156).

Given the likely significance attached to such rocks, to utilise them for construction may have been an extremely symbolic act in itself, but such structures also appear to mark important positions within the local landscape. As at Coldrum, they are set below the foot of the Chalk escarpment, close to the springline; the Coffin stone lies immediately adjacent to a spring, Little Kit's Coty on the shallow interfluve between two springs, and Chestnuts on the valley floor between two springs. None take the high ground of the Upper Chalk, and although slightly elevated, positioned on the Lower Chalk bench and Greensand, it is clear that prominent intervisibility was not a primary concern in their construction. Siting might even reflect nothing more than the distribution of sarsens – the rocks themselves being of primary symbolic importance.

Their position to the south of the Downs escarpment, on either side of the Medway appears significant. Effectively they flank the funnelled entrance gap through the Chalk formed by the river, but are located at a little distance from the river itself, close to its bluffs and terraces, or as noted above, by the springs of its constituent tributaries. A similar position can be observed for the Julieberries Grave group of long barrows situated by the Stour gap, and at Farnham, the difference in structure perhaps reflecting local availability of stone. Gaps through the Chalk provided important access to the Thames Valley, an altogether different landscape, and perhaps a different world. The monuments mark liminality and broadcast that one is leaving one landscape and entering another; such landscapes may have been unfamiliar and potentially dangerous (Snead and Preucel 1999, 172). Monuments, however, are missing at other gaps through the Chalk, around the Mole at Dorking, the River Wey at Guildford, and the Darent. Medieval towns lie at the former two places and significant amounts of early agriculture might be expected at both, so it is possible that similar complexes have been eradicated.

While the ultimate purpose of such monuments remains unknown, that some housed human remains cannot be ignored. Coldrum contained the bones of some 22 people, for example (Evans 1950), Chestnuts at least nine (Alexander 1961). Clearly the largest part of the population is unaccounted for and the deposits represent the remains of certain preferred individuals. It could be that these monuments are receptacles for the bones of shamans or similarly influential individuals, where the importance of 'stacking up' genealogies may enhance inherited legitimacy (Humphrey 1995, 153–4).

Sarsen is not the only material that might be seen as sacred rock. Flint is ubiquitous in one form or another across the South East, and found in a variety of primary and secondary deposits, although deep mining for it is strangely confined to the South Downs. The ready availability of resources begs the question of why it was necessary at all to mine for flint. The often quoted reason that the desire was for good-quality flint in order to make axes is negated by the observation that at least two of the South Downs flint mines do not utilise the best deposits in the vicinity, while at Cissbury and Harrow Hill seams of variable quality flint were utilised (Barber *et al* 1999). All this indicates that it was the place rather than the flint deposits themselves that was

important, and it is perhaps unfortunate that despite the extensive archaeological deposits little modern investigation has taken place at these sites and we know precious little of their origin, chronology, or development.

There are adequate ethnographic parallels to indicate that mining was regarded in an almost spiritual manner (Field 1997; Topping this vol). The process of digging shafts into the earth may have been more than utilitarian and caution may have been exercised for fear of disturbing spirits etc. Equally the implications of entering the earth may have been significant in terms of fecundity (Layton 1995, 217). It may even have been the chalk as much as the flint that was sought, perhaps for body decoration (M Green pers comm). Equally, when out of use the nature of the sites may have passed into legend. At one site in Australia, according to mythology, stone spear quarries were formed where ancestral women had felled trees (Morphy 1995, 184).

The product too might be considered in the same way. Discussing tool use by Australian aboriginals, Gould (1977) emphasised how axes were invariably derived from quarried material that was prized, curated, and sometimes transported great distances as it was considered to be part of the ancestral body. Similarly Topping (this volume) has considered the symbolic use of axes and other tools emanating from British flint mines.

An open landscape

By the early Bronze Age, considerable numbers of round barrows around the Weald were being constructed of turf, eg West Heath, Sussex (Drewett *et al* 1988) or Deerleap Wood, Surrey (Corcoran 1963, 3), which indicates that the immediate areas were grassland at that time. How extensive this was on a wider scale and how it was maintained is another matter, but it is clear that herding of one form or another was necessary in order to maintain that type of vegetation.

Living within an open landscape, pastoralists are likely to perceive their world very differently to those living in forests. For one thing the vista is more open. Discussing nomadic beliefs in modern Mongolia, Humphrey (1995) concluded that 'place' is wherever they are at any one time. The world moves weekly and is viewed as a shifting dome, which has a new horizon each time they move. Like hunters, among such groups the very landscape is considered to be alive, landforms invariably taking on association with the human body or animals (Humphrey 1995, 144).

The Weald provides a well-defined landscape. Standing in the centre, the Chalk of the North and South Downs frames the area, henge-like. It provides comfort, knowledge of an area where it is possible to envisage the extent of the world. The limits were clear. To inhabitants the full extent of the local landscape could be seen and easily understood. Spiralling smoke would declare the presence of known neighbours and betray the position of unfamiliar visitors.

By the end of the early Bronze Age, passing through a landscape punctuated with countless burial monuments must have immediately emphasised the degree of human as well as ancestral presence, and indicated that space was declining. Myth attached to many of these human constructions as well as remnants of natural landscape features and vegetation, must have engendered respect and inhibited destructive activity, perhaps demarcating areas that were inhabited by spirits or were taboo.

Round barrow distribution in the Weald is spread across geologies, but concentrates in the south, spreading across the Chalk as the Greensand strip narrows (Field 1998). The implication is of a twofold division of landscape, the Chalk scarp to the north being perceived as having different qualities, and used, as well as thought of, in a different manner to that in the south. Here, perhaps, we might catch a glimpse of early Bronze Age, and by implication earlier, cosmologies.

There is precious little evidence of Neolithic agriculture in the South East. As elsewhere the amount of grain recovered from Neolithic contexts is small eg Murphy (196, 171). Cereals are present at Corney Reach, Chiswick (Giorgi, 1996) in association with flint dated to the Neolithic or early Bronze Age. A number of bifacially-knapped single-piece flint sickles occur, including examples from Hammersmith (Macdonald 1976), Shooters Hill, Bexley, Kent (Ashmolean Museum unaccessioned), and a dozen from the coast of Essex (Warren 1912a), though whether these were utilised in agriculture or in other activities, such as cutting reeds is unclear. It may be that the resources of the coast and major rivers encouraged a successful economy based on pastoral and fishing activities.

Land use, space, and movement

In terms of open-access countryside, it was the laying out of extensive co-axial field systems in the South East during the middle Bronze Age (Yates 1999) that represented significant change, even if they were not all in fact contemporary. The parallel ditches about 100m apart found in salt marshes at Lion Point, on the Essex coast, for example, are surely 'Celtic' fields.

The intensity of such field layout speaks of control of the landscape and investment in it, rather than respect of nature. The construction of field boundaries certainly kept wild animals out,

but people too, occasioning a shift in how the world was perceived. Domestication of the landscape placed human values on it (Snead and Preucel 1999, 172).

With greater investment in the land, sedentary activities would have been necessary, though seasonal transhumance is still possible. There must have been less need to move distances. While the daily experience may have been restricted to the field system, the fields themselves would probably have been intimately familiar, and may even have been named (Field 2001). Just as clearance civilised the forest, field boundaries effectively organised and tamed the countryside.

It is clear that extreme caution needs to be applied when approaching such matters as ancient belief systems, and it is all too easy to fall into traps of hypothesis that cannot bear testing. While it is important to discard 'cultural baggage' and emphasise the range of likely potential belief systems, it is equally important to avoid at all costs a 'fringe' approach whereby almost anything goes. One person's sacred node is another's factory floor. Much of the evidence, of course can be argued two ways: on one hand, scatters of flint around a spring, for example, might be seen as representing a purely practical stop for refreshment during hunting, on the other as offerings to a spirit. One avenue of research may be to channel excavation activities into landscape investigation rather than individual sites in order to help determine whether such areas attracted activities of an unusual kind.

The contrast today between the afforested North Downs and the open South Downs could not be greater. Whereas the open South Downs give the impression of space and the lack of boundaries allows the eye to wander unhindered across the horizon, most of the North Downs engender a feeling of a very enclosed landscape. The hills of the Chalk and Greensand escarpments provide a scale in the vertical landscape. It is possible after all to climb them and share elevation with the birds. It is easy to imagine that they might provide an interface with the sky or spirit world. Most importantly, from these high points it is possible to extensively view the country below and establish an image of the relationship between places.

Certain places recur as places of sacred significance (Tacon 1999, 37–8): the interfaces of water/earth/sky with mountains, hills, springs, lakes, and other dramatic natural places or focal positions recur. In the South East among these we could identify the escarpments and springlines, the Thames itself and the coastline. Just as in other parts of the world mountains are invariably sacred, often with temples or cairns placed on top (Barnes 1999, 117), so we might consider the nature of the highest points in the South East. But those other places are important too – the natural combes and re-entrants that provided shelter in a hostile landscape, for it is the settlement landscape that we must get to grips with as much as the sacred.

In plan the south-east landscape is sandwiched by Chalk. The Chilterns and the North Downs in the case of the Thames Basin, and the North and South Downs in the Weald. For each, the Chalk forms the highest ground. It forms steep escarpments difficult to climb and offers a clear division between one landform and the next, but it also provides the source of much of the water, and its deeply incised combes provide hidden nooks and crannies that provide variety, and contrast with the open land of the river terraces. The Chalk landforms were evidently utilised and perceived differently, the South Downs containing many more monuments than the Chilterns or North Downs, and it may be that we can catch a glimpse here of ancient cosmology, where the landforms are used in different ways according to belief rather than economic resources. Such cosmologies may have focused on natural features in the landscape, springs, rivers, lakes, and hills (Carmichael *et al* 1994; Richards 1996a; 1996b; Hugh-Jones 1996; Ashmore and Knapp 1999) that became increasingly domesticated through time. Invariably these sites may be located at a distance from settlement (Hirsch 1995, 4); the manner in which round barrows, for example, lie at a respectable distance from the river's edge (Field 1998) suggest that this may be so. In other cases striking landforms eg the Hog's Back, or Devil's Punchbowl in Surrey, in contrast to those of the South West, are almost devoid of monuments (eg Hirsch 1995, 4), and perhaps too sacred to be defiled.

The construction of genealogies, both human in the case of long-barrow deposits and in terms of 'places' within the landscape, appears to have been an important component in the prehistoric landscape. Some time ago Bradley (1981) noted how hillforts often harboured evidence of earlier activity. Such reuse of monuments is now seen as commonplace (eg Bradley 1998), and causewayed enclosures such as Abingdon (Barclay and Halpin 1999), Eton Wick (Ford 1986, 319), Whitehawk (Topping and Field 1995), and Orsett (Hedges and Buckley 1978), flint mine sites at Cissbury, Harrow Hill, Blackpatch, and Church Hill (Barber *et al* 1999) have all attracted later activity, but such reuse also occurs at sites not marked by monuments. The so-called pit dwellings by the spring at Bourne Mill, Farnham, contained middle Neolithic and Beaker potsherds in the upper levels (Farnham Mus A983.796/802), while the Mesolithic flint scatters in Deerleep Wood attracted a round barrow (Corcoran 1963, 7). In terms of landscape archaeology the acceptance that certain natural landscape features were of considerable importance is a significant development (eg Bradley 2000) and new

approaches need to be adopted in order to investigate and interpret these landscapes.

Just as Barrett (1999) has suggested that the Iron Age landscape is of Bronze Age making, so the Bronze Age landscape is a product of the Neolithic. But there is more to the perceived landscape. It is the sum of received activities since the end of the last glaciation. Existing landscape features are rarely destroyed, they are more often respected and adapted for contemporary use (McOmish *et al* 2002). The Neolithic landscape of the South East incorporated the coppice stools and overgrown camp sites of the early Holocene population as well as the worn pathways leading to the most fruitful trees. Over time, only receding memories coupled with shifting mythologies would result in forgotten people. But the evidence of their existence may take on greater significance. Not until the middle Bronze Age would this landscape together with its myths and legends see a new order.

Acknowledgements

My thanks to colleagues Nicky Smith and Graeme Kirkham for constructively commenting on an early manuscript, any remaining errors however are my own.

18 Franks' Sandpit, Betchworth, Surrey: a site of special significance? *by David Williams*

Introduction

Franks' sandpit lies below the North Downs on the Lower Greensand formation in east Surrey, at a point where the belt of sand, which extends across the county, is at its narrowest (Fig 18.1). Excavations in advance of sand quarrying took place during the winter and spring of 1995–96 and were organised by the Surrey Archaeological Society. The excavations were of particular regional importance in view of the presence of three pits, which contained large quantities of Grooved Ware, the first such pottery from Surrey south of the Thames and the largest group from Surrey, Kent, and Sussex. Radiocarbon dates obtained from carbonised residues adhering to this pottery suggest the deposition of the Grooved Ware took place in the early to mid-third millennium BC. The site itself, which continued to be visited over several millennia, is difficult to parallel.

Earlier prehistoric discoveries in the vicinity include another site of uncertain nature only 0.7km to the west. That site, at the so-called Box Hill sandpit, was destroyed during sand quarrying from the late 1920s onwards and yielded a number of complete and fragmentary ground-flint axes and a small quantity of apparently late Neolithic pottery as well as earlier and later material.

The site

The Franks' sandpit site (Fig 18.1, Site 1) was recognised following topsoil stripping by the quarry company. In view of the very soft and mobile nature of the light-grey sand, a scene of considerable disturbance was presented prior to excavation as a result of this work. The remains were found to consist of three phases of pits (Fig 18.2), which lay at the core of a wider concentration of lithic material. The two

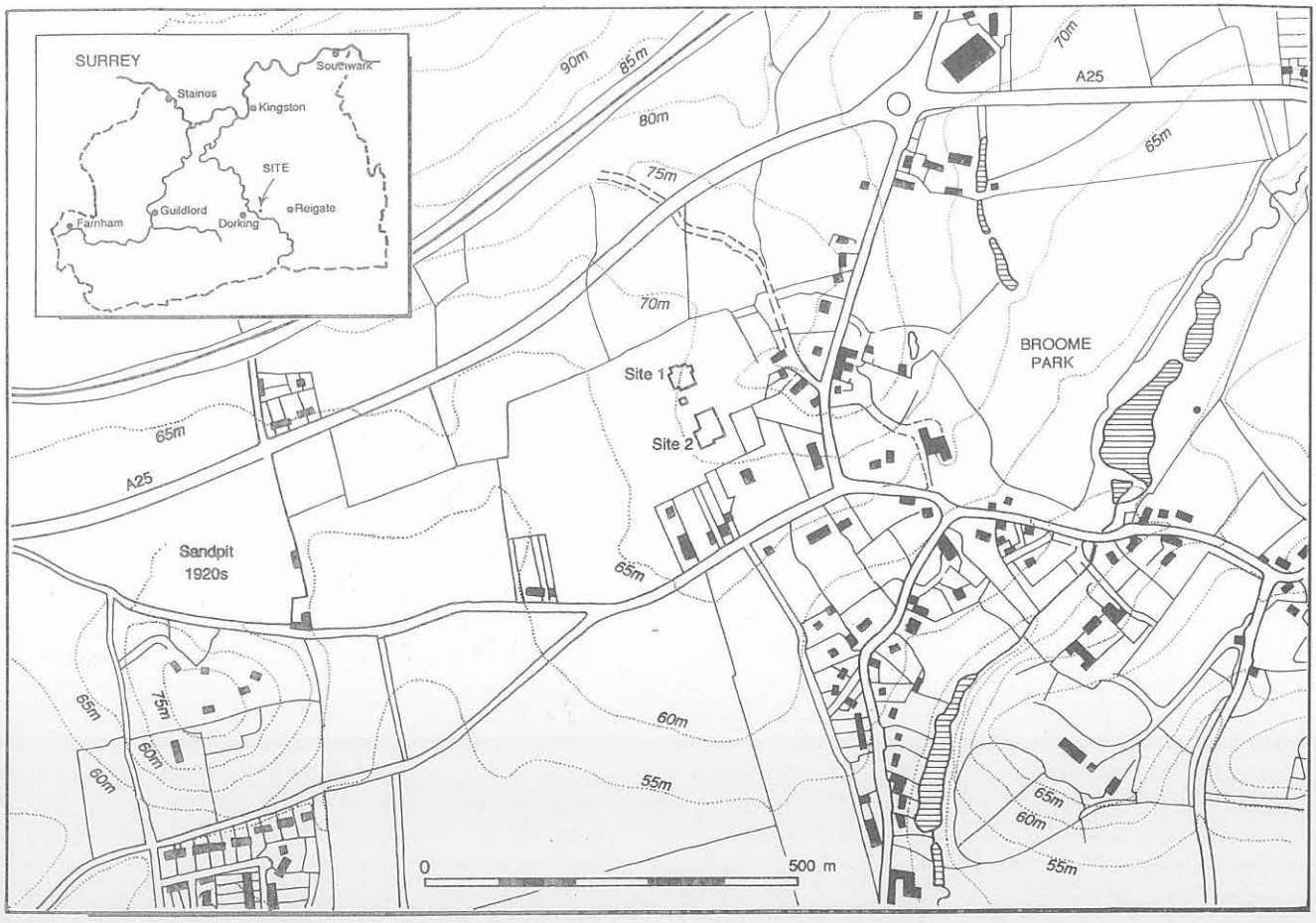


Figure 18.1 Franks' sandpit, Betchworth: site location

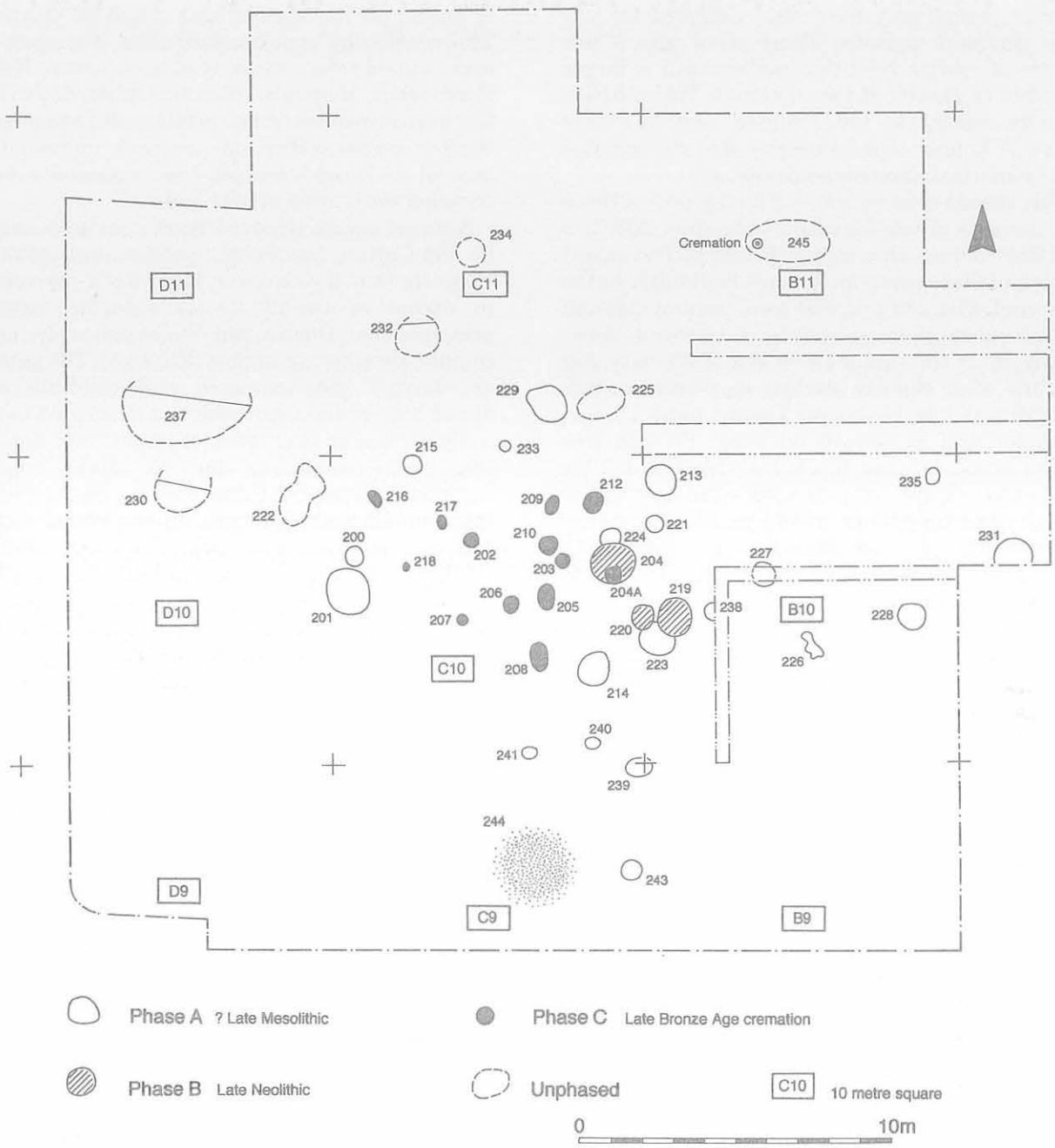


Figure 18.2 Franks' sandpit, Betchworth: plan of multi-phase pit concentration

later phases of pits (Phases B and C), which belong to the late Neolithic and later Bronze Age respectively, occupied a small area of some 11×6m. The earlier phase of pits (Phase A) occupied a somewhat wider area. This earlier phase comprised seven small features containing a densely packed mass of fragments of burnt flint and small pieces of burnt ironstone in a matrix of black sand, and a greater number of small features of varying character which contained very little. One of these was filled with a black sand, which contained several hundred small fragments of burnt ironstone. The date of Phase A is unclear but in view of the aceramic nature of the pits' contents, the presence of Mesolithic material on the site, and their position below a layer of sand containing a spread of lithic material, they may be of late Mesolithic date.

