Chalcolithic and Bronze Age Scotland: ScARF Panel Report

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ScARF Summary Bronze Age Panel Document

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Executive Summary

Why research Chalcolithic and Bronze Age Scotland?

Chalcolithic and Bronze Age Scotland is traditionally defined by the introduction and use of copper and copper alloys for the manufacture of tools, ornaments and weapons. It is, however much more than that, forming a less than well-understood ‘tunnel’ into which the Neolithic ‘cattle train’ disappears to emerge as an ‘iron horse’ two millennia later. Gradually, what has occurred in the tunnel is being elucidated, as research reveals sites and objects, assumed to have been from earlier or later periods, to be of Bronze Age date, whether it be hillforts, Clava cairns, recumbent stone circles and small henges in north-east Scotland, or, of course, hut-circles. Bronze metallurgy, by virtue of its dependence on supplies of copper and tin (and gold) from often distant sources, provides a category of evidence through which the place of Scotland in a wider system of exchange and circulation can be explored, and allows precious insight into the dynamics of contacts at this period of prehistory. The very nature of Bronze Age technology dictated that Scotland was to become part of an international network facilitating the distribution of metal and other materials, and tracing links with communities in Ireland, England and Europe is a growing research area.

The Scottish Chalcolithic and Bronze Age also offer a uniquely strong data set to study the effects of climate and environmental change on past communities. Palaeoenvironmental data for the period is strong, supplemented by increasing evidence of settlement systems. This was a period of dramatic social, economic, and cultural change, characterised by changes in social stratification, rich regional diversity and an increase in inter-regional, indeed international, interaction, and development of the landscape both as a physical and cosmological resource. The period is now being appreciated on its own terms and the fascinating insight it can provide both as a coherent region, and within a European context.

Panel Task and Remit

The panel remit was to review critically the current state of knowledge and consider promising areas of future research into Chalcolithic and Bronze Age Scotland. This was undertaken with a view to improved understanding of all aspects of what happened in Scotland from the appearance of metallurgy and other Beaker-related innovations in the 25th century BC up until the early 8th century BC and the beginnings of the Iron Age.

The resultant report, outlines the different areas of research in which archaeologists interested in the Chalcolithic and Bronze Age work, and highlights the research topics to which they aspire. The report is structured by theme: *The History of Bronze Age studies in Scotland; Interconnecting Issues; Lifeways and Lifestyles; Material Culture, Technologies and Use of Resources; and Identity, Society, Belief Systems*. The document is reinforced by material on-line which provides further detail and resources. The Chalcolithic and Bronze Age panel report of ScARF is intended as a resource to be utilised, built upon, and kept updated, hopefully by those it has helped inspire and inform as well as those who follow them.

Future Research

The main recommendations of the panel report can be summarised under five key headings:

- **Building the Scottish Bronze Age:** Narratives should be developed to account for the regional and chronological trends and diversity within Scotland at this time. A chronology

based upon Scottish as well as external evidence, combining absolute dating (and the statistical modelling thereof) with re-examined typologies based on a variety of sources – material cultural, funerary, settlement, and environmental evidence – is required to construct a robust and up to date framework for advancing research.

- **Bronze Age people:** How society was structured and demographic questions need to be imaginatively addressed including the degree of mobility (both short and long-distance communication), hierarchy, and the nature of the ‘family’ and the ‘individual’. A range of data and methodologies need to be employed in answering these questions, including harnessing experimental archaeology systematically to inform archaeologists of the practicalities of daily life, work and craft practices.
- **Environmental evidence and climate impact:** The opportunity to study the effects of climatic and environmental change on past society is an important feature of this period, as both palaeoenvironmental and archaeological data can be of suitable chronological and spatial resolution to be compared. Palaeoenvironmental work should be more effectively integrated within Bronze Age research, and inter-disciplinary approaches promoted at all stages of research and project design. This should be a two-way process, with environmental science contributing to interpretation of prehistoric societies, and in turn, the value of archaeological data to broader palaeoenvironmental debates emphasised. Through effective collaboration questions such as the nature of settlement and land-use and how people coped with environmental and climate change can be addressed.
- **Artefacts in Context:** The Scottish Chalcolithic and Bronze Age provide good evidence for resource exploitation and the use, manufacture and development of technology, with particularly rich evidence for manufacture. Research into these topics requires the application of innovative approaches in combination. This could include biographical approaches to artefacts or places, ethnographic perspectives, and scientific analysis of artefact composition. In order to achieve this there is a need for data collation, robust and sustainable databases and a review of the categories of data.
- **Wider Worlds:** Research into the Scottish Bronze Age has a considerable amount to offer other European pasts, with a rich archaeological data set that includes intact settlement deposits, burials and metalwork of every stage of development that has been the subject of a long history of study. Research should operate over different scales of analysis, tracing connections and developments from the local and regional, to the international context. In this way, Scottish Bronze Age studies can contribute to broader questions relating both to the Bronze Age and to human society in general.