These Phase A pits were sealed by a spread of pink/grey sand which contained large amounts of lithic material, which, along with the other lithics from the site, have been studied by David Field. Tools assigned to the late Mesolithic comprised a tranchet axe and fragments of two others, and a number of narrow microliths. Neolithic material comprised two leaf-shaped arrowheads, scrapers, and a knife. Most of the flint appears to derive, unsurprisingly, from the nearby Chalk and includes a number of spherical cricket-ball sized

nodules, which may have been collected for less than practical reasons. There were also a few sherds of earlier Neolithic pottery and a larger quantity of sherds of Peterborough Ware, which belongs mostly to the Fengate and Mortlake styles. A Roman context nearby also yielded part of a cylindrical greenstone pestle.

This spread of sand was cut by a group of three circular pits of late Neolithic date (pits 204, 219 and 220) and which comprise Phase B. The extent of each of these pits was difficult to identify in the soft sand. Pits 219 and 220 were located through the presence of large sherds of Grooved Ware, which lay at the southerly extent of two merging spreads of a slightly darker grey/brown sand. Pit 219 was a bowl-shaped feature some 1.1m in diameter and at least 0.4m deep. Pit 220 was rather smaller, being 0.8–0.9m wide and *c* 0.5m deep, and pit 204 some 1–1.2m wide and rather deeper than the others at 0.75 m. Pit 204, whose upper levels were disturbed by a pit of Phase C, contained a uniform dark-grey fill in contrast to the lighter fill of the other two pits.

Each pit contained quantities of Grooved Ware, the larger amounts deriving from pits 219 and 220. Each also contained struck flint including scrapers; pit 219 yielded more than 30 scrapers. This recalls the high concentration of scrapers at a site outside the causewayed enclosure at Robin Hood's Ball, Wiltshire (Richards 1990, 63) where ten were recovered from a pit that also had a large surface concentration of scrapers immediately around it. In addition pit 204 contained a petit tranchet derivative arrowhead.

A report on the Grooved Ware is in preparation by Jon Cotton. However, a preliminary estimate suggests that the Grooved Ware itself represents in excess of twenty or so separate vessels, principally of Durrington Walls sub-style, none completely reconstructable (Fig 18.3). The vessels are largely grog-tempered and coil-built and about 25% of the assemblage is decorated externally. In descending order of importance decorative traits comprise: multiple plain applied cordons; twisted cord impressions; finger pinching; random stabbing; and, on one vessel, rough grooving with a blunt stick. The most common combination seems to be multiple plain vertical cordons with twisted cord impressions – both important defining elements of the Durrington Walls sub-style (Wainwright and Longworth 1971, 242). The assemblage gives the impression

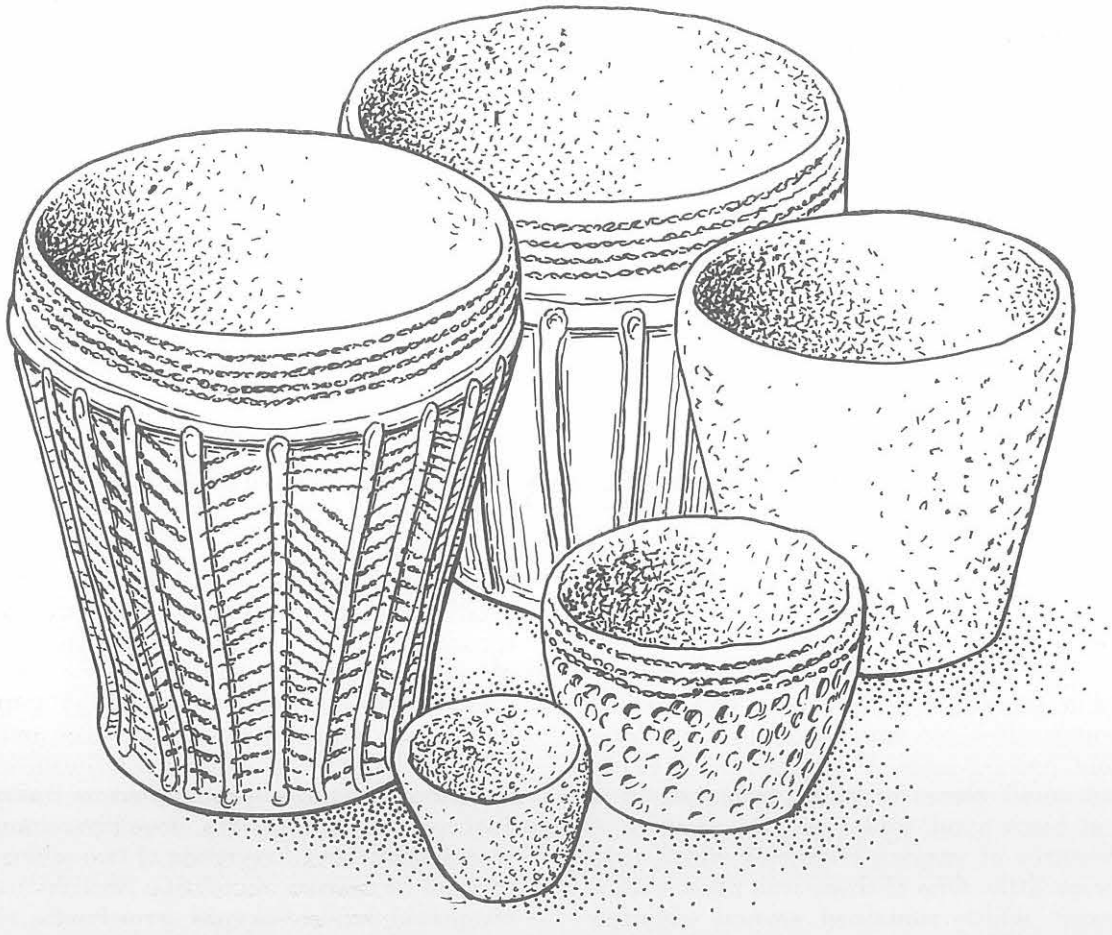


Figure 18.3 Franks' sandpit, Betchworth: group of reconstructed Grooved Ware vessels from the Phase B pits

of having been made, used, and broken and selectively deposited in the three pits in relatively quick succession – perhaps as part of a relatively short-lived episode. A number of sherds bore carbonised residues adhering to their inner surfaces. Palynological analyses of these by D J Long and R Tipping was unfortunately unsuccessful; pollen and spore counts being too low for reliable interpretation. The same samples were submitted for radiocarbon dating. Samples from pit 219 were dated 3840 ± 60 BP (OxA-7698: 2470–2130 cal BC) and 4080 ± 80 BP (OxA-7699: 2880–2460 cal BC); pit 220 at 4015 ± 70 BP (OxA-7700: 2900–2300 cal BC); and pit 204 4045 ± 40 BP (OxA-7710: 2860–2460 cal BC).

The final phase at Franks' sandpit, Phase C, comprised twelve small pits containing a dispersed human cremation of the late Bronze Age. One of these cut Phase B pit 204. In addition to the three phases of pits was a group of seven poorly defined features located to the north and west of the pit concentration. These each contained a few flint flakes and one contained a few sherds of Neolithic pottery. Another contained a small group of cremated human bones.

The site at Franks' sandpit suggests that a precise location was returned to over a period of perhaps as much as three millennia. The evidence from the pits of Phase B and C at least suggests that the site may have been a focus of ritual activity in the late Neolithic and late Bronze Age. Clearly, for whatever reasons, this was a place of special significance in the landscape, although today the spot appears unremarkable. It could be that its position at the narrowest point of the belt of sand (here not much more than 100m wide on the surface) was a factor in its siting. However, in an area devoid of stone it is difficult to see how such a spot could have been marked in any permanent way. A group of trees is the most likely form of marker (although these would clearly require a continuity of regeneration) or perhaps a clearing. Such a group of trees is the interpretation for the seven less distinct features lying north and west of the site.

Less than 100m to the south of the pit concentration, and also within the sand-extraction area, were a length of metalled track with accompanying fence line, dating to the late Bronze Age, and a group of small conjoined enclosures of the early Roman period (Fig 18.1, Site 2). The track, which finds few parallels, is capable of a ritual or ceremonial interpretation. The Roman site itself is enigmatic and is difficult to interpret in purely domestic terms. A possible shrine is one interpretation that may be advanced, although a continuity of ritual activity cannot unfortunately be proven.

19 The treachery of images: deconstructing the early Neolithic monumental architecture of the South Downs *by Miles Russell*

Introduction

The earliest monumental forms constructed in Britain, the 'long barrow', the 'causewayed enclosure', and the 'flint mine', are usually explained as relating to a period when human groups were changing their subsistence base from hunting and gathering to sedentary farming. In fact monuments have at times been viewed as if they were secondary to agriculture, and that without new forms of food production, and the consequent impact upon population mobility, monuments would not exist at all. Significant doubts have however been expressed with regards to the perceived synchronism of monument building and farming in Britain (cf Bradley 1993, 1–21), whilst the 'sedentary' nature of the earliest monument builders themselves has also come under question (cf Whittle 1997, 15–22). Monuments may well represent the major defining element in our understanding of the term 'Neolithic', but, as archaeological evidence would appear to suggest, the same cannot be said for agriculture and permanent forms of settlement.

Analysis of monumental architecture dominates a considerable portion of recent works attempting to chronicle, outline, and describe 'the Neolithic'. Despite some attempts to counter this (eg Holgate 1988), it is becoming clear that, if nothing else, monumental architecture represents the one certain defining element of the period (eg Bradley 1993, 20–1). If we wish to comprehend 'the Neolithic' mindset we must first understand the monuments: their origins, nature, and significance, as well as the regional conditions and localised environments upon which this architecture impacted (cf Topping 1997a). This particular work focuses on the early Neolithic monumental architecture recorded from the chalkland of central south-eastern England, an area commonly referred to as the South Downs.

René Magritte and the art of asking questions

This paper is permeated by the philosophy of René Magritte (1898–1967), widely considered to be one of the foremost surrealist painters of the 20th century. This is not intended to be an exercise in the wilfully obscure. Magritte, throughout his life, attempted to examine the nature of reality by questioning the world around him (Gablik 1985, 9). Possibly one of his more famous works was *La Trahison des Images* (*The Treachery of Images* 1929) where he sought to examine the discrepancy between object and symbol, depiction and representation, by painting a pipe and placing an inscription above it stating 'Ceci n'est pas une pipe' (This is not a pipe). There is no clear association between an object and the name given to categorise that object, for the name does not actually represent what the object really is (Hammacher 1986, 27).

The fundamental centre to Magritte's work lies in the exploitation of all possibilities. This is particularly true in his experiments with spatial representation and the structure of enclosed space, most vividly portrayed in works such as *La Condition Humaine I* (*The Human Condition I* 1933) and *Les Valeurs Personnelles* (*Personal Values* 1952). Here everyday objects are shown outsized and wildly out of context. Landscapes possess crucial flaws in perspective or visualisation. Paradoxes exist. The observer cannot be complacent in their outlook: they must constantly question what it is that they perceive to be their own reality.

Whilst I do not intend to subvert the complacent view of the physical world in the same way that Magritte gleefully intended, I do hope that, by questioning conservative interpretation, the ordinary and familiar may appear more extraordinary and that alternative viewpoints and conclusions may be attained. Our view of the past is, understandably, shaped by the world in which we live. When we examine the first monumental constructs built by prehistoric communities within the British Isles we look for patterns and attempt a formal classification (Barrett 1994, 87). We use discrete categories such as 'Barrow', 'Mine', or 'Enclosure' with a clear, predetermined concept as to the meaning of such terms within the context of our own society. Barrows or Tumuli are monuments raised to commemorate the dead. Mines are functional industrial constructs, while Enclosures delimit an area of ground, setting it apart from its surrounding landscape for the purpose of defining private ownership for settlement, business, or religious activity. Unfortunately the monuments that we encounter within the British Neolithic do not always fall so easily into such neat and digestible packages. There are incongruities and paradoxes which are often overlooked. More importantly there are significant

gaps in our knowledge and in our ability or willingness to understand.

Furthermore, it could be argued that by constructing a series of rigid site-specific categories we run the risk of imposing a series of definitions that possess little or no validity when compared to the prehistoric reality. What did the first monumental constructs mean to those who built them? What were they intended to say about the nature of society, how they perceived themselves (or wished to be perceived by others), and how they understood the landscape around them? These are issues that are difficult, if not impossible, to resolve, yet if we persist in visualising the Neolithic from the same general perspective, instead of questioning even the most fundamental of tenets, then we will only ever come to the same general series of conclusions. Like Magritte we need to focus our attention upon the use of words and the context of landscape and break these rigid categories down.

An additional element inspired by Magritte is the desire to erode facile resemblance and iconic homogeneity. Magritte was opposed to the view that the interpretation of one place or object could be taken to interpret places or objects within alternative cultures the world over. The visualisation of prehistoric sites within the British Isles is similarly hindered by the desire to homogenise a wide range of site-specific data in order to obtain a single overview. Such treatment cannot only mask chronological and cultural dissimilarities (Bradley 1998a, 70–1; Harding 1998, 204), but it has the unfortunate side-effect of treating all recorded sites as if they were part of an articulated system. Thus a 'causewayed enclosure' in Dorset may be so equated with an example from Tyne and Wear (or even Northern France or Poland) with the unstated implication that it possessed all the same functions, phases, and sense of meaning to those who initiated its construction and maintained or modified its external appearance through time.

The illustrations of the downland 'long barrow' from Alfriston, 'flint mine' shaft from Blackpatch, and the 'causewayed enclosure' from Whitehawk that I have chosen to preface the discussion that follows, possess the respective subtitles 'This is not a burial monument', 'This is not an industrial monument' and 'This is not a ceremonial monument'. On a basic level, the captions appended to these figures make perfect sense for, as with *La Trahison des Images* these are not realities, merely drawings. On a secondary level, however, the captions may be seen to possess a more insidious aspect. These are not burial, industrial, and ceremonial monuments because these terms of classification are ones which have been generated within a modern, industrialised society in an attempt to categorise the prehistoric past. Such 'parcelling-up' of the British Neolithic into a series of uncluttered, activity-based categories may prove to be misguided.

Supposition 1: 'this is not a burial monument'

The origin and nature of early Neolithic linear mounds in Britain has proved difficult to elucidate (Fig 19.1). From central and Atlantic Europe, comparisons have frequently been made between early Neolithic 'long houses' and 'long mounds' (eg Childe 1949, 135; Ashbee 1970, 87–99; Whittle 1977b, 221), Hodder having noted at least eight distinct points of comparison between the two types of construct (Hodder 1984, 5–9). Bradley has further argued that the concept of 'long barrow' may have arrived through an observation of the decay processes of abandoned or 'dead houses' within the Neolithic settlements of central Europe (Bradley 1998b, 44–5).

If the mound is based upon the long house, then this still leaves us with the question of 'why?', something made more pertinent for southern Britain due to the minimal number of Neolithic long house structures (Darvill 1996, 83–90). Hodder (1994) has suggested that 'the plan of the house' evolved into that of 'the tomb' as the Neolithic lifestyle was disseminated through north-western Europe and became centred upon the reverence of the ancestral dead. In such a framework, the long mound becomes a physical manifestation of all the conceptual aspects of the Neolithic way of life that were centred upon the 'house' and the ties that bound together the 'household' (Hodder 1990, 44–5). This would appear plausible, for the long mound as 'house tomb' would express, in monumental form, the economic, religious, and political interrelationships of the close-knit social group involved in its construction. Unfortunately the 'house – tomb' equation is, on the South Downs, hindered by the

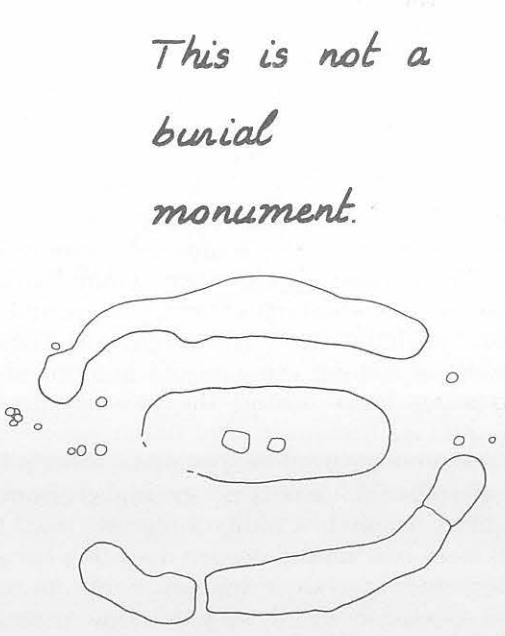


Figure 19.1 Supposition 1.

lack of any meaningful quantity of human bone from the linear mounds, and datasets recovered from the structured mounds of the eastern, east south-eastern, and western (Wessex) chalklands have confirmed that the disposal of human remains, though often assumed to represent the primary motivation behind the building of all linear mounds, did not play a prominent role within the majority (eg RCHME 1979, xx; Kinnes 1992, 105–7).

Certain linear mounds, though comparatively well preserved, have furthermore produced little convincing evidence of human burial activity from primary contexts (eg Thickthorn Down: Drew and Piggott 1936; Holdenhurst: Piggott 1937; Alfriston: Drewett 1975; Beckhampton Road: Ashbee *et al* 1979, 228–50; Horslip: Ashbee *et al* 1979, 207–28; South Street: Ashbee *et al* 1979, 250–75; Kingston Deverill G1: Harding in Harding and Gingell 1986, 7–14; North Marden: Drewett 1986; Woodford G2: Gingell in Harding and Gingell 1986, 15–21), despite producing alternative artefactual assemblages of a varied and distinctive nature (eg Thomas 1999, 77–80, 203–8). Sometimes it appears that the perceived importance of the mound lay within its actual construction rather than with any artefactual associations (for example the separation of geological materials at Nutbane: Morgan 1959, 24; Thomas 1999, 134; and Beckhampton Road: Ashbee *et al* 1979, 240–4).

Elsewhere in western Britain, the 'stone-chambered' long mounds have produced, sometimes considerable, quantities of articulated, disarticulated, disassembled, and cremated human bone (eg Saville 1990). In fact it is this type of assemblage that often demands centre stage within discussion about prehistoric burial activities. It is worth noting however that the spatial patterning of human remains within the 'chambered tombs' is usually confined to the wider or 'business' end of the mound. In fact the dimensions of these structured mounds often present a great contrast to the numbers and distribution of body parts so that 'with only one end devoted to interment they may be quite as much or even more properly regarded as monuments than as mere tombs' (Thurnam 1872, 340). Sometimes the chambers themselves may represent a secondary element of mound definition, perhaps in turn suggesting that the disposal of human remains did not provide the motivating force behind the primary building phases of such monumental linear constructs.

If the evidence from long mounds, especially the non-chambered, 'earthen' examples from the southern English Chalk, suggests that these sites were not 'tombs', where does this leave our understanding of their context within an articulated Neolithic social system? One potentially useful line of enquiry, as Magritte proposed in the 1920s, is to re-examine the application of terminology (Hammacher 1986, 27). When examining the set of ideologies and activities centred around the Neolithic house, Hodder used the Latin term 'domus' (1990, 44–5), as this covered all 'practical activities' conducted in the house as well as acting as 'a metaphor for social and economic strategies and relations of power'. Like Hodder, I see no problem with applying the term 'domus' to long mounds for, despite the almost total absence of the 'ancestral dead', the external form and structural components of earthen long mounds may conform to the threefold division of the term: a house; a discrete social unit; and the ability to tame. Firstly mounds were designed, at least in their original form, to mirror the external form and internal structuration of a continental long house; secondly they contained elements important to the social group that constructed them; and thirdly they were important visual markers within the local topography.

Long mounds were, it is my contention, intended to act as a form of cultural archive, 'symbolic houses' that contained the identifiers specific to the social group that constructed them. These community markers could be represented by the accumulation of different soils or geologies common to a particular geographic locale (eg Beckhampton Road: Ashbee *et al* 1979: Nutbane: Morgan 1959). Social identifiers may have been affirmed through the deposition of artefactual assemblages generated by, or common to, a particular group (such as worked flint or pottery). Alternatively the remains of animals that lived, or had been killed, within a particular social territory may have been deliberately deposited. Occasionally human bone, a small but representative sample from the community, would be incorporated within the structure of the mound or within the rapidly backfilling ditch segments. Other materials of an organic nature (textiles, artefacts of leather and timber, food and drink), could also have played their part.

In this model the presence of human bone is not the defining factor of the long mound, presence or absence of human body parts being dependent upon their availability or perceived importance at the time of mound construction. Alternative artefactual assemblages, such as flint waste, pottery, carved chalk, or faunal remains may, at times, have been viewed as being more representative of the social group or the land to which they laid claim. Hence such items claimed prominence over human bone. It is possible that, having been established as community identifiers, some mounds would, over time, have been further modified and adapted. In some regions of Britain, the long mound may have become gradually more synonymous with the deposition of human body parts, though whether such sites could still be justified as being primarily tombs or burial grounds, remains debatable. Only the stone-chambered linear mounds of Britain may be

described as 'tombs' with any justification and even here the actual burial components often only comprise a very small percentage of the total construct. Perhaps the only real point of divergence between the earthen long mounds and those possessing stone chambers, is that the latter category gave the living members of society the opportunity to continually access, catalogue, examine, and reorder the community database. The earthen long mounds, in contrast, represented the final narrative statement, serving to both seal the archive and mark its presence within the landscape (cf Thomas 1996, 133; Whittle 1999, 69).

Cultural archive mounds were presumably created within specific locales for a variety of reasons, though it may be tempting to view them as constructions designed to establish a claim over a specific area of land. Such claims need not be political in nature; there may be as much reason to want to dedicate the important aspects of tribal or social identity to a local deity to ensure the long-term good will of supernatural forces. Dedicated deposition of cultural markers could have been designed as a way of taming a new or potentially wild space by seeding it with the identity of the social group (an aspect that could further explain the criss-cross ard marks preserved beneath mounds like South Street: Ashbee *et al* 1979: Taylor 1996, 184–5). Such a hypothesis may explain the single pits under mounds such as Moody's Down south-east (Grimes 1961, 249) and Alfriston (Drewett 1975, 126), which could originally have held libations or some other form of archaeologically undetectable dedication. The desire for increased soil fertility, ample food stuffs, games, and the provision of subterranean flint may also have been important, something which may explain the similar range of artefactual types deposited within and around backfilled flint mines and enclosure ditch circuits.

If linear mounds did represent a form of cultural archive or community statement imposed upon the landscape then any archaeological model established to explain or discuss 'burial rites', 'mortuary rituals', population numbers, or the general reverence for the dead within the British early Neolithic, would be largely defunct, for there would be nothing within the bone assemblages from mounds that would elucidate the nature of Neolithic society. Bone deposits do not represent part of an exposure rite only enacted for the great and the good, for they could instead be viewed as representing the deliberate disassembly of one or more 'typical' members of the community. How such pieces were come by would also be debatable, for there would no longer be any certainty that the bone derived in long mounds had come from those who had died naturally. It is just as possible that the 'typical' individual, be they male or female, adult or immature, had been selected for disassembly and eventual inclusion and may not have gone willingly. They need not be the powerful, the successful, the wealthy, the religious, and spiritual leaders. They could just as easily be the poor, the dispossessed, captives, or slaves.

Supposition 2: 'this is not an industrial monument'

The vertical land cuts from which deeply bedded flint was extracted in the Neolithic are often categorised as economic constructs (Fig 19.2), associated with the earliest archaeologically detectable forms of 'heavy industry' within the British Isles (cf Piggott 1954, 36–7; Sieveking 1979; Shepherd 1980; Drewett *et al* 1988, 60). Recent analysis of the context of stone tools as well as the recorded extraction sites and the material remains associated with them (eg Bradley and Edmonds 1993; Edmonds 1995; Whittle 1995; Topping 1997b; Russell 2001), has, however, prompted the suggestion that although the desire to generate sufficient flint suitable for the manufacture of certain tool types presumably provided one of the motivating forces behind the digging of shafts, such sites may well have possessed a significant ceremonial or ritual component (Topping 1997c; Barber *et al* 1999, 53–71; Russell 2001, 224–50).

It is important to re-emphasise that we cannot judge the Neolithic sites by the standards or mindset of today's urbanised society. The 'mines' cannot be treated as simple industrial monuments or functional constructs in the same way that today one may treat a modern coal, tin, or gold mine. These sites were operated within a landscape dominated by 'non-functional', and, to the modern mind, 'non-rational' activities. Shafts, though often consigned to the footnotes of

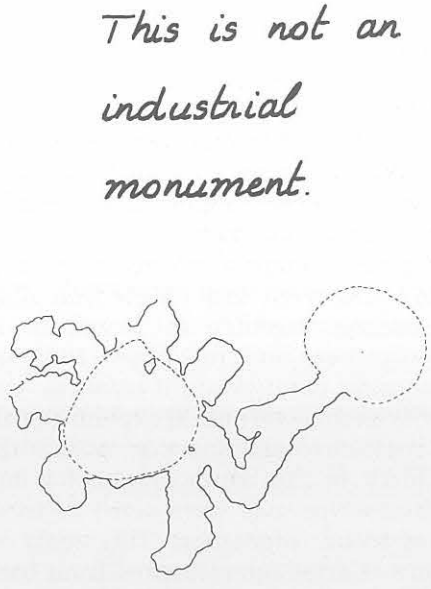


Figure 19.2 Supposition 2.

prehistoric research (Shepherd 1980, vii), may be viewed as being just as important, from the perspective of monumental architecture, as the mound or the enclosure.

With regard to the siting of shafts, the Southern 'mine' series may have been placed to ensure that the white scars and chalk spoil heaps could be seen over great distances (Parker Pearson 1993, 36; Edmonds 1995, 59–61). In this respect it is interesting to note that on the central block of the South Downs, Neolithic vertical land cuts are placed in such a way so as, whilst remaining locally prominent (Barber *et al* 1999, 55–6), they are invisible from the enclosure and linear mound sites to the immediate east and west. The wish to partially obscure visibility to the sites may have helped to enhance their perceived mystery, or the hills chosen for extraction may have been conceptually important, in a spiritual, tribal, or ancestral sense to those living in this area. Other hills, which contain as good a source of accessible seam flint, do not, for example, appear to have been worked (Field 1997). Tools made of the stone derived from specially selected hills may even have been thought to possess significant or magical properties (cf Parker Pearson 1993, 36).

If the mines were largely peripheral to the areas of enclosure and mound construction, then the process of extraction could, for those going to the shafts, have meant a measure of significant dislocation from their respective communities (cf Edmonds 1995, 66). Such a sense of isolation would have been increased for those working within basal subterranean gallery systems. Anyone who has crawled to the end of one of the Grime's Graves galleries and lain there in the dark, will be aware of just how totally divorced one feels from the 'cheerful, sustaining sounds, the songs of birds and human voices' of the world above (Forrest 1983, 21). It is possible that the act of descending into the dark and cramped working areas of shaft galleries and extracting the flint seam formed part of a rite of passage for the immatures of Neolithic social groups who were about to enter into adulthood (Edmonds 1995, 66; Russell 2001, 224–50). Many of the basal galleries of such vertical land cuts are, for example, extremely constricted making access difficult for all but the slightest of build.

Working at the mine sites could have been part of a wide social event with people from disparate groups coming together to cooperate in the extraction process and thus affirm their individual community identities and loyalties. Communal activity such as this could explain the absence of large enclosures and linear mounds within the central block of the South Downs for here the shafts themselves may have acted as important centres of social interaction. This could explain the nature of artefacts recovered from backfilled mine shafts and why such assemblages appear to mirror the range, if not the quantity, of material retrieved from the backfill of enclosure circuits and linear mounds, as all could represent a type of community marker with which individual groups hoped to imprint their identity into the land.

Supposition 3: 'this is not a ceremonial monument'

Part of the reason why the interpretation of Neolithic enclosure sites in Britain and north-western Europe has remained problematical, and consequently occupied large sections of the archaeological literature, is that, while linear mounds (or 'long barrows') and vertical land cuts (or 'flint mines') are thought to possess clearly defined functional attributes making their explanation as 'burial site' and 'industrial monument' clear enough, enclosures fall into an interpretational void, partly created by the observation that they represent a combination of the monumental, domestic, functional, ceremonial, and ritual (Fig 19.3). A variety of enclosures are sometimes 'welded together' in an attempt to generate an interpretational model that makes sense of the complex and disparate data set. Much of this analysis usually results from the misplaced 'desire to fix the right interpretation' (Bradley 1998a, 69–71; 1998b, 188–9). A way forward here may be to adopt the philosophical questioning of Magritte, by focusing our attention on the current use of terminology as well as the context of objects and landscape, in order to question the perceived 'reality' of this form of Neolithic construct.

The ritual imperative is one which has dominated the archaeological interpretation of Neolithic enclosures in Britain since the 1960s (Evans

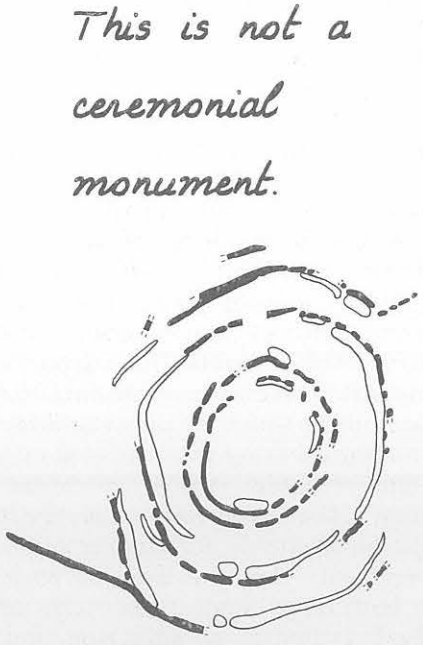


Figure 19.3 Supposition 3.

1988b). The consensus of opinion tends to be that as there is little sign of occupation 'within the circuits of ditches' and certainly no evidence of structured 'houses' (Hodder 1990, 260), that enclosures must have possessed some other purpose. This has the unfortunate side effect of ensuring that when evidence is recovered that would, in other circumstances, suggest some form of occupation, this is explained within the context of ceremonial activity. Thus areas of ditch fill where significant quantities of faunal remains predominate are zones of 'meat feasting' (Hodder 1990, 260) demonstrating the 'deliberate wasting of food' (Thomas 1999, 77). Flint knapping debris represents a desire 'to contextualise the act of working stone' (Thomas 1996, 174) whilst scrapers and serrated flakes, which 'can be taken as evidence for domestic activity' can here be invested with a 'conceptual context' beyond their usual functional significance (Edmonds 1993, 117).

It is my contention that the enclosures of the central south-eastern Chalk were designed as areas of clearly demarcated settlement, but settlement only within the context of what was happening in Britain relative to the rest of Europe. Whittle (1997) has argued persuasively against the automatic assumption that the early Neolithic in Britain should automatically be equated with sedentary agriculture. The spectrum of Neolithic mobility proposed by Whittle (1997, 21), all contain an aspect of attachment or 'anchoring to place' through the utilisation of monumental architecture. Enclosures would fit such a structured framework as bounded areas, where particular social groups could return to at semi-regular intervals in order to interact, engage in trade, corral livestock, reaffirm allegiances, and, perhaps more importantly, reestablish patterns of temporary, seasonal settlement within the confines of a theoretically 'safe haven'. At such times, distinct social groups may have reaffirmed their own cultural identity through the cleaning out and remodelling of rampart circuits, or the deposition of discrete community markers within pits, slumped ramparts, or rapidly backfilling segments of ditch.

Many people have drawn attention to the concept of 'ancestral veneration' reflected in the density of human body parts within enclosure ditch fill, Barrett noting that human bone may have helped such places to reaffirm 'the permanence of the community' (Barrett 1994, 93). Whilst agreeing that the presence of human remains within the makeup of Neolithic banks, ditches, and pits implies a desire to incorporate elements of 'the dead' into the monumental architecture of 'the living', I would argue (as with supposition 1) that the human remains themselves did not originally constitute the affirmation of an 'ancestral presence' over the land, but were part of a process designed to imprint a particular locale with the identity of a particular social group. This 'imprinture' would probably have taken the form of the deliberate incorporation of deposits that best identified or defined the social group in question. In such instances 'the typical' or social norm was likely to have been the pottery, flintwork, and other artefacts made by the group, examples of the geology that defined their area, the animals that they reared or predated upon, food that they grew, and sometimes even the body parts of deceased members of the community itself, all in varying degrees of quality and quantity.

Whether this material should be considered as refuse or midden material generated by the social group (and left lying around), or artefacts that were separated from the discard process and selected for deliberate deposition, cannot be determined with any certainty. The issue may however be largely irrelevant from an interpretative standpoint for the fact remains that the material under consideration was incorporated, sometimes in great amounts, into the backfill of ditches, pits, and shafts, and the primary fills of banks and mounds, with no apparent worry that it was in any sense contributing to the social pollution of the structure in question. Unlike today, there was perhaps no concern that discarded materials detracted from 'a sense of place', in fact it might be that discard was positively encouraged as it was considered to represent a vital component in the reaffirmation of land claims by specific human groups. Given the paucity of domestic refuse from elsewhere on the Chalk, and the absence of any substantial body of data relating to 'normal settlements' (Andersen 1997, 302), it would perhaps appear obtuse to argue for the exclusion of enclosures from models of settlement. If residential mobility in the early Neolithic of southern England was as fluid as Whittle has proposed (1996, 190–1), then the gradual and relative increase of enclosures, linear mounds, and shafts throughout this period must represent an attempt to generate more detailed ways of defining place, imprinting identity, and structuring movement.

It has already been suggested that enclosures with multiple circuits of bank and ditch represent the product of lengthy periods of exploitation within which they were likely to have performed a variety of functions and possessed a wealth of changing meanings and associations to different human groups over time (cf Bradley 1998a). Some of the enclosures recorded from the South Downs, such as Bury Hill, Court Hill, Barkhale, and Halnaker Hill, appear to have been built, utilised, and allowed to decay without any apparently significant modification to the original design, though the constructs themselves would have remained as prominent earthwork features, presumably retaining a place in the conceptualisation of the surrounding landscape. On the South Downs it is only at Whitehawk, the Trundle, and

possibly at Combe Hill and Offham, that we see evidence of substantial remodelling of primary enclosure circuits over a lengthy period of time (Russell and Rudling 1996). The phases of restructuration at these sites may have been such that completion was an alien concept, these constructs being viewed as 'projects', rather than defined entities with a set and final morphological sequence (Evans 1988a, 85–8; Bradley 1998a, 190; 1998b, 71).

As certain enclosures evolved, with the subsequent elaboration of access points, intensification of earthwork circuits, the filling-in or recutting of earlier ditches, so the next stage of social development of the human groups engaged in their maintenance may be reflected in the density, range, and distribution of artefact types recovered from ditch fills. The progressive expansion of enclosed space may have been conducted to increase the social standing of particular constructs as they began to dominate the skyline with ever more daring circuits of bank and ditch, or through a combination of more continuous (non-interrupted) circuits and the provision of timber posts in the form of ramparts or gateways. Some enclosures, from the central south-eastern Chalk and beyond, may even have evolved into a more substantial and permanent form of settlement structure with heavily structured ramparts and points of entrance and exit (eg Whitehawk: Curwen 1936; Hambledon Hill: Mercer 1980; Orsett: Hedges and Buckley 1978). Some may even have been attacked and partially destroyed, possibly by those who did not feel part of the new settlement structure or social system or who felt in some way threatened by it (Bradley 1984, 34–5; 1998a, 79; Evans 1988b, 62; Whittle 1996, 268).

'The cultivation of ideas'

By 4200 cal BC, human social groups moving around the South Downs seem to have been anchoring their mobility to specific points in the landscape. This 'tethering to place' did not involve a radical change towards sedentism, but the gradual rise in the population base across southern England appears, at the close of the fifth millennium BC, to have coincided with the arrival of new theoretical frameworks concerning the nature and identification of community, new ways of defining and remodelling space, and new ways of ordering the landscape and 'taming' the natural world. These concepts were articulated through the construction of monumental architecture.

Horizontal land cuts (enclosures), vertical land cuts (shafts), and linear structured mounds were probably built, utilised, and maintained at

Figure 19.4 Postulated primary phase of monument construction upon the South Downs (c 4500–3500 cal BC)

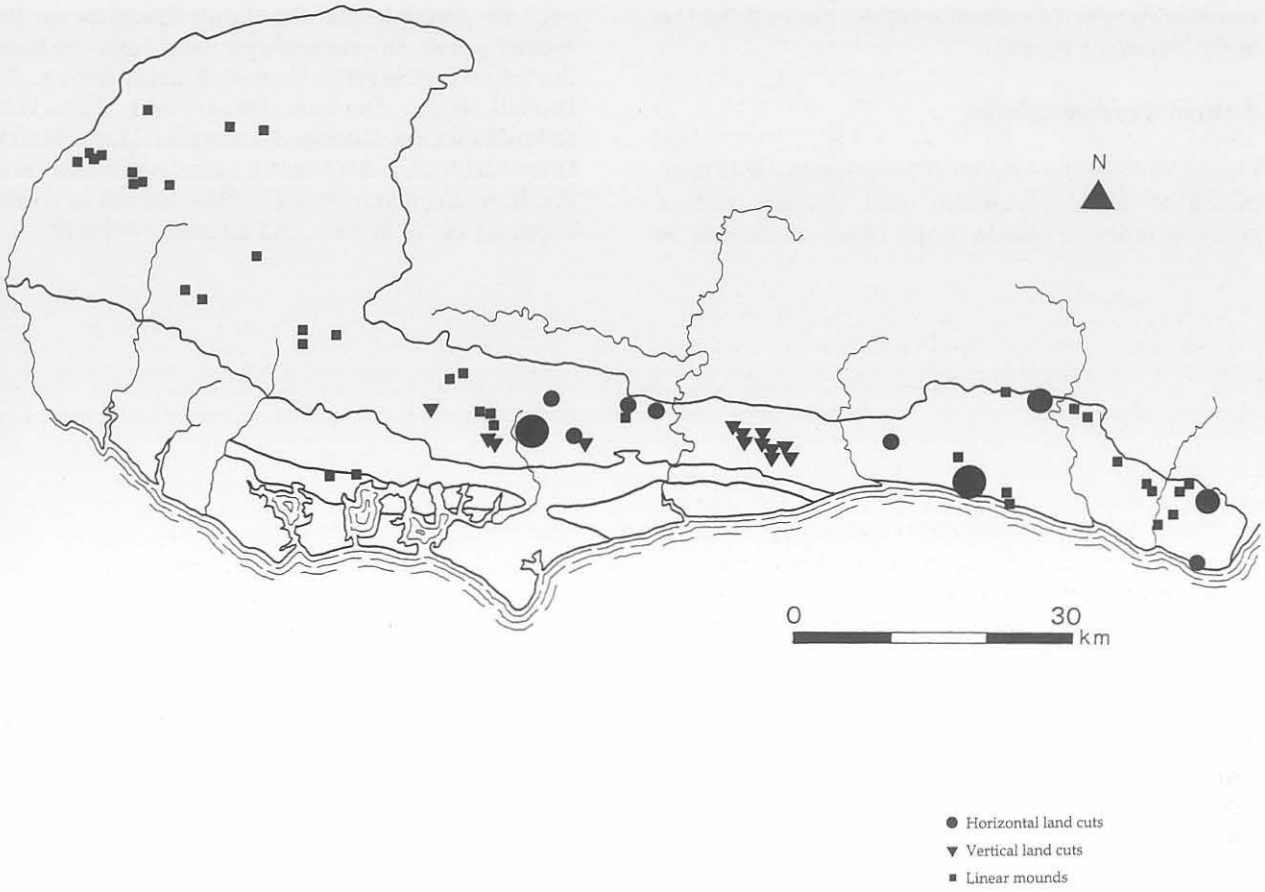


Figure 19.5 Postulated secondary phase of monument construction and redefinition upon the South Downs (c 3500–2500 cal BC)

various times by a diverse set of human groups, possibly at the margins of discrete social boundaries (Figs 19.4 and 19.5). Selected material derived from settlement waste, considered representative of each social group, was deliberately incorporated within ditch, shaft, and mound backfill, together with additional items that best characterised the group in question. The combination of monumental form and artefactual assemblage would have helped emergent societies to imprint their own identity into the land and help establish a level of control beyond the monument construct itself. The white chalk rubble generated from linear ditches and deep shafts would have had a significant impact upon a landscape previously unaffected by deliberate and large-scale modification. Through the careful topographic placement of shafts and enclosures, those involved in their building ensured that the majority were not intervisible. This may reflect the fear of neighbouring communities, or the desire to ensure that the areas visible from monuments did not include the domain of other social groups. Alternatively it may have been part of a deliberate programme of structuring the landscape, so that social units, presumably progressing along seasonal or migrational paths, would increasingly find their movement ordered. The landscape was no longer totally wild. Familiar places were being altered and their significance and meaning rewritten in new and more permanent ways.

Conclusion

This study of the early Neolithic monumental architecture of the South Downs has suggested that the current classification and categorisation of built forms into groups with clearly defined functional attributes is misplaced. Interrogation of primary data would seem to suggest that 'long barrows' were not burial monuments, 'flint mines' were not industrial monuments, and 'causewayed enclosures' were not ceremonial monuments. It is instead proposed that all three types of early Neolithic construct, the vertical land cut, the horizontal land cut, and the structured mound, represented subtly different elements of the same desire to imprint specific areas of the Chalk with the cultural attributes and identity of locally based social groups. It is further argued that it is the construction of monuments, and not the

arrival of a new subsistence base, that defines the early Neolithic period.

Acknowledgements

I have, during the course of formulating this text, benefited from discussion and debate with a great number of people (none of whom should be held responsible for the final thoughts as presented here). In particular I would like to thank the following: Martyn Barber, Martin Brown, Tim Darvill, Roger Doonan, Dave Field, John Gale, Robin Holgate, George Lambrick, Mark Maltby, Dave McOmish, Al Oswald, Colin Richards, David Rudling, Bronwen Russell, Gale Sieveking, Peter Topping, Sally White, and Alasdair Whittle.

20 The South Downs flint mines: towards an ethnography of prehistoric flint extraction

by Pete Topping

Introduction

This paper will review a sample of ethnographic data from North America to attempt to create an interpretative framework by which to study European, and in particular, South Downs Neolithic flint mining. The dataset includes groups or communities who exploited flint/chert, obsidian and pipestone sources and followed – historically – both hunter-gatherer and/or small-scale cultivator lifeways, arguably broadly comparable socially, economically, and technologically to the Neolithic communities of Europe. This ethnographic data clearly illustrates that raw-material procurement and reduction was a specialist task and was age and gender specific in many cases. The processes of extraction and knapping were often embedded within ritual behaviour and at times social exclusivity. The craft specialists could use their skills to either enhance their social position or to maintain a degree of separateness from the community: their activities were given much kudos and often played a pivotal role in social ceremonies.

The ethnographic data

The Hidatsa

In the historic period this semi-sedentary Plains tribe included craft specialists responsible for the procurement and knapping of flint artefacts. Traditionally the Hidatsa knappers lived alone and procured the raw material from quarries ranged among the higher buttes west of the Missouri River. Reduction and knapping were ritualised activities, partly associated with the sacred arrows. The most important ceremonial periods occurred during the spring, coinciding with the north-west migration of large raptors and corvids. Underpinning these ceremonies were the bundle rituals (a variety of ceremonies involving a cloth or leather-wrapped bundle of artefacts and/or bones that have deep symbolic meaning) that provided the supernatural endorsement for flint knapping, the bundle keepers dispensing this authority during the Big Bird ceremony. Social mores controlled access to flint working; no one could knap without first gaining permission from the bundle keepers or those with secondary rights (Bowers 1992, 120; 363–4).

Reduction took place in a closed lodge by firelight. Raw material was kept moist and covered until used. Flint working was a solitary activity as it was believed that 'the stone would fracture irregularly if people stood around watching and, like pottery making, stonework was done in secret' (Bowers 1992, 166). Certain artefact types became symbolically charged, building upon the ritualised production. Thus, for example, flint knives were deposited at a stone-built turtle effigy to bring good fortune (*ibid*, 370).