Contents

Executive Summary

1. Bronze Age studies and chronology in Scotland	1
1.1 Introduction	1
1.2 History of Bronze Age Research in Scotland	3
1.3 A Scottish Chalcolithic?	11
1.4 Research Recommendations	15
2. Overviews and interconnecting issues.....	16
2.1 Interconnecting Issues	16
2.2 Chalcolithic and Bronze Age Scotland: an overview	18
2.4 Research Recommendations	34
3. Lifeways and Lifestyles.....	35
3.1 Introduction	35
3.2 Landscape, environment, climate.....	35
3.3 Settlement, Landuse and Resources.....	48
3.4 Agriculture	62
3.5 Demography of the Bronze Age population in Scotland	67
3.6 Transportation and Movement.....	69
3.7 Research Recommendations	71
4. Material Culture and Use of Resources	73
4.1 Introduction	73
4.2 Ceramics.....	74
4.3 Stone artefact traditions	76
4.4 Organics	86
4.5 Metallurgy	90
4.6 Research Recommendations	103
5. Identity, Society, Belief Systems	104

5.1	Introduction	104
5.2	Identity	104
5.3	Society, structure, and organisation	108
5.4	Belief systems and ceremony in Bronze Age Scotland	113
5.5	Funerary and Burial evidence	131
5.6	Research Recommendations	137
6.	Bibliography	138

List of Figures

Figure 1: Distribution map of sites mentioned in the text. ©RCAHMS	2
Figure 2: Late Bronze Age hoard found at Adabrock, Ness, Isle of Lewis. ©NMS.....	6
Figure 3: Cairnpapple under excavation by Professor Stuart Piggott © RCAHMS.	7
Figure 4: Coles' chronological table for the Scottish Bronze Age.	8
Figure 5: Metalwork assemblage from Rohl and Needham 1998, 122..	11
Figure 6: Archery equipment: a cannell coal belt ring and stone wristguard © NMS.....	19
Figure 7: This copper head band, also known as a diadem, one of two found at Lumphanan in Aberdeenshire. ©NMS.....	21
Figure 8: Hoard of Early Bronze Age flat axes from Hill of Finglenny, Aberdeenshire © NMS	22
Figure 9: Early Bronze Age hoard from Gavel Moss, Renfrewshire (Clarke <i>et al.</i> 1985) ©NMS	25
Figure 10: A Beaker from Borrowstone, Kingswells, City of Aberdeen © University of Aberdeen.	27
Figure 11: Kintraw ©RCAHMS	29
Figure 12: Bronze Age dirk from at Pitcaithly, Perthshire ©NMS.	30
Figure 13: LBA sword hoard, Grosvenor Crescent, Edinburgh ©NMS	32
Figure 14: Plan of Sumburgh (Downes and Lamb 2000, Figure 30, 73).....	33
Figure 15: The issue of tracing sea-level change was central to work at the Early Bronze Age Pict's Knowe henge (Tipping, Haggart and Milburn 2007)..© RCAHMS.	37
Figure 16: Blanket peat in Glen Affric (Tipping 2008) ©Richard Tipping.....	38

Figure 17: GIS model of blanket peat inception and spread in Glen Affric from a series of AMS 14C dates. (Tipping 2008) ©Richard Tipping	38
Figure 18: Summary of environmental changes at sites investigated by Farrell (2009), © Michelle Farrell	47
Figure 19: Burnt mound at Liddle, South Ronaldsay ©RCAHMS.....	52
Figure 20: Aerial shot of Lairg under excavation ©Rod McCullagh.....	55
Figure 21: Roundhouse at Lairg under excavation ©Rod McCullagh.....	56
Figure 22: Loanhead of Daviot, Aberdeenshire © RCAHMS.....	59
Figure 23: Example Pollen diagram from Carn Dubh, near Pitlochry (Tipping 1995) ©Richard Tipping	60
Figure 24: The row of houses at Cladh Hallan showing the location of the human foundation burials (after Parker Pearson <i>et al.</i> 2005, fig. 3).....	62
Figure 25: Archaeologists often associate feasting with the Iron Age because of literary evidence for the Celts, but a range of equipment was present during the Late Bronze Age.© E O’Riordan	66
Figure 26: Carpow log boat under examination ©Trevor Cowie.....	71
Figure 27: Jet buttons, belt ring and fastener from a mortuary context in Harehope, Peebleshire. © NMS.....	76
Figure 28: V-perforated buttons and pulley belt ring from Harehope, Scottish Borders. Photo: ©NMS	80
Figure 29: V-perforated buttons from Rameldry Farm, Fife. From Sheridan & Davis 2003	81
Figure 30: Distribution of V-perforated buttons (squares) and pulley belt rings (triangles). From Sheridan & Davis 2002	81
Figure 31: Disc-bead necklace from Barbush Quarry, Dunblane, Stirling. From Sheridan & Davis 2001	82
Figure 32: Disc-bead necklace with second strand of metallic lead beads, from West Water Reservoir, Scottish Borders. From Hunter & Davis 1994	82
Figure 33: Early Bronze Age jet pulley belt ring, from Nr Kirriemuir.	82
Figure 35: Spacer plate necklace from Inchmarnock, Argyll & Bute. Photo: Alison Sheridan	83
Figure 36: Spacer plate necklace and bracelet from Kinkharrie, Angus. Drawing by Helen Jackson for NMS.....	83
Figure 37: awaiting permission	83

Figure 38: Fig 10	Disc-and-fusiform bead necklace from Greenhill, Fife. Photo: © NMS.....	84
Figure 39:	Disc- and fusiform-bead belt from Culduthel, Highland. Photo: © NMS	84
Figure 40:	Squat, gently biconical jet bead from Cairnholly, Dumfries & Galloway. Photo: NMS	85
Figure 41:	‘Napkin rings’ from Camps Reservoir, South Lanarkshire: top: <i>in situ</i> (photo: Tam Ward); bottom: side view (photo: Alison Sheridan)	85
Figure 42:	Image of Langwell Farm burial taken before police intervention © John White	87
Figure 43:	Textile fragment from late Bronze Age hoard from St Andrews, Fife, © NMS	88
Figure 44:	Aerial image of the remains of Tonderghie copper mine, Dumfries and Galloway ©RCAHMS.....	91
Figure 45:	Four striking gold discs were found with a cremation in the principal mound in a barrow cemetery in Orkney. © National Museums Scotland.	92
Figure 46:	Sketch plan of the Tonderghie copper mine, Whithorn, Dumfries and Galloway © J.Pickin.	95
Figure 47	©NMS Late Bronze Age hoard recovered in 1990 from Priestden Place, St Andrews, Fife.	96
Figure 48:	Visualisation of the Copper working process and taphonomy (Ottaway 2001, Fig 1)	99
Figure 49:	Replica weapons seen post-experiment and evidencing damage. Examination of the edges of swords in Britain and Ireland suggest they were often used in combat. © Kate Anderson	101
Figure 50:	Beaker, archery equipment, strike-a-light and amber bead found in a cist burial at Culduthel, Inverness, Inverness-shire. ©NMS.....	106
Figure 51:	Necklace from burial at Killy Kieran, Argyll, © NMS.	106
Figure 52:	(top) View of Arthur’s Seat and Duddingston Loch (©RCAHMS) and (bottom) bronzes from Duddingston Loch (©NMS).	114
Figure 53:	Late Bronze Age shield from Yetholm, Roxburghshire ©NMS	115
Figure 54:	The three decorated axes from Dunsapie Crag, Edinburgh.....	115
Figure 55:	The Ballachulish figure. (left) as discovered in 1880 and (right) as it currently is. ©NMS	116
Figure 56:	Sculptor's Cave, Covesea. (left) showing the site at the base of the cliff, image courtesy I Shepherd. (right) showing the site under excavation.....	117
Figure 57:	Hair rings from Sculptors Cave, Covsea ©NMS . ‘Hair rings’ from Sculptors Cave ...	117
Figure 58:	Ormaig rock art, Argyll ©RCAHMS	118
Figure 59:	The decorated cist slabs from Balblair (after Dutton and Clapperton 2005, fig. 2).	119

Figure 60: Kilmartin Valley, showing the remains of standing stones and cairns. ©RCAHMS.....	121
Figure 61: Plan of the excavated features at the henge and timber circle at Broomend of Crichton (Bradley 2011, 35; Illus 1.35)	122
Figure 62: Cup and ring marked standing stone at Nether Largie, Kilmartin valley ©RCAHMS	123
Figure 63: Plan of the stone colours at the recumbent stone circle at Tomnaverie (from Bradley 2005b, 30)	124
Figure 64: Ri Cruin end slab ©RCAHMS.....	125
Figure 65: Temple Wood, Kilmartin valley ©RCAHMS	126
Figure 66: The Nebra disc © LDA Sachsen-Anhalt (Foto: Juraj Lipták).	128
Figure 67: Linga Fiold Orkney Mound 7, showing cremation features around barrow, and mortuary building in foreground, © Jane Downes	135

List of Tables

Table 1: Summary chronology for the Southern British Bronze Age (After Needham et al. 2010 Table 1 and Needham 1996 Fig 3.)	5
Table 2: Summary chronology and associated artefact types for Scotland (based on Needham <i>et al.</i> 2010 (Table 1) and Needham 1996 Fig 3 for the Southern British Bronze Age).....	14

1. Bronze Age studies and chronology in Scotland

1.1 Introduction

The Bronze Age has been recognised as a distinct period in the prehistory of Scotland since the mid-nineteenth century. Synthetic accounts were produced up to the mid-twentieth century but since then its study has become fragmented into various specialities. In more popular accounts, the Bronze Age has suffered from an apparent lack of distinctive field monuments, like Neolithic chambered tombs or Iron Age brochs, and from a shortage of well-dated settlements.

The task of attempting an overview of the main developments between the 25th century BC – when metal-using and a ‘package’ of other continental novelties appeared in Scotland (and elsewhere in Britain and Ireland) – and around the 8th century BC, when iron objects and iron-using appeared, has been facilitated by several major developments over the last decade. The chronology of the period has been refined through several programmes of radiocarbon dating (namely the *Beaker People Project*, led from Sheffield University; the *Beakers and Bodies* project, led from Marischal Museum; and the National Museums Scotland programmes), together with radiocarbon dates obtained as a result of fieldwork.

This, along with Stuart Needham’s reconsideration of Beaker pottery throughout Britain, has led to a much clearer picture of developments in ceramics and in funerary practices (*inter alia*). The application of

isotope analysis to human remains (through the *BPP* and *B&B* projects) has clarified issues of diet and mobility among late third and early second millennium BC individuals. Developer-funded fieldwork has revealed numerous settlements, especially of Middle Bronze Age date (as at Kintore, Aberdeenshire and Upper Forth Crossing, Clackmannanshire); Pope (forthcoming) provides a synthesis of the C-14 dated roundhouse assemblage; Orcadian Bronze Age funerary practices have been clarified by Jane Downes’ *Orkney Barrows Project*; metalwork developments have been clarified by targeted research by Stuart Needham, Brendan O’Connor and Trevor Cowie; and fieldwork by Sheffield and Cardiff Universities in the Western Isles has produced a detailed picture of developments in this part of Scotland (including the remarkable evidence from Cladh Hallan). These developments, together with others – including the fruits of Richard Bradley’s excavations of Clava cairns, recumbent stone circles and small henges in north-east Scotland – allow a richly-textured and regionally-variable picture to be formed. Only the main features of that picture will be sketched here, and the periodisation scheme developed by Stuart Needham to characterise this period over the whole of Britain will be adopted as a way of structuring the evidence (at least as far as the earlier part is concerned). A key point to make is that, with the various novelties described in this document, current research is not dealing with major population replacement: the ‘actors’ in this period are, by and large, the descendants of the communities who had been farming in Scotland for up to 1500+ years.