The Mandan

The Mandan had similar conventions to the Hidatsa, and rights to flint knapping had to be purchased from a bundle keeper. The Snowy Owl bundle controlled flint knapping rights and symbolically contained a complete arrow-making kit alongside wings and claws from the snowy owl, skins, herbs, feathers, a pipe, a bow, a lance, a buffalo robe, and various pigments (Bowers 1950, 283–5).

The Cheyenne

Certain flint knapping (eg arrowheads) was gender-specific and generally undertaken by older men who accumulated much prestige from their activities (Grinnell 1923, 178).

Traditionally the most significant ceremony of the Cheyenne was the Renewal of the Sacred Arrows. These medicine arrows were the 'supreme tribal fetish' believed to have been given to the Cheyenne by their mythological hero Sweet Medicine (Hoebel 1960, 7). In terms of the knappers' art the sacred arrows were the ultimate spiritual expression invested in an artefact, centering tribal identity onto a portable metonym. The four sacred arrows were curated in a medicine bundle: two arrows had power over the buffalo (representing the food chain) and two over humans (particularly enemies of the tribe). The sacred arrows were treated in particular ways, tasks were age and sex specific: they were carried on the backs of the bundle keepers' wives and could only be taken into battle by a prominent warrior (where they were believed to blind enemies). However, their principal ceremonial usage was in the renewal rituals which enhanced the links between the tribe and the supernatural world, restored social norms, reconfirmed origins, guaranteed power structures and gender differentiation, and helped to integrate the various

segments of the tribe. The sacred arrows thus came to epitomise the entire fortunes of the tribe and play a central role in determining their future.

The Ho-Chunk (Winnebago)

Roughly comparable to the sacred arrows of the Cheyenne are the seven sacred stones of the Ho-Chunk. The Ho-Chunk believe that 'little people' gave the tribe their stones and that they represent various rituals. Oral tradition recorded that these stones would be lost when the tribe became disunited, which occurred *c* 700 years ago during inter-tribal warfare. Traditionally the seven sacred stones were associated with a serpentine motif. Recently a petroglyph of such a motif was discovered upon a boulder in the Upper Iowa River Valley: a cache of seven projectile points placed within a clamshell had been discovered at the base of this boulder in 1944 (Stanley 1999). At the time of discovery the cache was taken to represent an Oneota votive offering, but oral tradition, the proximity of the petroglyph, and tribal history suggest a deeper resonance to this find.

This example again emphasises the importance that can be invested in stone artefacts and by implication the work of the knapper who fashioned them. Interestingly amongst the Ho-Chunk and their neighbouring Siouan-speaking groups the number seven is replicated consistently in various rituals, which contrasts markedly with the four sacred arrows of the Cheyenne (the number four in this case is only reproduced in certain rites during the renewal ceremonies (cf Hoebel 1960, 6–11)). Numerical repetition is an important facet of Plains anthropology.

The Skidi Pawnee

This tribal group had five arrow makers listed among the 200+ adult male population in 1867 (Weltfish 1965, 138). However, the fact that such craft specialists were a minority of less than 3% need not be significant as this tribe had a long history of contact, which led to the loss of many of their traditional skills and an early dependence upon Euro-American trade goods.

The Red Pipestone Quarry of Minnesota

The first written records of the Red Pipestone (*inya sa*) Quarry were by Philander Prescott in 1832, who described the quarry as ranging from two to ten feet deep (0.6m to 3m) and 100 yards in length (91m) (Parker 1966, 136–45). Traders such as Pierre Charles Le Sueur had previously noted its existence in the early 18th century (Wedel 1974; Hoover and Bruguier 1989, 9). However it was George Catlin who provided the most detailed account of the quarry and something of the significance of the site following his visit in 1836. At this time the quarry had been claimed by the Lakota (Sioux), although traditionally it had been neutral ground open to all because of the symbolic nature of the resource and the role of pipe smoking in Plains tribal ritual (fetishes, cups, and other objects are still fashioned from pipestone and considered equally sacred or special).

The Pipestone Quarry is imbued with a deep religious significance to Native Americans and the locale continues to be used for vision-quests. Its origins are associated with the Great Spirit and Buffalo Calf Woman/White Buffalo Calf Maiden (Hall 1997, 77–85), both of whom are credited with either creating the pipestone and/or giving the sacred pipe and smoking rituals to the tribes. The red pipestone itself is considered to symbolise the Native American – it centres their whole ethos in the landscape. Catlin records a conversation where he was told 'You see (holding a red pipe to the side of his naked arm) that this pipe is a part of our flesh. The red men are a part of the red stone' (Matthiessen 1989, 432). The intensity of this spiritual symbolism is illustrated by the careful guardianship of the pre-eminent Sacred Calf Pipe (probably of late 18th-century manufacture; Hughes 1995, 13, 33), which has been curated by a single family of keepers for nineteen generations (Looking Horse 1989, 13). The pipe is central to seven sacred rites. On a different level the pipe is thought to symbolise various elements: stem = male, bowl = female, and tobacco = the earth (Hughes 1995, 33). Failure to observe the correct treatment for each component part can lead to misfortune or a loss of spiritual power for the tribe. All pipes of the Lakota are considered derived from the original given by White Buffalo Calf Woman.

Recent X-ray powder diffraction studies have suggested that some quarrying of the red argillite pipestone (or Catlinite) occurred as early as the middle Woodland Period (*c* 300BC–AD700) and late middle Woodland pottery of *c*AD500–700 has been recovered from the monument, although not necessarily a confirmation of quarrying (Tom Thiessen pers comm). However, by AD1350–1400 there was a demonstrable increase in extraction and a widespread distribution of pipestone coinciding with the 'Classic' horizon of the Oneota tradition (Henning 1998, 356–60). By 1680 there are records of the Yankton (Sioux) using red pipestone pipes and by the second half of the 18th century they had a thriving inter-tribal trade (Derby 1989, 15). More recently, since the sale of the Pipestone Reservation in 1892 by the Yankton to the US Government, a pan-tribal community of pipe makers has developed who supply medicine people and healers with raw material or finished pipes (Derby 1989, 16).

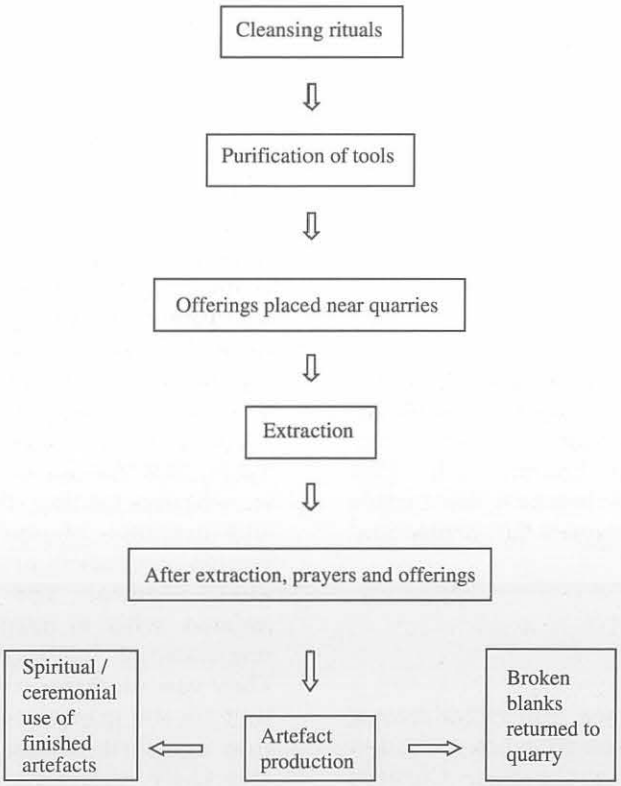
According to traditional lore (which appears to be paralleled by the archaeological record) tribes who visited the quarry had to camp and perform subsistence tasks away from the quarries. The distancing of these activities helped to maintain the concept of a sacred space surrounding the source of the pipestone (Hughes and Stewart 1997, 9). Ethnohistory and archaeology have recorded camp sites and enclosures at a distance of some two miles or more from the quarries, but none closer (eg Winchell 1911, 108–10).

Traditionally pipes were made by craft specialists who were given tribal authorisation or who had received permission during a vision-quest (DeCory and DeCory 1989, 18). The procurement and crafting processes were ritualised, and in recent years, whether as the continuation of ancient traditions or an amalgam of different beliefs, began with ritual purification in a sweat lodge located near the quarry. In recent times the sweat lodge ceremony took place at the beginning and end of the quarrying season, accompanied by prayers and pipe smoking with the pipe offered to the six sacred directions (four cardinal points, the earth, the sky). In addition daily ceremonies included 'smudging' with sage smoke to purify tools accompanied by further prayers (Hughes 1995, 44–5).

Once purified, the pipe maker placed offerings near the quarries to mediate with the spirits (Hughes 1995, 32; Hughes and Stewart 1997, 42–4). Fieldwork by the US National Park Service in 1998 noted both artefacts (bandannas used as tobacco tie offerings), avifaunal remains (hawk wings) tied to bushes adjacent to the quarries, and vertically set forked sticks decorated with tobacco ties near the sweat lodges. Catlin had previously recorded similar offerings placed at the Three Maidens[1] 'humbly propitiating the guardian spirits of the place, by sacrifices of tobacco, entreating for permission to take away a small piece of the red stone for a pipe' (Matthiessen 1989, 430) – a practice which still continues at this location (Hughes 1995, 22–6). Such offerings clearly link procurement with the primary function of the finished pieces. The Three Maidens locale was further enhanced with a range of petroglyphs including anthropomorphs, various animals (including turtles), and geometrical and abstract shapes (Table 20.1, Winchell 1983, 15–8; Holmes 1983, 31).

The pipestone is still extracted using iron handtools comprising picks, levers, and chocks to split the overlying Sioux quartzite. This tool kit replaced the traditional hammerstones and wooden tools (Holmes 1983, 21–7). Once at the workshop, the pipestone is cut into rough blanks

Table 20.1 Ritualised extraction processes at the Red Pipestone Quarry, Minnesota



before final shaping. The shape of the pipes often correlates with specific tribes: 'disk' pipes are typical of Iowa, Oto, and Osage medicine bundles; 'elbow' pipes (L-shaped bowl) among the tribes of the northern Plains and eastern margins; the 'micmac' pipe is common to the Algonkian tribes of the north-east periphery of the Plains, particularly the Blackfoot, Cree, Chippewa, and Ojibwa; the 'Sioux' or 'Plains' type (inverted T-shaped bowl) was common to the Dakota and their neighbours; and the Arikara and Mandan had their own robust variant of the 'Sioux' or 'Plains' pipe (Murray 1983, 84–5; Murray 1993, 5–11). Traditional pipe making without metal tools took some eight days and the finished pipe had to be purchased direct from the maker (Hughes 1995, 90).

When pipes were broken and because of the inherent symbolism of the red stone, the fragments were returned to the quarry for renewal purposes in a similar way to the periodic return of the Sacred Calf Pipe to the quarry. During fieldwork in 1998 a number of broken blanks were observed placed upon the spoil dumps of the southern quarries at Pipestone.

The Pipestone Quarry continues to have an important role for many contemporary Plains Tribes as is illustrated by the presence of a Sundance Lodge, used annually in association with renewal ceremonies linked to the Sacred Calf Pipe (Hughes 1995, 31–42). However, the potency of the pipe as a spiritual symbol is not confined to this quarry or restricted to the Lakota, the Arapaho have a creation myth which records a spirit person known as 'Nih' ançan' using his pipe to firstly create the earth, then people it with men and women. The Blackfoot believe that their original medicine pipe was given to the tribe by a deity known as 'Thunder', who was responsible for Spring thunderstorms, and their use of the pipe in medicine bundles was designed to propitiate these natural forces (Murray 1993, 20–2).

The Diné (Navajo)

The reverence with which the Diné hold the earth is typified by their attitude towards extraction. The Diné must 'treat the land and each other with respect ... The Diné become sick upon entering mines that burrow beneath the earth's surface unless they say prayers for protection' (McPherson 1992, 42).

Puebloan 'Tchamajillas'

The tchamajillas, or stone hoes, are crafted from a fine-grained silicified siltstone that has a banded appearance and is found in the Four Corners Region. This raw material has been quarried since Anasazi times and the careful working and grinding was designed to enhance the coloured banding of the finished tool.

Contemporary usage of these artefacts includes a role as part of the altar equipment for the Snake Dance of the Hopi (Bourke 1884, 125). Amongst other Puebloan groups, tchamajillas are owned by each clan where they are symbolically fed and rocked like a baby (it is unclear whether this is a recent phenomenon).

General observations

Records from many other tribes or groups including the Arapaho, Comanche, Crow, Omaha, and Teton, indicate specialist flint working, but unlike many tribes listed above, the rights to knapping were not purchased. Craft specialists were also recorded among the Apache of the South West, the Shoshone of the Great Basin, the Yurok of California, and the Klamath of the north-west Coast. Where detailed records exist, the knappers were males, and generally older men (Seeman 1985, 15–6). In addition, it has been suggested from the evidence of the archaeological record that flint knappers/arrow makers display little evidence of accumulated wealth or status, which could imply that the role and social niche of the flint worker conferred no political power, but was seen as an alternative to the traditional male pursuits of warfare and hunting (Seeman 1985, 20).

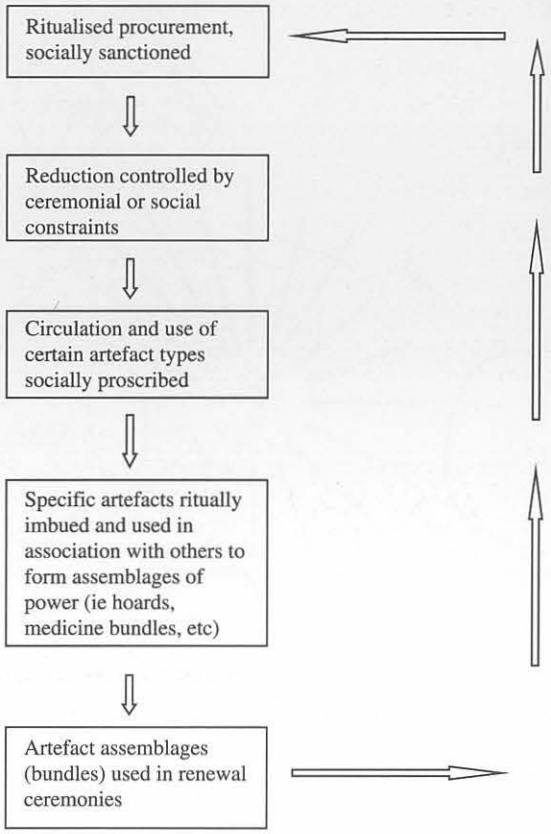
The comparative framework

From the randomly selected Native American evidence described above, it is possible to identify several recurrent themes relating to:

- procurement strategies;
- methods of reduction and knapping;
- the social position and role of the flint worker;
- the significance of certain knapped artefacts for ceremonial usage; and
- the linkage between the knapper and/or his products and the ritual of the community.

These general themes are summarised in Table 20.2. As can be seen, such a social system is self-perpetuating, the procurement, reduction, and curation phases ultimately lead back to further procurement as artefact renewal feeds social renewal. The use of specific artefacts, imbued with a deep ritual significance, help processes of legitimisation and social control. They can underpin traditions and oral histories that tie the group or community to the land and they can form a direct link between the people and their ancestors and deities, much as the Sacred Calf Pipe does today for the Lakota.

Table 20.2 A hypothetical model for 'ritualised' flint procurement strategies



The English prehistoric flint mines

There are several basic observations that can begin to inform the interpretation of the English prehistoric flint mines. The skills evident in the structure of the mines implies that the miners fully understood the mechanics of subterranean earthmoving and the geological stresses associated with tunnelling into chalk. Technologically, flint mining by sinking shafts with galleries (rather than by simple pits) was a skilful operation and not an opportunist ad hoc activity (P J Felder pers comm).

From the evidence of the Native American data, we should probably expect that the miners had some form of social mechanism through which they passed down their knowledge and skills to the next generation. Whether this was by purchase or through the induction of individuals to a group of craft specialists is debatable, but it would appear that the skills base developed and was current more or less throughout the Neolithic period, a timespan of more than 2000 years (and arguably may have in turn informed Bronze Age copper mining). Over such a lengthy timescale flint mining must have developed its own histories and mythologies to legitimise the role of the miners and create and maintain their social niche.

It could be argued that the technology was evolutionary, beginning with the predominantly simple pits at Martin's Clump recently dated by a single determination to 5150 ± 70 BP (BM-3083: 4220–3770 cal BC), through to the more elaborate shafts and galleries at sites such as Cissbury, from 5100 ± 60 BP (BM-3082: 4040–3760 cal BC) to 4710 ± 60 BP (BM-3086: 3640–3360 cal BC) or Harrow Hill 5350 ± 150 BP (BM-2098R: 4500–3800 cal BC) to 4880 ± 30 BP (BM-3084: 3710–3635 cal BC); cf Barber *et al* 1999, 81–2). At what point the South Downs and Wessex Groups of mines were abandoned is unclear – artefact assemblages record activity suggesting some mines such as Blackpatch and Church Hill retained a cultural value into the later Neolithic and beyond, indicated by the presence of Grooved Ware, Beaker, and Collared Urn assemblages, many from stratigraphically later barrows located adjacent to, or even overlying some shafts (Fig 20.1).

One of the fundamental aspects of the mines that suggests they may have been imbued with an importance beyond simple extraction is the evidence of the artefact assemblages and other deposits (cf *ibid*, 61–7). Much of this data cannot be directly linked to the extraction process and lies outwith the range of functional tools. This evidence comprises: placed or structured deposits within many shafts and galleries consisting of

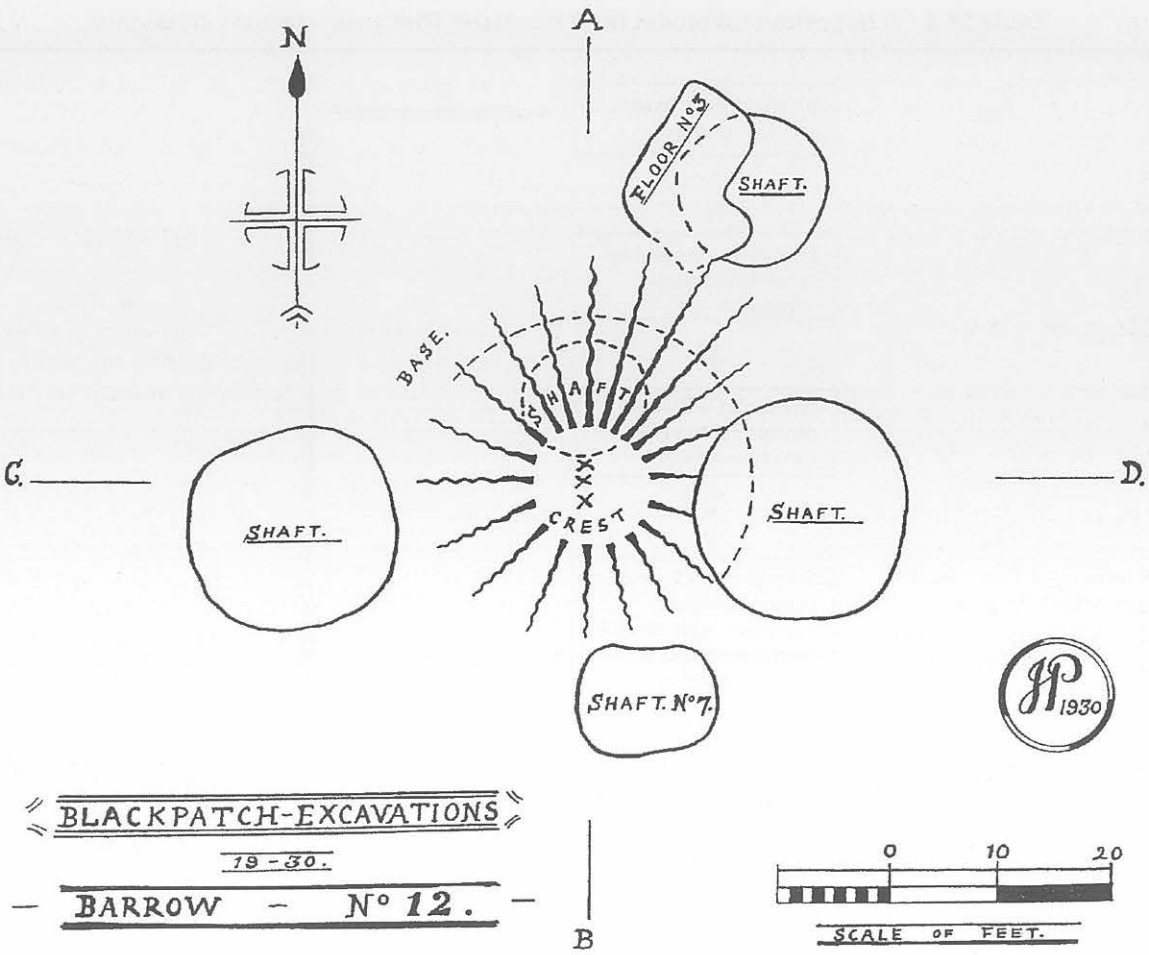


Figure 20.1 John Pull's plan of his 1930 excavations at Blackpatch Barrow 12, recording the relationship of the barrow mound to various shafts. Note, although one shaft has been buried, that to the north and east are later than the barrow (cf Pull 1932, 84–85)

animal bones, pottery, carved chalk objects, graffiti, small flint tools, and stone axes (both complete and broken), some occasionally in juxtaposition. Such artefacts must have had peripheral roles to the mining process itself, but may have been central to ritualising the context of extraction, acting as encoded referents. Almost certainly they would have recorded the importance of *place*, defining social space and taboos and transmitting the symbolic meaning of the mine workings.