Figure 1: Distribution map of sites mentioned in the text. ©RCAHMS

1.2 History of Bronze Age Research in Scotland

This is a brief and selective summary of research in, and chronology of, the Bronze Age in Scotland, both as set out in purely Scottish studies and in those covering the whole of Britain that display significant Scottish content or implications. A simplified version of the latest relative and absolute chronology published for southern Britain is included below (see

Table 2) as an indication of the chronological parameters. The extent to which this chronology is relevant to Scotland will be discussed at various points below.

1.2.1 19th and early 20th centuries

The Three-Age system was adopted more readily in Scotland than in other parts of Britain or in Ireland so the Bronze Age has been an integral part of discussions of Scottish archaeology since Sir Daniel Wilson's account published in 1851 (*The Archaeology and Prehistoric Annals of Scotland*, first edition). In this he explicitly acknowledges C J Thomsen's (1788-1867) classification in 1816 of the prehistoric collections of the Royal Museum of Northern Antiquities in the Christiansborg Palace, into Stone, Bronze and Iron Periods as 'now universally adopted in the nomenclature of archaeological science'.

Wilson was the author of the first catalogue of the Society's museum, published in 1849 (*Synopsis of the Museum of the Society of Antiquaries of Scotland*), in which material identified as pre-Roman was dated to the Stone or Bronze Periods (iron, he considered, replaced bronze only under the Romans) both classified as Celtic. In later editions pre-Roman objects were simply classified by material. However, the presumed author of these later versions of the catalogue, Joseph Anderson (1832-1916), keeper of the museum from 1869 to 1913, used the 'Age of Bronze' in his Rhind Lectures, published in 1886, in which he gave 'a general review of the existing materials for the Archaeology of Scotland'. Anderson devoted three lectures to the Bronze Age, covering burials, with associated pottery metalwork and other grave-goods, stone circles and bronze objects, settlements being at that time unknown.

In *The ancient bronze implements, weapons, and ornaments, of Great Britain and Ireland* (1881), Sir John Evans (1823-1908) - an Honorary Fellow of the Society - generally treated Scottish finds in separate sections of his respective chapters on the main bronze

types. Evans sometimes noted where Scottish forms differed from those elsewhere in Britain but did not otherwise consider separate typology or chronology for Scotland.

Evans never devoted much attention to chronology and his tripartite division of the material, though accurate in sequence, can now be seen as distinctly unequal in that he separated what is now defined as the Arreton assemblage (Needham's Period 4; see Table 1) from the preceding phases of the Early Bronze Age on the one hand and the whole of the Middle and Late Bronze Age on the other. It was left to the great Swedish scholar Oscar Montelius (1843-1921) to set out the chronology of the British Bronze Age in greater detail in an article published in *Archaeologia* in 1908. Montelius's absolute chronology in particular - a Copper Age starting around 2500 BC and the end of the Late Bronze Age around 800 BC - was so far ahead of its time that his contribution was rejected by British scholars (Piggott described it as 'curious' fifty years later) and has now been largely forgotten. Like Evans, Montelius listed Scottish finds separately but his chronology covered the whole of Britain.

John Abercromby (1841-1924) (*A study of the Bronze Age pottery of Great Britain and Ireland...*1912) divided Bronze Age pottery into Beakers, Food Vessels and Cinerary Urns, the last comprising in Scotland Collared Urns, Pygmy Cups, Cordoned Urns, Encrusted Urns and Enlarged Food Vessels. Urns occurred throughout his five periods, which lasted from 2000 to beyond 400 BC. 'With the best will in the world' he found Montelius's absolute chronology unacceptable.

In 1923 J G Callander (1873-1938), Director of the Museum, read the Society a paper on Bronze Age hoards. He acknowledged Montelius's scheme but judged it unsuitable for Scotland (Graham, 1981, recalls the antagonism that Callander felt for anything foreign) because certain types were lacking here. Callander divided hoards among four periods: I, flat copper axes; II, flat bronze

axes; III, flanged axes and palstaves; IV, socketed axes. Beakers and Food Vessels were assigned to Period II, cinerary urns to Period III. Gold ornaments were assigned to the three later periods.

Following Alexander Curle's hut-circle excavations at Bonchester Hill (Scottish Borders) and Loch Asgaig and Kinbrace in Sutherland (Curle 1909-10; 1910-11), Curle and Cree used similar techniques in their

excavations at Traprain Law. By 1922, Curle and Cree were responsible for discovering the first circular structure using area excavation. Unfortunately, the decision to dig to four pre-established levels, meant that they failed to identify anything but the most obvious of features and, despite numerous hearths, areas of paving and at least two stone-founded circular structures, no cut features were discovered.

Table 1: Summary chronology for the Southern British Bronze Age (After Needham et al. 2010 Table 1 and Needham 1996 Fig 3.)

Period	Date range	Pottery	Metalwork assemblage
1. Copper	2450-2200	Early Beaker	Moel Arthur
2. EBA	2200-1950	Climax Beaker/Food Vessel	Brithdir> Mile Cross
3. EBA	1950-1750	Early Urn/Food Vessel	Willerby Wold
4. EBA	1750-1550	Middle Urn	Arreton Down
5. MBA	1550-1150	Late Urn/Deverel-Rimbury	Acton Park>Taunton>Penard
6. LBA	1150-950	Post Deverel-Rimbury	Wilburton
7. LBA	950-800	PDR Plain Ware	Ewart Park
EIA	800-600	PDR Decorated	Llyn Fawr

1.2.2 *Mid 20th century*

Gordon Childe (1892-1957) wrote the Preface to his textbook on the European Bronze Age in Edinburgh in 1930 and the focus for the study of the Scottish Bronze Age passed to Edinburgh University. Almost fifty years after Anderson's Rhind lectures Childe published the next survey of Scottish prehistory in 1935. He noted that Montelius had distinguished five periods, but was content with what had then become the conventional division into Early, Middle and Late Bronze Ages based on

typology of tools and weapons: flat axes and daggers; flanged axes, palstaves and rapiers; socketed axes and swords. However, Childe went on to compare and contrast Scottish bronze types with those from England. While Early Bronze Age types were briskly equated with those south of the border, Middle Bronze Age types were common only in southern Scotland. Childe also noted the scarcity or absence from Scotland of various types characteristic of the Late Bronze Age in England and recognised the Irish origin of many contemporary gold ornaments. Childe treated the Bronze Age chronologically,

beginning with Beaker invaders, Food Vessels and other Early Bronze Age objects, then Early Bronze Age monuments and settlement. Cinerary Urns and accompanying material followed, with a separate section on Early Bronze Age burials in the Northern Isles. The Late Bronze Age was represented by invaders using flat-rimmed pottery, building recumbent stone circles and living in settlements such as Jarlshof and Skara Brae, who reached Scotland when iron was already in use.

A decade later Childe published another synthesis (the 1944 Rhind Lectures) concentrating on indigenous development more than external influences and dividing Scottish prehistory into six stages. Beaker pottery defined Stage III, though it persisted into Stage IV, defined by Food Vessels and including the Migdale hoard. Cinerary Urns distinguished Stage V with Late Bronze Age metalwork (exemplified by the Adabrock hoard) said to be contemporary. Childe devoted three chapters of his main text to these stages under the titles 'Early Bronze Age', 'Heroic Age' and 'Late Bronze Age' respectively. Thus, the Early Bronze Age was populated by users of Beakers and associated material, Childe's 'heroes' were chiefs buried in dagger graves and in conspicuous monuments such as Kilmartin Glebe Cairn, while subsequent material was attributed to the Late Bronze Age.

Figure 2: Late Bronze Age hoard found at Adabrock, Ness, Isle of Lewis. In addition to axes and other tools, this hoard contains razors, beads

of gold, amber and glass and fragments of a sheet-metal vessel of continental origin. ©NMS.

In a short appendix on bronze typology, Childe in effect reverted to Evans's scheme, reintroducing a second stage of the Early Bronze Age equivalent to the Arreton assemblage in addition to the Middle and Late Bronze Ages. He repeated that Middle Bronze Age types were practically unknown beyond southern Scotland and noted again that most of the sword types which could be used to subdivide the Late Bronze Age in England were unrepresented north of the border. In an appendix on absolute chronology, Childe argued that his Stage IV and Food Vessels persisted well into the currency of the Late Bronze Age elsewhere in Britain, so that the Late Bronze Age in northern Scotland at least would not have begun until the mid-first millennium BC.

Stuart Piggott did not produce such a detailed synthesis of Scottish prehistory, but he did make several contributions to the Bronze Age in Scotland while in Edinburgh: excavations at Cairnpapple, Clava and Croft Moraig, the Badden cist slab, the Horsehope hoard, and other grave-groups and hoards – notably Migdale. Some of this work was done in collaboration with colleagues or pupils, while his pupils (e.g. Audrey Henshall, Derek Simpson and especially John Coles) published substantial contributions themselves. Ian Shepherd's catalogue of V-bored buttons appeared posthumously in 2009. Cairnpapple, Clava and Croft Moraig have all been subject to reinterpretation. To quote Roger Mercer (1998, 440) : "His own revolutionary work upon the Neolithic and Iron Age of Scotland is perfectly matched by that of one of his postgraduate students, John Coles, who gave a modern foundation to Scottish Bronze Age Studies in which Piggott took great pride."

At first consideration, Feachem (1961) saw platform settlements as intrusive and Iron Age; however by 1965 he was beginning to consider them as Late Bronze Age. Combining the work of Margaret Piggott and Kenneth

Steer with his own excavations – at Glenachan Rig, Harehope, and Green Knowe in the Scottish Borders (Feachem 1958-59; 1959-60; 1961) – Feachem (1965) created the first roundhouse typology. This classification, despite being based on just a few type-sites has actually stood the test of time reasonably well (Pope forthcoming). Feachem (1965) was clearly inspired by the work of Margaret Piggott regarding both excavation strategy – the deliberate targeting of structures – and house reconstruction.

approached as a henge), and is of central importance to the period in providing a stratified sequence, © RCAHMS.