Considering the paucity of settlement evidence at the mines and the deliberate creation of sacred space at Pipestone, for example, and even allowing for taphonomic processes, these assemblages cannot easily be explained as casual dumps of domestic debris. They have been brought to the mines for careful placement and/or to play an indirect role in the extraction process. These assemblages or deposits trend towards zoning and occur, generally, in specific contexts, for example:

- Human remains are found in the shafts or at gallery entrances;
- Pottery is primarily focused upon the shafts, placed upon chalk platforms, at gallery entrances, or upon basal silts;
- Hearths occur mostly at the base of shafts or in the shaft fill (recent excavations have also discovered charcoal deposits too small to be hearths in galleries at Grime's Graves, cf Longworth and Varndell 1996, 26, fig 17);
- Graffiti is positioned near gallery entrances;
- Impact marks from ground stone axes are cut into a minority of gallery walls;
- Carved chalk objects are generally recovered from the galleries.

Many of these deposits reference entrances and thus the act of entering the mines, reinforcing the observation above that they acted as 'encoded referents' designed to impart specific messages to the miners, visitors, or supplicants.

A percentage of these artefacts must represent either the deposition of offerings or the return of finished and/or broken tools to their source as a form of symbolic renewal, much like the example of Pipestone Quarry. This would explain the presence of broken axes found in the shafts and

galleries at sites such as Cissbury (see below) and Harrow Hill (Curwen and Curwen 1926, 130–2). Such depositional patterns are also reflected in the (potentially later) Grooved Ware pits in the Upper Thames region, some of which contain broken artefacts in association with animal bones (Barclay 1999, 14), perhaps suggesting similar referencing in these contexts.

Cissbury, Shaft 27

An informative example of the range of depositional patterning is provided by Shaft 27[2] at Cissbury excavated by John Pull in 1953 and never fully published.[3] Shaft 27 had a diameter of 11ft 6ins (3.5m) E–W by 8ft 3ins (2.5m) transversely and was notable not only for its rich assemblage but also for the discovery of a female inhumation at the base of the shaft (Fig 20.2). The depositional sequence is summarised in Tables 20.3 and 20.4.

Other finds came from peripheral contexts:

- 'Clearing in South section. Found at junction on left, 3 prong antler pick many flakes ... 2 knife flakes ... near the pick the remains of a thin walled and tubular bone probably a bird bone ...'
- Found in W branch of S (?) 'several animistic nodules'

The depositional sequence suggests episodic accumulation, not a consistent and single backfilling event as might be expected if the shaft was rapidly filled with spoil from an adjacent mine. The Shaft 27 deposits illustrate a number of stabilised horizons ranging between 6 inches (0.15m) to 4 feet (1.2m) in depth. Pull records that the upper fill comprised a fine silt or 'rainwash' to a depth of 5 ft (1.5m), below that was 'many large blocks of chalk completely rounded as if by water action. most peculiar. some were pick marked'. At 6 ft (1.8m) a 'Highly consolidated

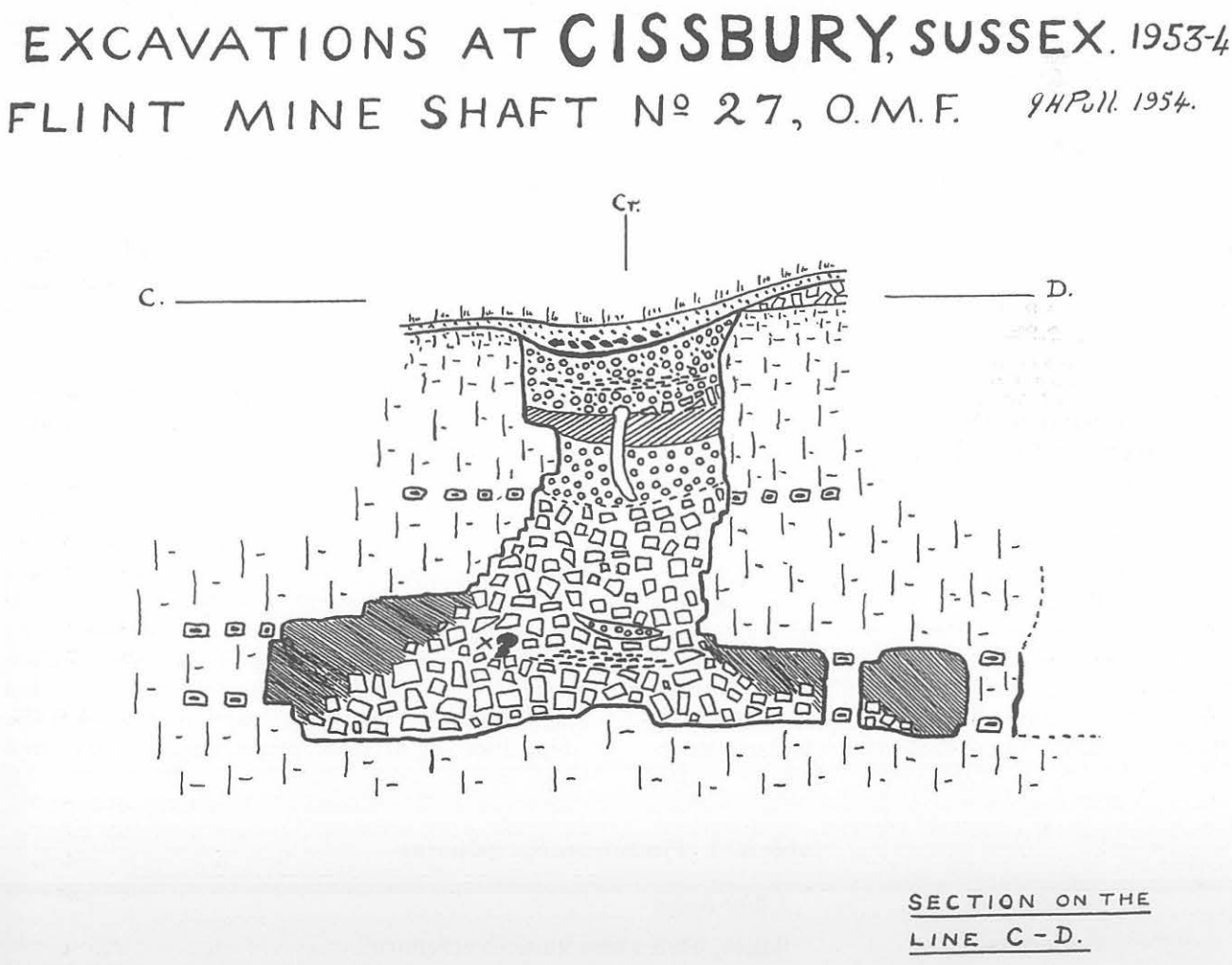


Figure 20.2 Shaft 27, Cissbury. Pull's section drawing of the shaft showing the position of the skeleton (skull in black beside an X) lying upon the basal deposits. Note the height of the skeleton in the section, which clearly demonstrates that the adjacent gallery entrance was roughly only half filled when deposition occurred

Table 20.3 Finds from the shaft

Depth		artefacts/deposits
Imperial	**Metric**	
9ins	0.2m	3 'roughouts' several flakes
1ft 3ins	0.4m	'large and fine parallel sided axe'; scraper; many flakes; several large knives; water-worn pebbles including 1 of quartz
2ft–2ft 6ins	0.6–0.75m	Cissbury type axe; 'triangular knife'; axe roughouts; a number of small blades; scraper; scapula shovel; small axe; many flakes
3ft	0.9m	flakes; broken animal bones; flint 'mousterian' type axe
4ft	1.2m	fragments of charcoal; 1 'roughout waster'
6ft	1.8m	a few flint flakes
10ft	3m	'a fine pressure flaked leaf-shaped arrowhead in mint condition'
11ft	3.3m	near complete skeleton of an ox with pig bones 'some charred black by fire' [NB a separate typescript by Pull states that this was found at 14ft]
12ft	3.7m	2 flint blades
15ft	4.6m	'graffi (sic)' on E side of shaft wall; in NW part of shaft 'Found skeleton of Cissbury ~~miner man~~ (author's strikeouts) woman laying...across the entrance to West gallery'. Charcoal found in right hand, 2 chalk charms and a 'fossil like worm' discovered nearby.
16ft	4.9m	'much charcoal scattered, not in situ'; flint flakes; cores; knives
18ft	5.5m	base of shaft; 1 axe roughout; 1 broken axe; 1 core; many flakes

layer of silt (was) met with 14″ (0.35m) thick ... broke it through with great difficulty and found loose air spaced angular filling below'. On morphological grounds alone, the record suggests a minimum of four separate deposits of backfill. However, if the artefacts represent separate depositional event-horizons, then there are arguably at least twelve correlating with the number of identifiable assemblages separating or interspersed between these layers.

That the shafts might have remained open and had a continuing role as a focal point is suggested by the evidence of the upper layer of fine silt overlying water-worn blocks, then compacted silt over 'air spaced' rubble representing a sequence of eroded material overlying backfilled or collapsed deposits. Elsewhere Pull observed the effects of natural erosion upon excavated shafts, concurring with Pitt Rivers in suggesting 'that this coarse silting takes but a comparatively short time to complete. Eight to ten years is about the limit' (Pull 1932, 38). Similarly an anonymous letter recording a visit to Grime's Graves in 1873, some three years after Greenwell had finished his excavations, records that 'At the close of his operations he left the 'Grave' open to a depth of thirty feet (9.14m) & upwards. I had the curiosity to go & see whether the pit was still open to that level, & was surprised to find that it had already filled up to within a few feet of the surface'.[4] It is quite clear that natural processes could backfill shafts quite rapidly. A process of gradual silting and/or the occasional dump of spoil would have created the episodic sequence of layers recorded in Shaft 27 and help explain the periodic deposition of artefact assemblages sandwiched

Table 20.4 Finds from the galleries

Gallery one	1 flint knife
Gallery two	flakes, blades and knife in entrance
South gallery (?2/3)	3 point antler crown 8ft (2.4m) inside gallery
North gallery (?5/6)	3ft (0.9m) inside gallery many flakes; nodules; 1 antler point; 1 core; 1 endscraper; 1 blade

between layers throughout the depth of the shaft, each fossilising the stabilised horizon of a depositional event.

The prospect that some mines remained open and were a focus for secondary activities implies a conscious desire to reference the mines and the past. The extent to which this occurred is illustrated by the final deposit in Shaft 27 of three roughouts a mere 9 inches (0.2m) below the modern ground level. These must have been placed on the final ground surface when the shaft was abandoned and almost totally backfilled, the location of the mine perhaps only clearly marked by its spoil dump. Oral tradition and folk memory would have sedimented the sites in the cultural landscape, recording their history and mythology. Such a construct has obvious parallels with Grooved Ware pits which frequently contain assemblages within 'ashy deposits' – possibly correlating with the hearths and charcoal deposits found in mine shafts (eg Cissbury, Harrow Hill): a further similarity is the fact that some Grooved Ware pits apparently remained open (Barclay 1999, 14). The two internally decorated Grooved Ware bowls discovered placed upon a chalk platform in the 1971 shaft at Grime's Graves (Mercer 1981, 24, fig 11) imply that the mine may have remained open and accessible to allow these vessels to be seen and impart their message. Such a reading may be borne out by the shaft section which illustrates recurrent deposits of chalk debris rarely more than 1m deep interspersed with layers of sands. This stratigraphic sequence suggests an episodic banded fill, the sand deposits representing erosion events between periodic collapses of the shaft walls or small 'ritualised' dumps of chalk debris.

At Blackpatch, Pull recorded a 'temporary living-floor' on the basal silts of Shaft 1 comprising knapping debris, ox and pig bones, and twelve or fifteen 'lower jaws of sheep complete with teeth' (Pull 1932, 40). Pull states that these sheep mandibles were discovered in a pile surrounded by burnt stones and a number of 'fine flint implements' including an ovate, a flint axe, and a red quartzite hammer. The selective deposition of the sheep mandibles (no other sheep bones were found) suggests a careful and structured assemblage surrounded by some of the products and processing tools used in the mines. Whether the sheep mandibles were an offering or a totemic reference is unclear, but their structure recalls many of the so-called 'idols' and 'magic piles' recorded by both Catlin and Bodmer amongst the early 19th-century Plains tribes. More contemporaneously, the animal-bone assemblages recovered from the mines parallel those placed in the ditches of causewayed enclosures (eg Pryor 1998 13–69; Whittle *et al* 1999, 381), emphasising the similarities between the mines and other special sites.

No such structured deposit was discovered in Shaft 27, although the 'Clearing in South section' did produce an antler pick, two knife flakes, and what was probably a bird bone. The incorporation of avifaunal remains in this deposit recalls that found in one of the galleries of Greenwell's Pit at Grime's Graves where a phalarope skull (*Phalaropus sp*) was placed between a pair of antler picks with their tines facing inwards, and a ground stone axe of Cornish origin was found at the base of the picks (Barber *et al* 1999, 66). This latter assemblage was placed in one of the few galleries that had ground stone axe marks cut into its walls. In a broader context, the remains of white-tailed eagles (*Haliaeetus albicilla sp*; currently the largest north-European raptor) were found at the Coneybury henge (Richards 1990, 129, 153) and Isbister tomb (Hedges 1984, 144–7), and a wide range of bird remains were recovered from the chambered cairn at Quanterness (Renfrew 1979, 138–143). These examples suggest that some of these may have played a totemic role in structured deposition – perhaps referencing sky deities. It is unnecessary to rehearse the deep symbolic roles given to different species of birdlife by Native American communities. The placing of avifaunal remains symbolising sky-borne deities within the depths of the earth, if ethnographic correlates are appropriate, could signify the meeting of concepts such as 'Father Sky' with 'Mother Earth' and have become a loaded metaphor for fertility and renewal: an equally imbued artefact may have been the chalk phalli placed in many mines. What is interesting about the juxtaposition of these artefacts in the flint mines is the combination of extraction tools, finished tools, and bird remains – arguably just the type of assemblage that might form a 'medicine bundle' in a Native American context. Certainly the juxtaposition of artefacts and their depositional context must have imbued these deposits with a diagnostic significance and social power relevant to the mines, miners, and earth deities. Such depositional histories would seem to demarcate separate event-horizons and illustrate strong elements of repetition as meanings were created and reworked, replaying processes of social renewal in the mines.

Although the assemblages discovered in the fill of Shaft 27 at Cissbury were impressive in their quantity and range, the female inhumation found on the basal silts is arguably the most important facet of the record. The presence of a female opens interesting questions about gender and the role of women in the mines. Considering that a second female skeleton was recorded by Lane Fox (1876, 375) near the base of Shaft H (or No 1 escarp shaft), although in this case it may have been an accident victim (the remains were found head-first down the shaft), contrasts with only one male burial from this site found in Shaft VI roughly 16ft (4.9m) below the surface (Park Harrison 1878, 431). Although the Cissbury remains could not be claimed as statistically

significant, they do demonstrate that access to, or association with these mines, may not have been as restricted as many of the Native American examples which are age and sex specific. The English mines may have been more complex socially, with a variety of gender roles. As yet there is little evidence for the association of children with flint mining.

The Cissbury skeleton represented the remains of a *c.* twenty-year-old individual and was discovered 'laying (sic) with legs flexed right across the entrance to West gallery: underneath collapsed arch. SHe (authors caps) was killed by the fall (of) three very large blocks ...'[5] The skeleton was found lying on her left side facing into the mines with 'Charcoal in his (sic) right hand' and from the 'same level' two chalk 'charms' and a 'fossil like worm' were recovered (Fig 20.3). It is interesting to speculate upon the charcoal, interpreted by the excavator as a torch. The character and species of the charcoal is not recorded, but may equally have been floral – a tribute or offering laid with the deceased. The chalk charms may have been grave-goods and the fossil recalls similar nodules recovered at the Long Down mines that had curious phallic attributes (inf the late Mr K Suckling). Although it is now difficult to reconstruct the exact cause of death, the pathological record could equally be interpreted as a deliberate burial followed by a post-depositional roof collapse. Certainly the evidence of the male burial from the fill of Shaft VI surrounded by chalk blocks and grave-goods (cf Park Harrison 1878, 431) demonstrates that formal burials did occur in these contexts. Placing the female skeleton at the entrance to a gallery and facing into the mine suggests a careful positioning referencing the source of the flint. One of the main issues is the linkage between the deceased and the mines – what role did this individual play in the extraction process, or was she simply buried here because it reflected her social position? Alternatively, the burial may have had a deeper meaning associated with concepts of renewal and fertility as has been suggested for the role of human remains at causewayed enclosures (Whittle *et al* 1999, 386).

The presence of burials demonstrates secondary roles for some mines. The (albeit) small number of burials so far recovered combined with the depositional sequence in the shafts, suggests that certain mines were paraphrasing, conceptually, tombs and barrows, with the mines referencing the burial context with deposits in a vertical 'pseudo-forecourt' and passage. Such a referencing of the individual adds a further dimension to the conceptualisation of these sites, and links the ancestors directly to the source of the raw material, creating associations between them and the mythologies surrounding these sites, thus sedimenting the ancestors not only into the cultural landscape but also into the ritual pantheon. Such depositional practices may have legitimised group claims to the mines, renewed the roles of the miners, and created a sacred geography bridging the past with the present, integrating the ancestors into a seamless continuum where conceptual boundaries were clouded. Creating space and place.

Comparative analysis

It has previously been noted that 'ritual activities involve highly formalised, repetitive behaviour' and that depositional patterns should have 'a high level of structure' (Richards and Thomas 1984, 191). If the ethnographic data presented in section 1 above is revisited, particularly the more detailed evidence recorded at Pipestone, and this is compared with the archaeological record from the flint mines, it may be possible to discern repetitive and structured patterning. Table 20.5 shows the datasets as a linear sequence comparing ethnographic process and material culture with that postulated as 'best fit': from the evidence of the archaeological record.

Although it is clearly difficult to establish the accuracy of the correlations presented below, there does appear to be some concordance between the datasets. This parallel patterning suggests that similar events may have taken place at the English flint mines, and lends further weight to the hypothesis of ritualised extraction.

On a broader perspective, the flint-mine assemblages have parallels at special sites such as causewayed enclosures, megalithic and non-megalithic long barrows, and Grooved Ware pits. For the later Neolithic mines (ie Grime's Graves, but also possibly the South Downs mines) there are similarities with depositional practices at henges. These assemblages are typified by socially restricted artefacts not in general circulation at domestic sites. Considering the longevity of the use-life of the mine complexes, they must also have referenced the ancestral past through sedimenting experience, tradition, and history upon these preexisting loci (cf Morphy 1995, 204). This matrix of a perceived ancestral presence layered with elements of earth symbolism and mythologies created charged foci within the cultural landscape and developed a sense of place designed to maintain aspects of the ancestral lifeways.

The flint mines would have created a sense of continuity and permanency within the context of a changing landscape and the appearance of new monument forms. They would have become a focus for social renewal through the continuing part played, symbolically, by artefacts of mined flint: the miners mediating between the world of

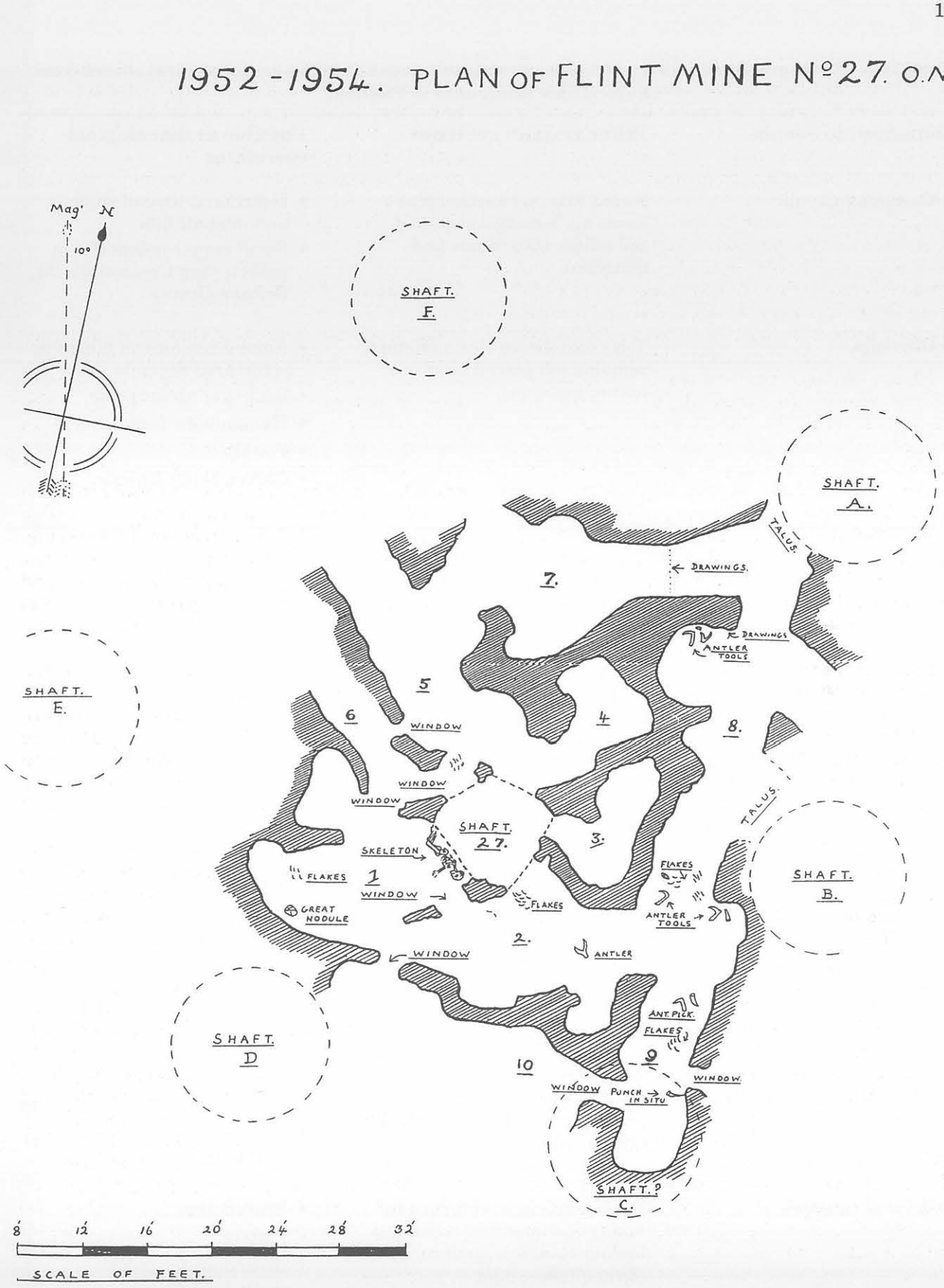


Figure 20.3 Shaft 27, Cissbury. Pull's plan showing the position of the female skeleton lying upon her left side and facing into the W gallery of the mine complex. Note the distribution of artefacts and ?knapping debris in certain galleries

Table 20.5 Ethnographic data for extraction strategies compared to the archaeological record from the Neolithic flint mines in England

Ethnographic events	Ethnographic evidence	Possible archaeological correlates
(1) Cleansing rituals	Sweat lodges; hearths; pipe-smoking; 'smudging' rituals [all adjacent to mines and quarries]	• Hearths at base of shafts and in shaft fills • Small charcoal deposits in galleries (eg Greenwell's Pit, Grime's Graves)
(2) Offerings	Tobacco; tobacco ties; avifaunal remains [all placed near extraction sites]	• Animal remains in placed or structured deposits • Caches of antler picks • Human bone fragments • Pottery • Carved chalk objects
(3) Extraction	Hand tools	• Antler picks, wedges and hammerstones • Ox scapulae • ? ground stone axes
(4) Post-extraction prayers and offerings	Tobacco; tobacco ties; avifaunal remains; graffiti and petroglyphs [all found in and around mines and quarries]	• Animal remains in placed or structured deposits • Caches of antler picks • Pottery • Carved chalk objects • Human remains • Graffiti • Impact marks from ground stone axes • Chalk 'platforms'
(5) Artefact production	Assorted hand tools at work-shop locations; tool production debris	• ? knapping debris in galleries and shafts • Working 'floors' on surface
(6) Ceremonial use of artefacts	Social events and rituals in various locations; artefact groupings and ritual structures (altars, etc)	• Axes in structured deposits • Special groupings of artefacts • Axe hoards in various loci including non-mining sites
(7) Rites of renewal	Broken artefacts returned to mines and quarries; including broken blanks or preforms; offcuts/flakes; dust	• Broken axes • Pottery • Broken antler picks • Chalk 'platforms'

the spirits and ancestors, and that of their own communities – much as others did at the enclosures and tombs. The placed and structured deposits in the mines thus represent a symbiotic partnership between the miners and the earth, a propitiating gift in return for the flint.

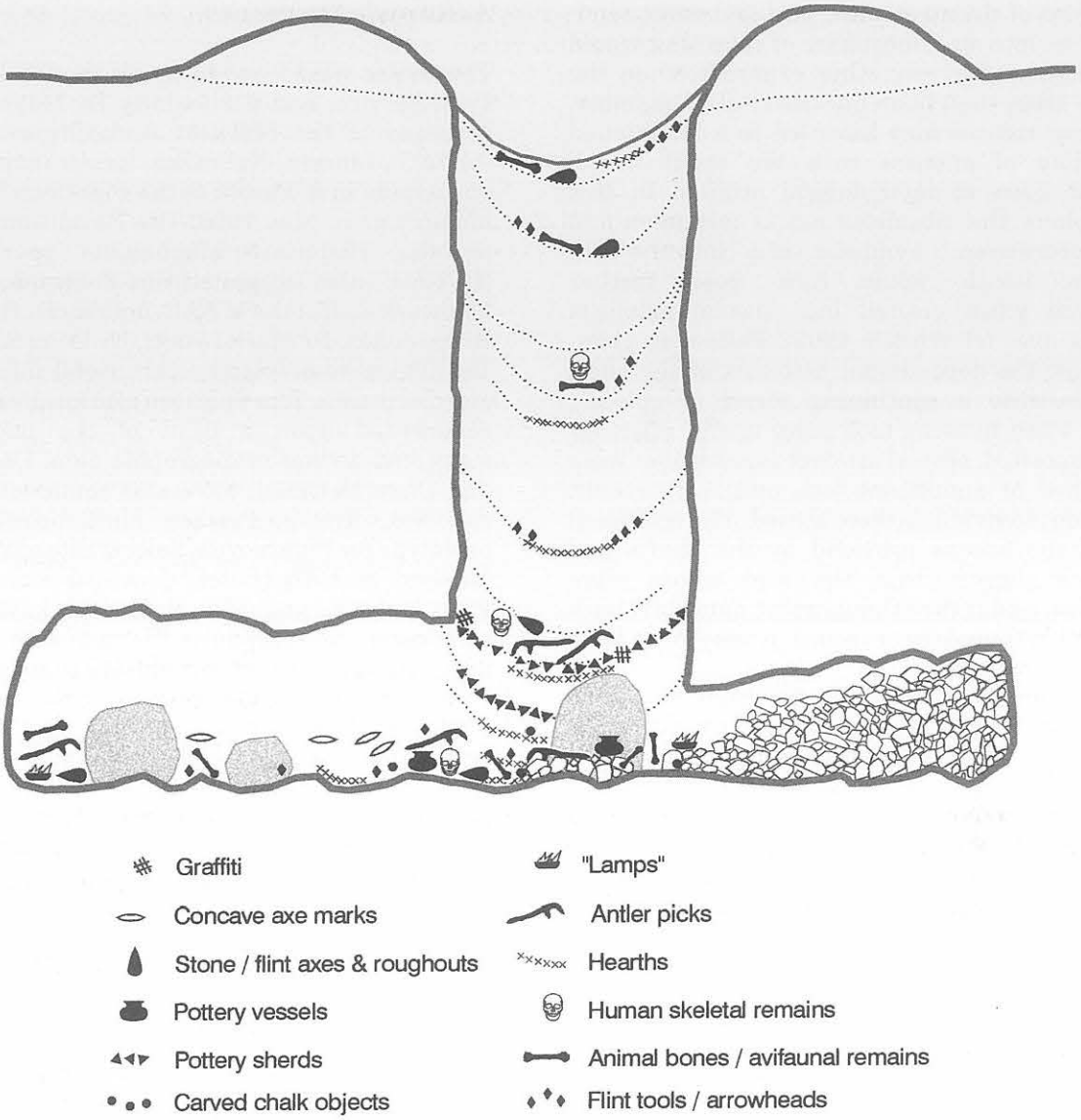


Figure 20.4 A schematic recording the spatial and temporal distribution of artefacts and event horizons in the English flint mines

It is interesting to note that with the exception of the antler picks, most of the resources represented in these deposits are from domesticated species, ie cattle, pig, and sheep, a situation strongly paralleled in the causewayed enclosures (Pryor 1998, 13–69; Whittle *et al* 1999, 386). With the addition of pottery and stone tools, these assemblages recall the innovations introduced by the Neolithic 'package' and may have symbolically formed a metonym designed to encapsulate, holistically, the complete lifeway for ceremonial and ritual purposes.

Conclusion

The observation that surface flint was readily available at most English flint mines suggests that the act of mining was strictly unnecessary for basic procurement purposes. Raw material could be obtained much more easily than by sinking a shaft. The fundamental question is why were mines sunk if procurement did not have a deeper resonance than simple functionalism? The subterranean sources of flint must have been imbued with a greater significance than surface flint and the ritualised extraction may have enhanced its embedded value (cf Weiner 1992, 102), investing it with social power. This is paralleled by the restricted range of raw materials generally used for ground stone-axe production throughout the Neolithic period (Coope 1979, 98), which suggests that similar concepts must have been widely held.

Mining and the act of entering the earth took the participant through a series of transitions passing placed deposits, pottery, animal bones, offerings, and graffiti, into another sensory

dimension of claustrophobic, cool and moist semi-darkness, into an atmosphere of calm that would have been unlike any other experienced on the surface other than in an enclosed burial chamber. Such experiences may have led to a heightened perception of oneness with the spirit world, perhaps even to mythological origins. In this atmosphere the ritualised act of mining would have interwoven a symbolic value into the flint nodules, which would have been further enhanced when crafted into special artefacts such as axes (cf Whittle 1995). Following abandonment, the depositional histories of the shaft fills illustrate a continuing series of episodic events when feasting took place and/or offerings were deposited, special artefact assemblages were positioned at significant loci, and, very rarely, important individuals were buried. The restricted size of the arenas provided by the shafts and galleries suggest that the flint mines were exclusive, and if the ethnographic data correlates with the archaeological record, it may have been socially regulated.

The mining locales may have been chosen or influenced by such rituals as vision-quests or states of altered consciousness rather than purely by geological considerations. This is illustrated on the South Downs where mining complexes (eg Harrow Hill and Blackpatch) were not always located upon the better flint sources but occasionally on adjacent poorer quality deposits (cf Barber *et al* 1999, 73) – thus they must have been chosen for other non-utilitarian reasons. In addition, the apparent lack of evidence for domestic habitation (cf Barber *et al* 1999, 58–61) may suggest that the mines were not continually inhabited but were special places, liminal to the areas of settlement and field systems, sites to which the miners travelled at significant times. Tradition may have prohibited domestic activity, as at Pipestone, to maintain a sacred space surrounding the mines.

Overall, the richness and variety of the evidence recovered from the English flint mines (Fig 20.4) strongly suggests that ad hoc flint extraction did not take place. The mines were not simply the source of a utilitarian raw material – they were much more important than that. The flint mines played a unique role as the origin of a symbolic stone derived from the psychological interface between the living communities and their gods: as such they became a marked focus in the cultural landscape. Mined flint may have become a 'tool' for mediation between the living communities and the spirit world, creating a means by which to stimulate both renewal and social control through the agency of carefully curated artefacts.

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Notes

1 The Three Maidens are a series of glacial erratics traditionally associated with the guardian spirits of these quarries (cf Hughes 1995, 22–6).
2 Data taken from Pull's unpublished manuscript held at Worthing Museum and Art Gallery: 'Diary and Field Notes of Survey and Excavations at Cissbury, Sussex'.
3 Pull was killed during a bank robbery at Lloyds' Durrington branch in 1961 before he had completed his excavations. Many of his projects had been written up for publication and the archive is held at Worthing Museum and Art Gallery.
4 Norfolk County Records Office: 21198.
5 Account taken from Pull's excavation diary. The skeleton was first discovered on the evening of Wednesday 27 May at 7pm, backfilled, then fully excavated on Friday 29 May. (Pull Archive, Worthing Museum and Art Gallery)

21 Trans-manche: l'entente cordiale or vive la différence *by Ian Kinnes*

'... *a situation in which Potemkin villages have traditionally thrived* ...' Kinnes 1988

Background

In preparing this paper I have been driven back to a century or more of literature, and to much the same effect as expressed in earlier papers (notably Kinnes 1985; 1988) and will therefore not attempt to repeat their message or dogma. Suffice to say that despite a longer archaeological tradition of observation, excavation, and collecting in Britain, we retain a sense of insufficiency; however brave the declaration of insular process we retain a component of envy for abroad: they certainly tend to have a lot more material to process, a lot more contexts to define, but then they would, wouldn't they? The 'Anglo-Saxonne' perception is largely drawn from Anglophone publication of selected European highlights, visionary perhaps but lacking breadth or bottom; we could, but largely do not, do the same for Britain.

This volume is parochial in purpose and intent and rightly so; that piece of Britain closest to Eurasia has rested until recently without the context provided by a long topographic tradition, as notably and infamously in Wessex, and secondarily in various other uplands, particularly those accessible by low gradients.

As I am sure other contributors will be providing explanatory historical contexts for their local surveys, I shall simply indicate here a relative assessment of the information base. Until recent extensive salvage work, the Kent Neolithic has been notoriously sparse in evidence and we are beginning to see the same kind of transform accomplished in Essex and the Thames Basin in the last 30 years. Regional views derived very much from the Chalk uplands with the enclosures, barrows, and mines of Sussex to the forefront in the inter-war years as perceptions of the Neolithic began to be formalised (Piggott 1954). When recourse was sought for parallels in more or less adjacent parts of the continent these were seen explicitly as sources, ie offshore islands must have been the last phase of colonisation ultimately deriving from Childe's land-winning Danubian peasants. Thus causewayed enclosures, rectangular houses, and flint mines were known for the Michelsberg, and long barrows without chambers in the Manio series in Brittany. Plain bowls were part of the Western Neolithic family and the Hembury trumpet-lugs could be found in Brittany. Antler combs were matched on Michelsberg sites. Whilst the operative model for the definitive work (Piggott 1954), there were clearly misgivings, suggestions were made for a source area between Belgium and Brittany where unfortunately little evidence was available. Chambered tomb origins lay along the Atlantic coastline, notably in Brittany whose rich and extensively published inventory could provide a match for just about anything. For later ceramic traditions the rustic appearance of Peterborough invited TRB derivation, and the more novel and formal Grooved Ware southern France or even Spain. This précis of Piggott's magisterial work (1954, and full references therein) does not seek to deride or invidiously compare the heights that current perceptions have reached but it does demonstrate that archaeology consists in finding things and the accruing database gives us less and less excuse.

This discursus on matters familiar from elsewhere in this volume is a prelude to an assessment of what positive or negative record might exist for links to continental Europe, focusing on our nearest neighbours. For the wider picture north-west Europe is taken here to comprise France north of the Loire and to the eastern limits of the Paris Basin, the Low Countries, Friesland and Schleswig-Holstein, essentially the maritime limit of the North European Plain and the east side of Doggerland (Coles 1998). With the exception of the Armorican Massif, a relatively rugged igneous terrain, the zone is essentially low-lying with mainly fertile soils on a sedimentary base and thus closely comparable to south-east England.

The early Neolithic circumstance from *c* 5000 BC is fundamentally that of Bandkeramik and its derivatives, largely based on riverine loess soils; elements of an extensive Atlantic tradition are increasingly detectable in Brittany (Constantin 1985; Whittle 1996; Boujot and Cassen 1998). The former vision of expanding, implicitly more successful, farmer-colonists pushing hunter-gatherers to the coast and finally eradicating their tradition can increasingly be seen as a simplistic model based on a combination of two factors: the relative invisibility of the 'Mesolithic' beyond flint scatters and a determinist view that food production, while quintessential to what passes for civilisation, has an innate superiority to any other economy, with implications, both capitalist and Marxist, for social interpretation. The current perceived reality is much more

complex across a broad and fluctuating spectrum of cultural and economic interplay. This assertion of the 'Mesolithic' role in the establishment of the full-blown 'Neolithic' can, obviously, and does, sometimes, run the risks of Golden Age assessment, a cyclic phenomenon of the Noble Savage from the Enlightenment to political correctness. This paper will not rehearse an increasingly familiar literature.

Material culture

In the search for cross-channel connections one should begin with the most tightly defined part of the record, the artefacts. In the millennium or so between the appearance of ceramics to east and west of the North Sea, the mainland tradition is predominantly limited in range of form and size but with often complex impressed and incised decorative schema. Despite the occurrence of such close to the littoral, not a single related sherd has ever been found in Britain.

Special pleas might be made for sites lost to rising sea level along the vulnerable east coast or now beneath metres of alluvium but the former is unproveable and for the latter extensive dredging has produced early pottery from the lower reaches of the Seine but not from the Thames. After 4000 BC, increasingly confirmed by secure radiocarbon determinations, plain wares, with a strong component of shouldered bowls, dominate the west and offshore, a widespread tradition given early recognition.

Familial relationships, estranged as they might be, would seem to exist across the Channel, notably with the Michelsberg group between Seine and Elbe; it is however worth remarking that distinctive aspects of the latter assemblage – the 'baking-plates' and necked 'Beakers' are entirely lacking in Britain. Britain, by whatever means, acquired the idea of pottery as a novelty, not as a product of a long-standing local tradition, but to this idea, maybe no more than a new need for a porringer or marmite but probably oversailing that, must be added that of a new technology, apparently not previously deemed necessary. This technology involves the transforming of natural materials – clay and the processing of fillers – then the creation of controlled firing temperatures. We shall return to the process of transmission of knowledge since it bears on the entire matter of ultramarine linkage.

Staying with pottery for the later stages of the insular Neolithic, past claims, when the archaeological world was younger, few contexts good, and chronology often speculative, have been made for a European perspective on the Peterborough tradition: '... an indication of settlement in south-east England by people arriving by sea from Scandinavia and sharing with the late Mesolithic inhabitants they encountered on arrival a common ancestry and many common traditions ...', thus the Secondary Neolithic. Current opinion would see purely insular development from decorated-bowl traditions, perhaps on a regional basis. Grooved Ware has its own internal mechanics. Insular pottery awaits better understanding and resolution at the local level without recourse to the external; nonetheless the increasing trend to more complex vessel forms and elaborate decoration after *c* 3500 BC seems universal on both sides of the Channel. The single sherd from the Michelsberg mining and domestic complex at Spiennes which has been claimed as 'Peterborough' (Verheyleweghen 1964) does not stand close scrutiny by identification or context and can safely be laid to rest.

Mention should be made of two finds of TRB sherds in England, both without context; those from the Durham coast (Childe 1932) have the appearance of a collector's type-series, three from 'a field near Orpington' are less obviously so (Cook 1937). Sheridan (2000 and pers comm) has recently made wide-ranging claims for connections between the Armorican Massif and western Britain vested in a decorated bowl from Achnacreebeag and its perceived affinities with the Castellic ceramics of the earlier fourth millennium; after extensive discussions the present author has agreed to differ, whilst applauding continued essays at an international perspective.

On pottery three final notes are needed. The first is historical: the trumpet-lug most notably attached to Hembury-style bowls once reinforced Breton connections but can now be seen to be an occasional component of several French groups of several different dates. The second is one of absence: in the Rhine delta and in Jutland what would seem to be thriving forager groups, apparently riverine/marine-resource based, although adjacent to farmers did not convert for some centuries to the new mode (farming products may have been exchanged and consumed but peasant labour was not on the agenda); the same applies to close-offshore Britain but here there is no Swifterbant or Ertebolle-Ellerbek-style pottery, a selective acquisition from the new array on those frontiers but not on this. Again, as with the absence of Bandkeramik tradition here, post-depositional factors might be invoked (Swifterbant is a relatively recent discovery: Raemaekers 1999) but on balance absence is persuasive.

The third, whilst we contemplate the cousinly relations of west European plain bowls, is the curious case of the vase-support, once thought on circumstances of retrieval from the odd passage grave as emplacements for bowls with offerings for the dead, but now with a database massively expanded by excavation and more international cooperation visible in many other and much more widespread contexts as far as the Rhine (inf Cassen), eliding into recent literature as the more-valued cross-cultural iconic coupe-à-socle;

Britain alone, with its new sociology of ceramics, did not seem to have a need or use for them.

Next, flintwork: broadly speaking blade industries predominate and there can, unsurprisingly, be difficulties in distinguishing new and Mesolithic traditions. There are two prime novelties: the bifacial pressure-flaked leaf arrowhead and the wholly or part-polished axehead. Piercing arrowheads are known in Roessen and Michelsberg contexts in the fifth to fourth millennium but these are squat and normally only edge-trimmed. Transverse arrowheads are much more common throughout the European Neolithic sequence; in Britain assigned to Mesolithic or later Neolithic. Leaf arrowheads are intrinsic to the recognisable early Neolithic in Britain but would seem very much an insular development; I (1988) have vaguely suggested linkage to the prestige of archery.

Polishing of axeheads is known for the Irish Mesolithic but has yet to be demonstrated for Britain; polished stone was, of course, one of the earliest and prime definers of the 'New Stone Age'. The extent of polishing beyond the cutting edge often exceeds functionality, and tranchet blades seem to have been good enough for Mesolithic tree-felling and timber working. Again here as with fine pressure-flaking and (some) fine pots, new technologies and presumably new symbolic systems are visible.

As to external connections axes fall into three categories. Five examples of Group X, usually assigned to the prolific Seledin source (Le Roux 1979) although recent work (inf Chancerel) suggests that such dolerite is widespread in the Armorican Massif, are known from Southern Britain, including two from Hampshire; all are surface finds. Another exotic source is represented by a pan-British scatter of axes of southern Alpine jadeite and nephrite; ten examples are known from the South East as casual finds (Jones *et al* 1977; Woodcock *et al* 1988). Britain here is attached to a west-European distribution and a sealed find of the early fourth millennium at the Sweet Track assures that not all casual finds need be modern losses. Finally there are the 'Scandinavian' flint axes recorded from various parts of Britain, nine being known from the study area (Piggott 1938) with a fragment from the mound at Julieberries Grave and claims for a dagger-axe association in a now-lost find from Ramsgate. Essentially any rectangular-sectioned blade has been placed here but even if genuinely exotic, recent collection losses cannot be ignored (Pitts 1996).

Certainly, as some at least of the jadeite axes show, Britain was within some sort of west-European distribution in the fourth millennium, whether by trade or exchange, and the apparent particular value carried by axes, especially the recognisably exotic, might argue for participation within a wider social network (cf Bradley and Edmonds 1993; Edmonds 1995). Petrological and typological studies of axes on the continent have not been geared to the recognition of any British imports.

On a further point it is worth remark that no Grand Pressigny products found their way across the Channel although prolific and widespread in west Europe (Mallet 1992). Equally the schist and greenstone bracelets, often found as special deposits in a variety of fifth–fourth-millennium contexts, are absent.

The majority of the material culture lacks specific identifiers which might engender a hunt through European collections. Rare antler combs, whatever their function have rarer congeners in Belgium.

Monuments

As in Britain the record has been greatly enhanced by continuing aerial prospection and to some extent by salvage excavation. Without falling into the trap of form equalling function it is convenient to use some basic shorthand.