Figure 3: Cairnpapple under excavation by Professor Stuart Piggott and aerial view of the henge and cairn. Cairnpapple was the earliest Bronze Age excavation carried out to modern standards in Scotland (although it was

1.2.3 Late 20th century

John Coles came to Edinburgh in 1957 to undertake research on Scottish Bronze Age metalwork and completed his PhD thesis in 1959. This has been described as ‘the first serious attempt at a systematic collation of data on Bronze Age metal artefacts [in Scotland]’. The card-catalogue he assembled is available in the Archaeology Department of National Museums Scotland. Coles published the results of his research in a series of papers in the *Proceedings*, notably three on Early, Middle and Late Bronze Age metalwork (in reverse order: 1959-60, 1963-64 & 1968-69; for a brief survey of the concept of the Scottish Bronze Age in relation to his work, see Ritchie 1999). In these articles he listed the data; ‘placed them in a chronological framework ... sought to define industrial traditions ... and highlighted imports and influences from outside Scotland’. Coles catalogued objects by type and county, then gave full details of hoards. His texts for the Early and Middle Bronze Ages discussed the typology and distribution of each type then went on to consider industrial phases, named after representative hoards or finds, while discussion of the Late Bronze Age sequence was more continuous. For the Early Bronze Age there were also data on composition (also examined in a separate article in the *Proceedings of the Prehistoric Society* 1969) and manufacture, though contemporary pottery had not yet been analysed thoroughly enough to shed much light on associated metalwork. Coles wrote before there was much absolute dating evidence from Scotland. His main chronological table (reproduced here as Figure 4) shows the Bronze Age lasting from the eighteenth century to the sixth, though an end-note acknowledging the effects of radiocarbon calibration suggests a beginning in the twenty-first century cal BC. In her contribution to the *Festschrift* for Coles (Harding, 1999) Alison Sheridan summarised finds and interpretations of Bronze Age material subsequent to his publications.

FIG. 52. Phases of industrial activity in the Scottish Bronze Age.

Figure 4: Coles' chronological table for the Scottish Bronze Age (Coles, J 1969, 75 Fig.52). Though up to fifty years old, this scheme has not been properly updated for the Middle and Late Bronze Age.

The metal analyses discussed by Coles were mainly from the *Studien zu den Anfängen der Metallurgie* project published in the 1960s and 70s. These have been supplemented by Cowie, Northover & O'Connor 1998, Late Bronze Age *Dijon*; 1999, copper *Bochum*; plus unpublished analyses. In December 1960 at a conference in London, Christopher Hawkes gave a lecture setting out a scheme for the British Bronze Age (a two-stage Copper Age and three stages each of Early, Middle and Late Bronze Age, lasting from 1850 to 500 BC).

Though samizdat versions have circulated ever since, the scheme itself has never been published. Coles was present at the conference but did not adopt Hawkes's scheme, which mentions hardly any Scottish sites or finds, though it came to form the basis of the current sequence for the British Bronze Age (summarised in Table 1) worked out by Burgess and followed by Needham.

Over nearly fifty years of publication Colin Burgess has been the dominant figure in the study of the British Bronze Age during the later twentieth century. He contributed to the corpora of rapiers, swords and axes which all cover Scotland, like his textbook on the later Neolithic and earlier Bronze Age (*The Age of Stonehenge* 1980) but only once has Burgess surveyed the entire period throughout Britain, in the proceedings of a 1972 conference published in 1974. An article published in the *Archaeological Journal* in 1969 (Burgess 1969) sets out the later Bronze Age metalwork sequence for the British Isles with reference to the sequence for Brittany published shortly before, with the contents of chronological and regional groups for England and Wales in an appendix, though the Scottish sequence appears in the chronological table. Early and Middle Bronze Age industrial stages were set out in *The Age of Stonehenge*.

Coles included gold in his articles, but gold objects are often dealt with separately from bronze for practical reasons of access to the material. Joan Taylor - one of his students - covered Scotland in the geographical corpus which was the foundation of her study *Bronze Age goldwork of the British Isles*, published in 1980 though compiled before 1973. George Eogan also included Scottish finds of the gold types he listed in *The accomplished art* (1994). Neither study necessarily includes complete references to the Scottish finds listed.

Corpora of three types of Early Bronze Age pottery including Scotland appeared in 1970 (Beakers, D L Clarke), 1978 (Food Vessel Urns, T G Cowie) and 1984 (Collared Urns, I H Longworth also card index in British Museum),

while an Edinburgh dissertation on Cinerary Urns (1958, J Barber) remains unpublished.

Work in Highland Scotland had begun to take shape and sites like Kilphedir in Sutherland (Fairhurst and Taylor 1971) extended the interest of roundhouse studies into the highland zone as George Jobey offered an alternative to Feachem's sequence for northern timberbuilt roundhouses. Feachem's (1965) suggestion that *ring-groove* and *ring-ditch houses* were not successive construction types was supported, but Jobey re-asserted Steer's (1955-56) point that simple-ring post-built structures were Bronze Age in date. In his Burnswark Hill report, Jobey (1977-78) attempted to re-affirm the idea that post-built houses pre-dated those of wall-slot construction. Jobey's work at Green Knowe (Jobey 1980) and the Northumbrian settlement of Standrop Rigg (Jobey 1983), tackled the issues of platform settlement, ring-bank construction, coppicing and agriculture, upland depopulation, and the damage to archaeology caused by afforestation. Jobey resisted the temptation to follow Piggott, Steer and Feachem in seeing development in north Britain as the result of southern immigrants. What we find in Jobey's work is the origins of a reaction to culture-historical approaches. Instead, enabled by his thorough reading of features and deposits and his appreciation of the problems of survival and excavation, Jobey began to move towards more detailed contextual interpretation at the level of the site. In the late 1970s, of particular note are the excavations of Bronze Age structures at Cùl a'Bhaile in Argyll as Colin Burgess' (1980) *Age of Stonehenge* brought together the Bronze Age settlement evidence for the first time. Some of the most influential work conducted in the 1990s was the excavation of wellpreserved unenclosed structures by John Barber (1997) at Kilpatrick and Tormore (Arran), as well as Laig in Highland (McCullagh and Tipping 1998). In south-west Scotland, the work of Jon Terry at Uppercleugh, Bodsberry Hill and Lintshie Gutter is now proving influential (Terry 1993