Causewayed enclosures, not certainly a feature of the insular Neolithic before *c* 3500 BC, are widespread in Europe between the fifth and third millennia. As in Britain, layout and structural history range from simple to complex with deposits, often recognisable as 'special', of artefacts, animal and human bone, and burials. Although no such explicit warfare episodes, as at Hambledon and Crickley, have yet been identified palisades are not infrequent and some had been burnt down, though not necessarily by malice (Burgess *et al* 1988).

Non-megalithic long barrows within west Europe are not frequent but many characteristics are shared with the better-known examples in the Nordic zone (Midgely 1985; Kinnes 1992). Recent trial excavations at Le Sarceau, Orne (Chancerel and Desloges 1998), have produced a turf mound and overall plan which would not be out of place in southern Britain and the greater visibility of megalithic structures might obscure the occurrence of other examples.

The frequently agreed house-long barrow transform (Hodder 1990; Kinnes 1992) is regionally explicit for the Cerny group at the start of the fourth millennium and here, and presumptively elsewhere, is the background for the regional diversities of the subsequent period. The Medway group of stone chambered mounds has been seen in the past as evidence for direct contact with Dutch or north German traditions (Daniel 1950) but more recent assessment would simply see a more durable version of organic structures enabled by accessible sarsens of suitable size.

For other monument forms in Britain such as henges and cursuses there are no known continental parallels.

If it may be forgiven it is convenient to mention flint mines here. In suitable geological conditions they are known in Europe from the fifth millennium onwards sharing the unsurprising characteristics of intensive exploitation and on-site primary processing (Weisberger 1999).

Economy and settlement

Insular archaeology often bewails the rarity of houses, let alone villages, in the Neolithic, a circumstance partly alleviated by Darvill (1996). Recent chance discoveries such as that in the Medway or the major complex of structures revealed by controlled excavation at Runnymede show that the record can only increase. Envious eyes cast across the Channel are too often chronologically unfocused or using small-scale atlases. For the study area after the end of the Bandkeramik longhouses the record becomes quite sparse with sporadic occurrence of usually isolated rectangular houses, much as contemporary Britain (Coudart 1998). Whether this indicates comparable land use remains to be seen although permanent settlement is taken as read whereas some recent Anglo-Saxon literature veers towards the nomadic in more senses than one (cf Thomas 1999). On both sides much depends equally on intensifying survey and chance discovery. Pits, as ever, are more prolific with a growing realisation that the British obsession with 'ritual' or 'placed' deposits might go far to explain some particular observations (Cassen pers comm).

For fourth to third millennium economies the basic inventory is much the same, with on both sides a great need for analysis of larger assemblages on the regional scale.

What argument can therefore be made for population movement across the Channel, unfashionably colonisation? We must begin with the basics. Domestic animals are not known in Britain before 4000 BC and after that there is no evidence for local domestication; the likely source therefore is from existing herds on the opposite shores. Equally domestic plants derived externally. Pottery too is a novelty and had a long tradition of manufacture across the Channel. What these share is a new knowledge: subsistence based on a different relationship with the food source (obviously former procurement skills did not die out) and a pyrotechnology of transforming materials. On the practical level these are not skills learned overnight or by hearsay. Arguments have been made in the past for an optimising late Mesolithic, in places resisting peasantification for some while, and perhaps widely connected by coastal navigation. Whilst the concept is tempting and certainly lends itself to the complexities of hunter-farmer interaction, still undervalued, it suffers from lack of evidence save in two micro-regions (both, however, note, with good organic preservation which does affect perception). A certain level of awareness of some knowledge may have been onwardly transmitted, perhaps even beginning to alter symbolic systems but evidence is lacking. This does not just apply to Britain for there is a growing awareness elsewhere of the actual and potential complexity even in areas where simple replacement had seemed the evident model.

It is difficult to escape the conclusion that the means of transmission was by people from within a developed tradition, simply movement by farmers across the Channel. These do not need to have been extensive nor from one specific source and a Mesolithic population already conscious of change might have been receptive to the new economy and the concomitant embedded symbolism of new technology, recalling that basic flint industries remained essentially unchanged. The mechanism is, however, less than clear.

Causewayed enclosures, long barrows, and flint mines are basic to the Western Neolithic (if that term might be used as shorthand). Flint mines, like the axe factories, are essentially associated with the desire for a consistent supply of high-quality raw material, such as could be found only sparsely in surface deposits. Again, whilst the technology of digging the shafts is not exceptional, a certain degree of acquired geological knowledge is needed and we cannot discount the process from a complex of belief systems (Barber *et al* 1999). Long barrows belong to a greater European family but are distinctively insular in internal structure; region by region there is no one to one transmission; after the possible precursors such as the Passy-Rots format (Mordant 1998) or houses themselves collapsed into linear mounds, we cannot point to the precedence of one province over another; certain apparent close parallels such as forecourts need be no more than a reflection of format and usage. Causewayed enclosures are again widespread, of some ancestry and a focus (as they must be) of recurrent social practices expressed by, archaeologically, preserved material in contexts which reify the familiar.

Now, where does this leave us? The many available radiocarbon determinations can be used only broadly, in rolling quarter-millennium blocks at best and then with critical assessment of each sample. This is not sufficient to describe the insular process in terms of the relative precedence of this 'package': are flint mines, say, as early as cattle, or is this, famously a non-question deserving a non-answer? It is easy to look across the Channel and visualise those neat regional cultures of 4000 BC in a form which would satisfy Childe's criteria; the truth is far from that: we might as well go back to the Windmill Hill culture. The complex and shifting realities of these on the ground increasingly

enforce the micro-regional approach just as in Britain; the conceptual difference has been the apparent security of established traditions and detailed pottery sequences to bolster them and the shock of the new for Britain.

The package might be seen as a once and for all implantation, gaining ground variously in its components between one region and another, its identifiable elements those of a developed and interdependent belief system. Inevitably the degree of visibility depends on many factors too tedious too rehearse here. It is worth saying, however, that the 'Neolithic' of north and west Britain seems as early as that of the south and east and unless we are to return to the vision of variously-equipped flotillas embarking on the same timetable from all ports between Roscoff and Esbjerg we must reconsider, on both sides of the Channel, what is the motive and mechanism of the Neolithic and what is its relation to the invisible Mesolithic? The other point, which must bear on this process, is the absence of provable contact with the continent between this early Neolithic and the currency of Beakers; some axes may have been circulated but nothing else remains. The widespread SOM tradition, variously visible from Brittany to the Rhine is unremarked in Britain nor did the quiddities of Grooved Ware impinge on the continent. Either our understanding of the evidence of contact is flawed, but artefacts are a normal procedure, or in the post-epiBandkeramik cultural reshuffle and wider land uptake Britain was for a while ready or vulnerable but why? Entry into a common market can be, as we know and sadly, all too brief before insularity prevails.

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Index

Numbers in italics refer to figures, captions and tables.

Abingdon causewayed enclosure, Oxfordshire 120, *121*, *122*, 159, 160, 162
Abinger, Surrey 159
Achnacreebeag bowl 192
adzes 155, 156
aerial survey 3, 71–75, *71*, *72*, *73*, *74*, 154, 193
agriculture 29, 36, 37, 156, 161, 173
  monuments and 168
alder 24, 25, 41, 42, 55, 94, 124
Alfriston, East Sussex:
  'long barrow' 169, 171
  oval barrows *111*, 113
Amazon river 155, 156
Amberley Wild Brooks 25
Amerden Lane West *86*, 93
Ancient Monuments Protection Act, 1882 *4*
Andrews, Gill 105
animal husbandry 25, 27, 34, 36
Antiquity 6
Apache people (USA) 180
Armorican Massif 193
arrowheads 22, 27, 44, 99, 193 *see also under names of find sites*
Arun Valley 25
Ascott-under-Wychwood 93
Ashbee, P 5, 110
aurochs 151, 157
Austin, P 159
Australia 161
axes:
  Continent and 193
  distribution maps 154
  flint 2, 26
  forest clearance and 156
  ground 27
  Group X 193
  jadeite 27, 115, 193
  Mesolithic 26, 28
  Neolithic 26, 27, 28, 84, 193
  polished stone and 193
  preform 27
  roughouts 27
  'Scandinavian' 193
  as symbols of wealth 27–28
  tranchet 26, 156
  see also under names of find sites

B&Q site, Southwark 47, 48, 58, *70*
BAA plc 105
Badshot Lea long barrow 9, 110
Bandkeramic 191, 192, 194
Barber, M 6
Barkhale causewayed enclosure *121*, *122*, 173
Barking Creek 64
Barking Reach *56*
barley 34
Barleycroft 91
Barn Elms 133
Barnwood Court, Silvertown 47
Barrett, J C 105, 163, 173
barrows:
  burial and 168–71
  cemeteries 76
  USA 159
  water and 159
  see also following entries
barrows, long (Neolithic) 9, 71, *71*, *73*, 160
  burial and 99, 110, *111*, 122, 169–71
  as community markers 170–71
  Continent and 193, 194
  as landscape markers 170
  long houses and 169, 170, 193
  meaning of 169–71, 174–75
  origin of 169
  as 'symbolic houses' 170
barrows, oval:
  Dorney area 84
  Isle of Thanet 76–81
barrows, round (Bronze Age) *8*, 25, 72, 76, 84, 98, 113, 155, 161, 162
  ploughed out 76 *see also* ring-ditches
Beaker remains 45, *47*, 58, 76, 77, 79, 133, 195
Beaumont, G F 10
beavers 26
Beckensale, S G 12, 13
Beckton 41
Belgium 32, 191
Belle Tout, Sussex *30*, *32*, 34, 35, *35*, 157
Berkshire 72, 99, 103
Bermondsey Island, London 38
Bermondsey Lake 47
Betchworth, Surrey 164–67
birch 24, 25
bison 157
Blackpatch flint mine 162, 181, *182*
Blackwater Estuary, Essex 33
Blackwall, London 50
blades (flint) 20, 26
Blue Bell Hill, Kent 71, *72*, 160
bone 'scoop' 149–53
Boughton Aluph, Kent 160
Bourne Mill, Farnham, Surrey 159, 162
Boveney 99
bowls:
  carinated 84, 89, *90*, 92
  decorated 89, 192
  plain 89, 93

Box Hill sandpit 164
Bradley, R 76, 162, 169
Bramcote Green 57
Bramcote Grove, Bermondsey, London 38, 41, 46, 48
Bray 94, 96, 97
Brede Valley 25
Briar Hill causewayed enclosure 115, 116, 118, 119, 120, *120*, *121*, *122*
Brightlingsea, Essex *112*, 113
British Museum 131
Brittany 32, 191, 192
Broadstairs, Kent 77, *78*, 79
Brook Farm, Berkshire 101, *101*, *102*
Brookway site, Rainham 47, 48
Broome Heath, Norfolk 100, 103
Brothwell, D 114
Brown, A 159
buckthorn 42
Buistra and Charles 159
burins 20
Burrin, P J 36
Burrows Hill, Greater London 106, 108
Bury Farm, Bedfordshire *30*, 34, 36
Bury Hill causewayed enclosure, West Sussex *111*, *120*, *121*, *122*, 173
Butlers Wharf Estate, Southwark, London *69*

Caesar's Camp, Heathrow 145, 146
Camden, William: *Britannia 8*
Canada Water 45
Canning Town 60
Cannon Hill, Berkshire 84, 92, 94, 96, 99
Canvey Island 59
Carn Brae, Cornwall 33:
causewayed enclosure *121*, *122*
Carstairs, P 84
Catlin, George 178, 179
cattle 32, 149, 157
causewayed enclosures:
access to 121–22, 123, 174
aerial survey 72, 73
ancestor veneration and 173
architecture of 118–22, 123
artefacts, spatial patterning 115–16
burials 121, 122, 173
completion and 174
complexity 119–21, *121*, 122
Continent and 193
dating 115
deposition practices 123, 189
design of 119–20, 173
ditches 119, 121
excavations 6–9, 26
human remains at 186
Kent 11
landscape and 174
meaning of 169, 172–75
overview, first 6
planning of 119, 122
positioning of 119, 120–21, 122
as project 174
remodelling of 174
reuse 162
rituals and 122, 123, 172–73
settlement 123, 173, 174
social groups 173, 174
structures 122, *122*
Sussex 6
understanding 168
water and 159
see also under names of find sites
cave sites 36
Celtic fields 161
cereals 25, 28, 42, 156, 161
Cerny group 193
Chalk Hill, Ramsgate, Kent 76
Chalk, the 154, 156, 157, 159, 160, 161, 162, 170, 173, 174, 175, 191
Chambers Wharf, Bermondsey, London 145
channel tunnel rail link 47, 71
charcoal 34
Charlwood, Surrey:
dating 17–18, *17*
excavation 13–15, *14*
flints 13, 14, 15, 16, 18–22, *19*, *21*, 22
pits 13, 14, 15–16, *16*, *17*, 18, *18*, *21*, 22
pottery 14–15
site *12*, 13, *14*
topography 13
visits to site 22
Chelsea club 124–27, *125*
Chestnuts, Kent 110, *111*, 113, 160
Cheyenne people (USA) 177–78
Cheyne Walk, Chelsea, London 124
Childe, V G 191, 194
Chilterns 36, 162
Chisenbury, Wiltshire 35
Church Hill flint mine 162, 181
Cippenham, Slough, Berkshire:
bone, animal 100, 101
excavations 99
flints 99–100, 101–2, 102–3, 104
geology 99
location *100*
monument sites 103
Neolithic settlement 99–104
pits 104
pottery 99, 101, 102
tree-throw holes 92
Cissbury flint mines, West Sussex 3, 4–5, 28, 154, 162, 181, 183–86:
artefacts 183–86
bones 183, *183*, *184*
flints 184
inhumations 185–86, *187*
Shaft 27 183–86, *187*
symbolic depositions 185–86
Clacton, Essex 10, 11, 158
Clark, Grahame 6
Clarke, D L 79
Clay, P 1
Cleal, R M J 133

Clinch, G 3
club, Chelsea 124–27, *125*
coast:
  changes in 157
  spiritual aspects 157–58
Coffin stone 160
Coldrum, Kent 110, *111*, 114, 160
Coldrum long barrow 71
Colne River 149, 159
Colne Valley 99, 105, 108, 109, 115, 153
Combe Haven Valley 25
Combe Hill causewayed enclosure *121*, *122*, 174
Coneybury 91
Coneybury henge 185
Continent: links with 10, 27, 28, 191–95
cores (flint) 20, 26
Corney Reach, Chiswick, Greater London 145, 154, 161
Cornwall, Dr I 29
cosmology 162
Cossington, Kent 160
Cotton, Jon 3, 4, 9, 166
Countless Stones, Kent *5*
Courage Brewery site 57
Court Hill enclosure 173
Cranford Lane, Harlington 146
Crawford, O G S 6
cremation 110, 113, 167
Crickley 193
Crockett, Michael 147
Crofton, Wiltshire 159
cropmarks 3, 72
Crossness 41
Crouch site 59, 60, *66*
Culling Road, Rotherhithe, London 38, *66*
cursus monuments 73, 76
Curwen, E C 1, 6, 9, 154
Custom House, Greater London 47, 48, 145

Daladies, Angus 29, 34
Darent river 160
Darvill, T 194
Deerleap Wood, Surrey 155, 162
deer 157, 161
Devil's Kneadingtrough, Brook, Kent 156
Devils Punchbowl, Surrey 162
Devoy, R J N 41, 50, 53, 58, 59, 60
diatoms 41
Dimbleby, Professor G J 29
Din people 180
Dorking, Surrey 160
Dorney area, Buckinghamshire:
  archaeological context 82–84, *83*
  axes 90, 97
  Beaker period 98
  bones, animal 90, 91, 92, 97
  bones, human 91, 97
  burials 97
  cattle 91
  causewayed 96, 97
  cereal 90, 91, 96
  dairying 91
  dogs 91
  environment development 84, 85
  excavations 84–85
  finds 84–94
  flint 89–90, 91, 92, 93, 94, *95*, 97
  hazelnut shells 91, 92
  Mesolithic 94, 95
  middens 85, 85–91, 95, 96, 98, *98*, *99*
  mortuary 97
  Neolithic landscape 82–98
  pigs 91
  pits *89*, 91–92, *93*, 96
  pottery 85, 89, 90, 92, 96, 97
  project results 84–85
    interpretation 85–98
  quernstones 90, 91
  radiocarbon dating 91, 94, 96
  ring-ditches *89*, 97
  settlement 89, 90, 94, 95, 96, 97, 98
  sheep 91
  sites *86*, *87*, *88*
  tree-throw holes 85, *88*, 91–92, 96
  woodland clearance 94, 96, 97, 98
Dorset 3
Douglas, James 3
Dovercourt, Essex 10, 158
Downman, Revd 154
Drayton Cursus, Oxfordshire *30*, 33, 34
Durham coast 192
Durrington Walls, Wiltshire 166–67

East Bedfont, Greater London 154
Easton Down, Wiltshire 32, 35, 36
Ebbsfleet Valley *66*
Ebbsfleet Ware 10, 11, 85, 90, 91, 92, 93, 94, 101, 116, 118, 119, 133
Eden Walk, Kingston 45
Edmonds, M 159
Ehenside Tarn, Sellafield, Cumbria 126
Ellaby, R L 155
elm 24, 25
elm decline 25, 42
Elmstead, Kent 160
enclosures, Neolithic 73, 76, 172–74 *see also* causewayed enclosures
Enfield 40
English Heritage 71 *see also* RCHME
Environment Agency 82
environmental changes 25
Erith, Kent 38, 40, 60
Essex 10, 29, 71, 110, 157, 158, 191
Eton College, Berkshire 82
Eton Rowing Course (Rowing Lake), Buckinghamshire 82, 84, 85, *87*, *89*, 90, 91, 92, 93, 94, *94*, 95, *95*, 96, 97, 98, 154
  soil study *30*, 31, *32*, 34, 35, 36
Eton Wick, Berkshire 84, 96, 99, 146, 159, 160, 162

Etton causewayed enclosure 115, 116, 121, 122
Europe, continental: links with 191–95
eustatic changes 24, 25
Evans *et al* 91
Evans, J H 160
Evans, Professor J G 29
Evershed, Professor Richard 91
excarnation 110, 118, 171

farming 27, 45
Farnham long barrow, Surrey 160
Faussett, Bryan 3
Fengate Ware 92, 97, 166
Field, David 3, 4, 9, 165
fields:
  Celtic 161
  layout 161–63
  significance of 162
fish trap 124
flax beaters 126
flint mines 4–6, 27, 28, 156, 168, 171, 194
  ancestors and 186, 188
  burials in 185–86
  children in 186
  comparative analysis 186–89
  Continental 194
  depositions 181–86, 188–89, 190
  ethnographic comparisons 177–90, *188*
  meaning 171–72, 174, 175, 181–83, 189–90
  as monuments 172
  Native American 177–80, *188*
  occupation of 182, 190
  pottery in 182
  reason for 189–90
  regulation of 190
  ritual and 182, 186, 190
  shafts 171–72, 174, 175, 181, 182, *182*, 183–85, *183*, 184, 185, 190, 194
  significance of 171–72, 181, 189–90, 194
  social aspects 186–87
  spiritual aspects 160–61, 186–87, 189–90
  surface availability and 189
  symbolic meanings 185–86, 190
  women in 185–86
  see also following entry and Cissbury flint mines, West Sussex
flints:
  abundance of 3
  analysis 26–27, 28
  burnt pieces 20
  Continent and 193
  knapping 177, 180
  Mesolithic 14, 15, 16, 26–27
  Neolithic 26–27, 85
  ritual and 177, 179, 181
  as sacred rock 160
  social control and 180, 181
  sources 26
  surface finds 3, 4
  technology 26, 27, 181
  uncertainties surrounding 3–4
  see also preceding entry and under names of find sites
Ford, Steve 84
forests:
  burning 155
  clearance 25, 26, 29, 34, 36, 42–43, 155–57, 159
  regeneration 156
  spiritual aspects 155–57, 159
  submerged 156
Fort Street site, Silvertown 46–47, 47, 48
Fox, Sir Cyril 2
Framework Archaeology 105, 108
France 32, 36, 191
Franks' Sandpit, Betchworth, Surrey 164
  arrowheads 165, 166
  flints 164, 165, 166
  pits 164–65
  plan 165
  pottery 164, 166, 167
  ritual finds 167
Frith, Mrs Zara 12, 13, 14
Frogholt, Kent 156

Gardner, E 3
Gates, T 82–84
Gatwick Airport 13, 154
genealogies 162–63
Gibbard, P L 53
Gibson, Alex 79, 133
GIS system 105
Glovers Wood 13
Glynde Valley 25
goats 32
Goodburn, Damian 124
Goring 97
Gould, I C 10
Gould, R 161
Grand Pressigny 193
Grange Farm, Lawford, Essex 160
Green Lane, Maidenhead 94
Green, T K 12
Greenham Sand and Ballast Ltd 148
Greensand 154, 156, 159, 160, 161, 162
Greenwell, William 1, 184
Grime's Graves, Norfolk 4, 5, 6, 151, 172, 184, 185, 186
Grinsell, Leslie 6
Grooved Ware 10, 45, 92, 97, 99, 108, 151–52, *152*, 164, 166, *166*, 191, 192, 195
Guildford, Surrey 160
Guildford Museum 12

Haddenham causewayed enclosure, Cambs 115, 118, 119, *120*
Halling, Kent *112*
Halnaker Hill enclosure 173
Hambledon Hill, Dorset 110, 115, *121*, *122*, 193