et al; Terry 1993; 1995); the latter site providing some of our earliest C-14 dates for roundhouse architecture. Patrick Ashmore summarized the Scottish Bronze Age in his comprehensive and authoritative book 'Neolithic and Bronze Age Scotland' (1996); this remains the only work that covers the entirety of this subject.

1.2.4 21st century

In a note to the 2001 reprint of *The Age of Stonehenge* Burgess admitted that the broader periods he used had not found acceptance, but his industrial stages (now called metalwork assemblages) have endured as the backbone of the relative chronology of the British Bronze Age. The prevailing versions are set out in full only in chapter 6 of a volume on lead isotope analysis published in 1998, the work of Stuart Needham, for some thirty years Bronze Age curator in the British Museum. These metalwork assemblages reflect absolute chronology published in Needham's contribution to the 1995 Verona conference (*Acta Archaeologica* 1996) where he divided the British Bronze Age into seven periods (plus the Early Iron Age which includes the last metalwork assemblage). Further radiocarbon dates for Middle and Late Bronze Age metalwork were published by Needham and colleagues in the *Archaeological Journal* in 1997, but none of those dates was from Scotland (apart from one Early Bronze Age date from the Migdale hoard). A summary version of Needham's chronology for the Early and Middle Bronze Ages in southern Britain appeared in June 2010 and a simplified version including the Late Bronze Age is attached as Table 1.

Needham has also reviewed the first phase of bronze-working in Scotland - the Migdale-Marnoch tradition formulated by Dennis Britton in 1963 - in the proceedings of the Society's *Scotland in ancient Europe* conference (published in 2004, which also included contributions on pre-Migdale metalwork (O'Connor), deposition of Early Bronze Age metalwork (Cowie), and faience

(Sheridan & Shortland)) and provided the latest overview of the Beaker sequence (PPS 2005). Needham's 2011 Rhind Lectures on the Late Neolithic and Early Bronze Age are available online¹.

Corpora of rapiers, swords and axes published in the *Prähistorische Bronzefunde* series and covering Scotland have already been mentioned. Scotland has been well-served by this series, in which published volumes also cover daggers, razors and sheet-metal vessels with volumes on Early/Middle Bronze Age spearheads and shields in preparation. The corpora of rapiers and swords have both subsequently been updated. These metalwork finds are normally included in the Royal Commission's online database, CANMORE². New finds, including those by metal detector, are normally reported to the National Museum under Treasure Trove procedure then recorded in *Discovery and Excavation in Scotland*³. This facilitates full publication of important finds and updating of corpora.

¹ <http://www.socantscot.org/article.asp?aid=1207>

² www.canmore.rcahms.gov.uk

³ Available to view online:
<http://archaeologydataservice.ac.uk/archives/view/des/>

Figure 5: Metalwork assemblage from Rohl and Needham 1998, 122. (Figure 23) These assemblages provide the basis for the sequence and chronology of the Scottish Bronze Age.

The possibilities of radiocarbon-dating cremated bone have been fully exploited in Scotland by Sheridan in a series of papers on Cinerary Urns (2003), Food Vessels (2004) and Beakers (2007b), whose value is amplified by similar work on Irish urns (Brindley *The dating of Food Vessels and Urns in Ireland* 2007), which has greatly improved the absolute chronology of the Early Bronze Age. Dating of daggers graves has also contributed to Early Bronze Age absolute chronology (Rameldry; Baker *et al.* 2003); Lockerbie Academy, Kirby 2011; Forteviot in course of study, all building on the corpus of Henshall (1968)). New radiocarbon dates for Bronze Age finds are published annually in *Discovery and Excavation in Scotland*; these have recently included many dates for Early Bronze Age burials as part of the Beaker People and the Beakers and Bodies Projects.

More recent excavations at the site of Kintore in Aberdeenshire provide a wealth of new information on ring-ditch structures (Cook and Dunbar 2008), and recent

developer-funded excavations continue apace including new and important sites in the west such as Aird Quarry and The Carrick, as well as Upper Forth Crossing in the east. Mike Parker Pearson's work at Cladh Hallan, South Uist (Parker Pearson *et al.* 2005) has produced not only evidence of remarkable treatment of the dead, but through the excavation and sampling approach undertaken has permitted a detailed interpretation of house architecture and use.

1.3 A Scottish Chalcolithic?

After many decades of conflicting terminologies for the later third millennium BC (Late Neolithic, Final Neolithic, (early) Beaker period, Copper Age, Early Bronze Age, not to mention Andrew Selkirk's suggested LaNEBA), a critical debate has recently begun about how we should label and interpret the period of 'transition' from the Neolithic to the Bronze Age. Various strands of individual research came together in a Prehistoric Society conference on the British Chalcolithic in April 2009 (publication in press). This still does not mean there is wholehearted consensus over the case for defining a Chalcolithic and it might be ventured that the case should anyway be considered independently for each region on the basis that the character of society was not uniform across Britain during the late third millennium BC.