Hammersmith, London 133, 146
Hampshire 27
Hampstead, London 42
Harmondsworth, Middlesex 99
Harrow Hill flint mine 162, 181, 183
Hawkes, Christopher 10
Hayes Common 9–10
Hayman, Graham 149
hazel 24, 25, 41, 42
Hazleton long cairn, Gloucestershire 29, *30*, *32*, *33*, 34, 35, 36, 96
Healey, F 103
Heathrow, Greater London 44, 48, 105–9, 154
Hemp Knoll, Wiltshire 103
Henderson, K 9–10
henge barrows 76
henges 11, 72, 73, 159
Hengistbury Head, Dorset *30*, *31*, *32*, 33, 34
Hengrove Farm 145
herding *31*, 32, 34–35, 36
Hermitage Rocks 26
Hertfordshire 3, 71, 72–73, 74
Hidatsa people (USA) 177
High Hurstwood, East Sussex 18, 22
High Peak causewayed enclosure *121*, *122*
High Rocks 26
High Weald 26
hillforts 8, 162
Ho-Chunk (Winnebago) people (USA) 178
Hoare, Sir Richard Colt 3
Hodder, I 169, 170
Hogg, A H A *8*, 9
Hogs Back, Surrey 162
Holloway Lane, Harmondsworth 99, 153, 157
Hopi people (USA) 180
Hopton Street, Southwark 44, *47*, 58, *67*
Horley, Surrey 13
Horselydown, Southwark, London 38, 45, 58, *68–69*
Horton, Berkshire 97, 99, 102, 153
Horton oval barrow 115
Hoveringham gravel pit 84
human remains, south-east England 110–14
  bones 110–13
  enclosures 110, 173
  excarnation 110, 118, 171
  see also burials *and*human remains *under names of find sites*
Humphrey, C 161
hunter-gatherers *see* Mesolithic period
hunters 155
Hunts House, London *69*
Hurst Fen, Berkshire 103

Imperial College Sports Ground 108
Iping Common 25
Ireland 193
Isbister tomb 185
Isle of Thanet, barrows on 76–81
  burials 76–81
  description 76–79
Italy 32, 36
Itford Bottom 25
Iver 99, 145

Jackson and Kennard 133
Joan Street, Southwark, London 40, 41, 42, 45
Jubilee Line Extension, London 40, 42
Jullieberries Grave, Kent 160, 193
Jutland 192

Keiller, Alexander 1, 6, 9, 10
Kendall, Revd H G O 2
Kennet Valley 96, 103
Kent 72, 73, 76, 110, 164
  Neolithic-Early Bronze Age 76–81
  see also under names of find sites
Kershaw, S W 3
kingcup 42
Kingston, Greater London 132, 154, 156, 157, 159
Kits Coty House, Kent *4*
Klamath people 180
Knap Hill causewayed enclosure *121*, *122*
knowledge: transmission of 192, 194

Ladle Hill hillfort, Hampshire *8*
Lafone Street, Southwark, London 58, *67*
Lake End Road West 84, 89, *89*, 90, 91, 92, 96
Lakota (USA) 178, 180
Lambeth, London 40, 43–44
land use, soil evidence 29–37
landscape:
  archaeology 162
  belief systems and 162
  considering 154
  domestication of 162
  genealogies and 162–63
  monuments and 161, 170, 173, 174, 175
  opening up of 29, 36 *see also* forest clearance
  sacred aspects 154–63
landscape, open 161
Lane Fox, A H 3, 5, 154, 185
Langley Silt Complex 105
Lanting and van der Waals 79
Lasham, F 4
Lawrence, G F 131, 154
Le Sarceau, Orne, France 193
Le Sueur, Pierre Charles 178
Lea river 40
leaf-shaped points 26, 27
Leicestershire 1
Lewis, J S C 158
lightning 25, 26
lime 25, 41, 42
Lion Point, Clacton, Essex 10, 157, 161
Little Kit's Coty House 71, 160
London:
  axes 154

see also following entries and under names of districts in and Thames River, central London
London, City of 134
London Basin 51–52
Long, D J 167
Long Down mines 186
Long *et al* 53, 55
long houses 169, 170, 193
Lower Chalk 160
Lower Greensand 25, 26, 164
Lower Kit's Coty House, Kent *5*
Lower Mill Farm, Stanwell, Surrey 148–53, *148*, *150*
bone, animal 149, 152
bone 'scoop' 149–53
cattle horn cores 152–53
excavations 152
flints 148, 149, 152, 153
pit 22 149–53
pottery 151–52
ritual activity 152, 153
Lympne, Kent 157

Macphail, Richard 29, 90
Macpherson-Grant, N 76
Magritte, René 168, 169, 170, 172
Maiden Bower, Bedfordshire 3, 6–7, *7*, 9
Maiden Castle, Dorset:
causewayed enclosure 115, 118, 120, 121, *121*, *122*
soil study *30*, 33, 34
Maidenhead 95, 99
Maidenhead Thicket 84
Maidenhead-Windsor Flood Alleviation Channel 82, 85, 91, 93, 97
Mandan people (USA) 177
Manor Farm, Lower Horton 145, 146, 154
Manston, Ramsgate, Kent 77
marine incursion 25
marine regressions 157
marine resources 114, 157
marine transgressions 27, 28, 157
Marsh Lane East *86*, 93
marshland 55
Martin's Clump 181
Mayfield Farm 109
Medway Valley:
barrows 110
megaliths 3, *4*, 160, 193
Mellars and Reinhardt 155
Merriman, N 57
Mesolithic period:
acceptance of reality of 4
change and 194
Charlwood site 12–23
invisibility, relative 191
landscape use 155
Neolithic transition 22, 23, 24–28, 33–34, 40, 108–9, 168
perception of 24
spiritual beliefs 155–56
woodland 155
see also Neolithic period
Michelsberg 191, 192, 193
microburins 20
microliths 12, 18–20, *19*, 22, 26, 27
Mid-Sussex Archaeological Society 12
midden sites 29, *31*, 32, 35 *see Dorney*
Miles, David 97
mining:
spiritual aspect 161
see also flint mines
MoLAS 105
Mongolia 161
monuments, Neolithic:
agriculture and 168
burial and 169–71, 173
classification of 168, 169, 175
construction of 174, 175–76
Continent and 193–94
deconstructing 168–76
as defining element 168
earliest 168
genealogies 162–63
human remains and 160, 173
importance of 3–4, 160
landscape and 161, 170,173, 174, 175
meaning of 168–76
origin of 169
social groups and 173
south-east under-represented 3, 11, 191
understanding 168–76
Monuments Protection Programme 72
Moody's Down 171
Mook, W G xix
Mortimer, Cromwell 3
Mortlake, London 128, 146
Mortlake bowls:
affinities 133
appearance of *130*
dating 133
decoration 128, 129, *130*
description 128–31
documentation 131–33
fingernail care 134
fingernail impressions 128, 129, *129*, *131*, 134, 147
fingerprints 128, *132*, 147
gender 134
Mortlake Ware 10, 11, 44, 85, 90, *93*, 96, 102, 166
see also preceding entries
Mount Caburn, East Sussex 156
Movers Lane 59, 60, 64, *67*, 145
Murphy, P 161
Museum of London 124, 126, 128, 132

Narrow Street, Limehouse, London 47
National Mapping Programme (NMP) 73, *75*
Natural History Museum 133
Navajo people (USA) 180
Nene Valley 34

Neolithic period:
aboriginal population and 22
aerial survey and 71–75
agriculture and 2, 3, 173
arrival of 22
children 114
Continent and 191–95
'core areas' 1
cranial indices 114
dating 194–95
definition and 176
divisions of 82
economy 194–95
forests and 157
houses 194
human remains, south-east England 110–14
see also under names of find sites
immigration and 2, 194
infants 114
inhabitation traces 84
local studies 1, 2, 11
Mesolithic, transition from 22, 23, 24–28, 33–34, 40, 109, 168
mobility of population 173, 174
monumental architecture 109
perception of 24
personality of 1–2
polished stone and 193
populations 3, 113–14, 155, 159, 173, 174
regional variation 1, 2
sacred geographies 154–63
settlement 99, 194–95 *see also under names of sites*
sex ratio 114
South East under-represented 3, 11, 191
studies of 1–11
term 1, 2
validity of 2
Neolithic-Beaker Bronze Age funerary rites 76
Nethercourt Farm, Ramsgate, Kent *112*, 113
Newham, London 96
NMR 72, 73
Nordic zone 193
Norfolk 73
North Downs:
afforestation 162
long barrows 160
monuments 162
see also South Downs
North Foreland Hill, Broadstairs, Kent 79
North Marden, West Sussex *111*, 113
Nutbane 170

oak 24, 25, 41, 42, 126
Offham Hill causewayed enclosure 120, 174
Offham Hill, East Sussex 111, *121*, *122*
Old Kent Road B&Q depot, London 47, 48, 58, *70*
Old Lane Way, Slough, Berkshire 99, 100, *101*
Oneota tradition 178
open landscape 161
Orkney 36
Orsett causewayed enclosure, Essex *121*, *122*, 154, 159
Oswald *et al* 73, 122
Ouse Valley 25
ovates 27
Overton Down, Wiltshire *30*, 32, 35
Oxford Archaeology (OA) (Oxford Archaeological Unit) 82, 105

Packet Boat Lane: West Drayton 44–45
Palace Chambers South, Thorney Island 38
palaeoenvironmental studies 24–26, 28
palisades 193
Palmer, R 73
palynological studies 24, 25, 26, 41–43, *43*, 45, 167
Pannel Bridge 24, 25, 26
Pannel Valley 25
Passy-Rots format 194
past: understanding of 168–69
Pegwell Bay, Kent *30*, 36, 156
Peninsula House 41
Perry Oaks, Greater London:
agriculture 108
arrowheads 109
Bronze Age 108, 109
cereal 108
cursus 106, 107–9
enclosure, horseshoe-shaped 108
flints 105, 106, 108
location 105
Mesolithic 105–9
monuments 106, 108–9
Neolithic settlement 105–9
pottery 106, 108–9
ring-ditch 108, 109
ritual 106, 108, 109
stock rearing 108
Peterborough Ware 10, 38, 44, 92, 99, 108, 128–47, *135–43*, *144*, *145*, 166, 191, 192
London, distribution of *144*
significance of 146
Petrie, W M Flinders *8*
Pett Level 24, 25
Phillips, C W 6
Phoenix Wharf 57
piercers 20
Piggott, Stuart 1–2, 6, 7, 9, 10, 11, 191
pigs 149
pine 24, 25, 155
Pipestone 182, 186, 190
pit alignments 73
pits:
pottery in 145
ritual and 194
tree-throw holes and 15, 91
see also under names of find sites
Pitt Rivers, Augustus Lane Fox 1, *4*, 184
Poles Wood East 151

Potterne, Wiltshire 35
pottery:
associated finds 145–46
Beaker 76, 77, 78, 98
Continent and 192–93, 194
depositional pattern 134–45
flint found with 145, 146
flint mines and 182
gender of potters 134
makers 134
Neolithic 27, 28, 84, 85–89, 164, 167
women and 134
see also bowls; Ebbsfleet Ware; Fengate Ware; Grooved Ware; Mortlake Ware; Peterborough Ware *and under names of find sites*
PPG 16 84
Prescott, Philander 178
Prospect Park 99
Pryor, F 103
Pueblo people (USA) 180
Pull, John 5, 6, *176*, *182*, 183, 184
Purfleet, London *30*, 33, 58, 59, 60, *66*
Putney, London 154

Quanterness chambered cairn 185
quartz 100, 104

Rackham, D J 57
Rackham, O 155
radiocarbon dating xix, 2, 17–18, 91
Radley causewayed enclosure 115
Radley long barrow 160
Rainham 57
Ramsgate, Kent 76, 77, 193
Rankine, W F R 9, 12, 155
Raunds, Northamptonshire *30*, 31, *32*, 33, *33*, 34, *35*
RCHME *see* Royal Commission for Historical Monuments of England
Reading Beds 149
Red Hill 26
Red Pipestone Quarry, Minnesota, USA 178–80
Remenham 99
Renfrew, C 3
Rhine delta 192
ring-ditches 76, 84, 109, 148, 159 *see also under names of find sites*
Rinyo-Clacton Culture 10
ritual deposits 104, 126 *see also* votive deposits *and under* causewayed enclosures; flint mines; flints; pits *and under names of find sites*
Rivenhall, Essex 160
river valleys, and settlement 154
rivers:
religious aspects 154, 157–61
ritual activity 159
Robertson, L 29, 34
Robertson-Mackay, R 115
Robin Hood's Ball causewayed enclosure, Wiltshire 115, 166
rocks, significance attached to 160
Rocks Wood 26
Roessen 193
Roman period 55
Romans, J 29, 34
Romney Marsh 24, 25, 157
Rottingdean 71
Rother Valley 25
Rotherhithe, London 42
Roundmior Ditch *86*, 92
Royal Commission for Historic Monuments of England (RCHME) 71, 115 *see also* English Heritage
Runnymede 84, 115, 132, 154, 156, 157, 194
Runnymede Bridge 57, 96, 99
Rutland 1

salt marsh 25
Sandy Meadow, Surrey 159
Sarup causewayed enclosure 121
Scaife, R G 36
Scheduled Monuents, aerial survey 71
Scotland 32, 36
scrapers 20, 118, 145, 149, 152, 153, 165, 166
sea level, changes in 40, 41, 50, 53, 55, 59, 60, 157, 158
Seaford, Sussex 27
sedimentological studies 24
Selmeston 26
settlement:
topography and 155
see also under names of find sites
Shand Street 57
sheep 32, 36, 149
Shelley, Mrs Jean 13
Shepperton, Staines Road Farm *111*
Shepperton Gravel: London 38, 53, 58, 82
Sheppey, Kent 154
Sheridan, J A 192
Shorne Marshes 51
Shoshone people (USA) 180
sickles 27, 161
Sidell *et al* 57, 60
Silvertown Urban Village, Newham 38, 42
Simpson, I A 29
Sioux people 178, 180
Sipson Lane, Greater London 145, 146
Skara Brae, Orkney 10, 151
Skidi Pawnee people (USA) 178
sky 158, 159, 162
Slade Green 57
Slade Green Relief Road 59, 60, *66*
Smith, I F 120, 153
Smith, Reginald 5, 132
Smith, W G 3, 6–9
SMR 72, 73, 74
Smythe's Megalith, Kent 110, *111*
snails, land 33

Society of Antiquaries: Earthworks Committee 154
Soffer, O 16
soft hammer 26, 27
soil:
chemistry of 33–34
erosion 37
European background 32–33
experimental studies 31–32
forest 33–34
herding 34–35
land use and 29–37
Mesolithic-Neolithic transition 33–34
micromorphology 34
middening 29, 35, 37
science 29, 29–31
settlement 35–36
sites mentioned *30*
Somerset Levels 27, 47
South Downs:
burials 110
causewayed enclosures 159, 173
excavations 6, 26
flint mines 27, 172, 177–90
flints 3, 5, 26
hillfort 5
long barrows 160, 169–70
monuments 3, 162, 168, 172
woodland 25
see also North Downs
South Dumpton, Broadstairs, Kent 77, *78*, 79
South Street mound 171
Southwark, London 41, 42, 43–44, *43–44*, 48, 58, 59, *67–70*, 145
Southwood Manor Farm, Weybridge 155
Spain 191
Spiennes 192
Springfield, Essex 110
springs 158, 159
stable isotope work 114
Staines, Surrey 84, 89, 96, 99, 110, *111 see also following entries*
Staines causewayed enclosure, Surrey:
access 122, 159
architecture of 118–22, *120*
artefacts, distribution of 115–18, 118–19
axe, jadeite 115
bones, animal 116, 118
bones, human *117*, 118
complexity *121*
deposition practice 118
description 115
design of 160
discovery 115
ditches 116, 117, 118, 119, 160
flints 116, 118
location 115, *116*, 159
position 115
pottery 116–18, 119
ritual 123
structures 118, *122*
Staines Moor 156
Staines Road Farm, Shepperton 115, 145
Stanwell cursus, Surrey 107, 109, 115, 153, 154, 159
stone hammers 26, 27
Stonehenge, Wiltshire 151
Stour river 160
Strachan, David 71
Straits of Dover 157
Strathallan, Perthshire 29
Streat 26
structures, Neolithic 32, 44, 46
Stuiver *et al* xix
Stukeley, William *5*
Stumble, The, Essex 96, 158
Suckling, Mr K 186
Suffolk 73
Suffolk House 41
Surrey 3, 110, 164
Surrey Archaeological Society 9, 12, 164
Surrey County Archaeological Unit (SCAU) 148
Sussex 5, 27, 28, 71, 110, 164, 191
Sweden 34
Sweet Track 27, 193
Switzerland 32, 36

Taplow, Buckinghamshire 82, 96, 105
Taplow Court, Buckinghamshire 82
Taplow Mill Site, Buckinghamshire 91, 92, 97
Taylor, Christopher 154
Temple Bottom Tomb, Wiltshire 151
Thames Archaeological Survey 124
Thames Foreshore Project 57
'Thames Race' 132
Thames River:
archaeological material from 154
as boundary 158
camp sites 155
causewayed enclosures 159
coastline 29
estuary 40, 42, 48, 51
flints 149
floodplain 38–49
ecology of 41–43
trackway 42
influence of 158
marshland 40
northward migration 40, 41
oxbow lakes 158
palaeochannels 82, 84, 92, 93, 101
ritual and 158
river level, rising 48
significance of 158
spiritual aspects 158, 162
see also following entries
Thames River, central London:
A13 finds 42, 44, 46, 48, 60, 64
alder carr 41, 42
archaeology 43–47, 48
Bronze Age 43, 45, 48
history 38–41
Iron Age 43

Landnam period 42
map *39*
Mesolithic 43, 48
Neolithic 43, 48
peats 41, 42, 47, 48
sand facies 47
settlement and 44, 45, 46–47, 48
structures 44, 46, 48
trackways 42, 46–47
woodland clearance 42–43
Thames Valley:
causewayed enclosure 159
long barrows 160
settlement 94, 155
see also following entries
Thames Valley, Lower:
archaeological investigations 50, 51, 57–64
Bronze Age 58, 60
environmental change 50–65
cultural response to 60, 64
environmental heterogeneity of sites 59–60
fen carr 58
geology 50, 51–56, *54*
landscape evolution 50–56, 60
location plans *51*, *52*
marine transgressions/regressions 53, 58, 60
marshland 58
Mesolithic sites 56–58, 64
Neolithic sites 50, 56–58, 60
peat 55, 57, 58, 59, 60
pollen analysis 59
radiocarbon dating *62*, *63*
sea level, changes in 50, 53, 55, 59, 60
sedimentary sequences 50, 51–56
site distribution 59
site heterogeneity 59
trackways, Bronze Age 50
transhumance 60
woodland 58, 60
woodland clearance 58
Thames Valley, Middle:
axes 99
causewayed enclosures 99
flint 99
Neolithic settlement 99–104
see also Cippenham, Slough, Berkshire; Dorney area, Buckinghamshire; Thames Valley, central London
Thames Valley Archaeological Services 82
Thames Water Utilities Limited 105
Thamesmead-Erith Spine Road site 58, 59, *66*
Thomas, Julian 1, 134, 145
Thomas, K 157
Thorney Island, Westminster 38, 40, 42, 43, 44
Three Maidens, Minnesota, USA 179
Three Oak Lane, London 38, 45, 68
Thrupp, Oxfordshire 97
Tilbury III 41, 55, 59, 60
Tilbury Formation 53
Tilbury Marshes 53
Tipping, R 167
Tofts Ness, Sanday, Orkney 29
Tooley Street, Southwark, London 58, *69*
Topping, P 6
Tottington, Kent 160
trackways 42, 46–47, 55, 58
trade 22
transhumance 60, 162
tree-throw holes 15, 33, *33*, 34, 36, also see Dorney
trees: burning 33, 34, 36
Trondheim convention xix
Trundle causewayed enclosure: excavations at 1, 6, *121*, *122*, 173–74
tumuli 168

Umeå *30*, 34
Union Street, Southwark, London 40, 41, 42
Upper Chalk 160
Upper Swell long barrow, Gloucestershire 151

Vale of the Brooks 25
votive deposits 27, 28, 97, 126 *see also* ritual deposits

Walland Marsh 25
Walton-on-the-Naze, Essex 10, 158
Wandle 40, 134
Wandle Meadows, Hackbridge 146
Warne, Frederick 3
Warren, S H 10, 157
water, spiritual beliefs and 158, 159
Waterloo, London 44
Waulud's Bank 11
Wawcott, Berkshire 18, 22
Weald:
barrows 161
pits 12
woodland 155, 156
Weir Bank Stud Farm, Bray 84
Welland Gill 13
Wennington, Greater London *47*
Wessex 2, 10, 29, 76, 114, 170
flint mines 181
Wessex Archaeology 105
West Drayton, Greater London 132
West Heath, Sussex 155, 161
West Hill 26
West Kennet 133, 151, 160
West Wickham Common, London *8*, 9
Westell, W P 3
Westfield Wood, Kent 160
Westheath 25
Westminster, London 48
Westnedge, W 13
wetland 55, *56*
Wey river 160
Whin Gill 90
White Horse Stone, Kent 32, 96
Whitehall, London 57

Whitehawk causewayed enclosure, East Sussex 6, 111, *121*, *122*, 154, 159, 160, 162, 173–74
Whitesheet Hill causewayed enclosure *121*, *122*
Whittle, A 173
Whyteleafe, Surrey *112*, 113
Wilkinson *et al* 60
Wilkinson and Murphey 60
willow 42
Wiltshire 3
Windmill Hill causewayed enclosure 1, 2, 9, 10, 35, 115, 116, 120, *120*, *121*, *122*, 151
Windmill Hill Culture 2, 194
Wingham, Kent 156
Winnebago people 178
Wolseley Street, Southwark *70*
Wood Lane, Slough, Berkshire 100: 101, *101, 103*
Woodhenge 10
woodland *see* forests *and under names of sites*
Woodward, A 134
Woolwich Manor Way, London 58, 59, 60, *61*, 64, *67*, 96
Wormley Wood *31*, 34
Wright, Thomas *4*
Wymer, J 95

Yankton (Sioux) 178
Yarnton, Oxfordshire 96, 97
Yeoveney causewayed camp 153
yew 42
Yorkshire Wolds 36
Yurok people (USA) 180

This volume fills a significant gap in prehistoric studies. It combines a series of regional overviews on such subjects as soils, aerial survey and human remains, with contributions on specific sites, artefacts and the natural environment. As such it is intended both as a summary of recent work and a reminder of the richness and diversity of the record available for study in the South East. Since so much of the material that it covers is novel and unexpected, it poses a challenge to accounts of British prehistory based on regions with a longer history of large-scale survey and excavation.

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