The 'Chalcolithic' did not of course exist in the minds of the people of the time, except insofar as social groups would have been aware if they held significantly different outlooks and values relative to the old social order, and again relative to any emergent social tendencies which crystallised as ensuing structures. The value of such a definition in archaeology must therefore rest on a broadly based consideration of how society was changing over this period; it would have little virtue if based solely on one aspect, notably the phase of use of unalloyed copper metallurgy.

For Britain in general, a case has been made for the period between *circa* 2450 and 2150 BC, being one of dynamic social change set in train by the insertion of a totally new set of cultural values, those appertaining to the Beaker life-way, into the indigenous scene of the preceding Late Neolithic. Salient questions remain regarding varied regional responses (including within Scotland) and, given a potential sequence of changes over just three centuries, of where precisely to place defining boundaries. Nevertheless, it is difficult to recognise much common ground between the state of society in the 22nd century and that of the 25th century. Moreover, by defining a Chalcolithic, we do manage to avoid the ambiguities caused by the double-labelling of this period of critical social transformations.

Topics of particular relevance to a Scottish oriented discussion around the Chalcolithic include:

- There is a need for further targeted excavation henges, recumbent stone circles and Clava cairns, following on from impressive campaigns of work over recent decades on these key monument types. Henges, in particular (and in Scotland), give the impression of relatively seamless continuity from the beginning of the third millennium through into the early second; but does the outward morphology mask change in use? One can point, for example, to the fact that single-grave burials were only permitted within these precincts after about 2200 BC.
- The orientations of Clava cairns and RSC's are frequently linked to cosmological interpretations; can this line of enquiry be broadened to take in other aspects of contemporary culture and is chronological resolution adequate to seek critical changes in cosmological outlook?
- Refining the extent to which Grooved Ware culture contexts continue after 2450/2400 BC and if so by how long. Of six dated sites thus far published, one (Littleour) does seem to belong in this later period, but a better statistical base is needed.
- The research undertaken within the *Beakers and Bodies Project* and *Beaker People Project*, have provided a solid platform for empirically assessing mobility and diet in (mainly) late third millennium populations. We await full assessment of the bodies of data yielded to see what gross patterns of change might be discernible. Ultimately this might need to be bolstered by more early Food Vessel and contemporary inhumations (assuming enough skeletal remains survive in the region); moreover, all further opportunities to analyse primary Beaker skeletons in Scotland must be seized, since this data-set is currently minimal. The biggest interpretative problem stems from the total absence of suitable skeletal material of the preceding Grooved Ware culture.
- Trying to define the geographical spread and density of *primary* Beaker contexts (mainly graves, but 'domestic' contexts should also be reviewed) – these notionally of the early Chalcolithic (2450/2400 – 2300/2250 BC)
- If there are various critical cultural changes around the 22nd century, why do climax Beaker graves (in Scotland dominated by the Short-Necked Beaker complex) appear to continue little altered from 2300/2250 – 1950 BC? Can any changes be documented?
- What part is played by the appearance of Food Vessel burials as a contrasting burial mode? Can we refine their relationship to the later Beaker sequence and thereby clarify the extent to which the distinction is temporal or spatial? Does this blur a convenient end-point for the Chalcolithic?
- Can settlement assemblages containing Beaker and/or Early Bronze Age ceramics be sequenced better? What implications for changing conceptions of identity and how do they relate to the funerary modes? Are there significant ruptures, or a more gradual process of continual

modification in the light of new influences and impulses?

- What was the currency and ultimate fate of the fine lithic repertoire of Grooved Ware communities? Specific to Scotland are the carved stone balls of the north-east and the many fine maceheads, including evidence for production especially in the northern Isles, but the question is hampered by the dearth of datable contexts. Newly excavated examples of the latter could potentially give a critical boost to this enquiry. Meanwhile, a reappraisal of the respective rock sources used for Late Neolithic and earliest Bronze Age (stage 1 battle-axes) could be instructive regarding continuity or disjuncture in production.
- The social implications of the metalwork repertoire before and after 2150 BC; for example, how defining was the currency of halberds, and the near absence of early

daggers? Why do halberds continue a little beyond the metallurgical transition?

- The organisation of metallurgy before and after 2150 BC; to what extent did the adoption of bronze metallurgy change networks of inter-dependence and inter-regional perspectives? The emergence of the Migdale-Marnoch tradition is relevant here. Is any change in the contexts of metalwork deposition discernible?

1.2.6 Summary chronology and associated artefacts

The table below summarises a chronology for Scotland based on artefact types. Although, as it will be seen, this chronology does not reveal what appear to be obvious changes for example around 1400BC in the settlement record, the period subdivisions are used to subdivide the Scottish Bronze Age in the overview chapter that follows.

Table 2: Summary chronology and associated artefact types for Scotland (based on Needham *et al.* 2010 (Table 1) and Needham 1996 Fig 3 for the Southern British Bronze Age). It is not clear whether any iron objects can confidently be dated to this period.

Period	Metalwork assemblage
1. Copper 2450-2200	Copper axes etc
Early Beaker pottery Copper axes, halberds, knives, sheet gold	
2. EBA 2200-1950	Migdale> Colleopard
Beaker/Food Vessel/Vase Urn Bronze flat axes, flat daggers, halberds, bronze and gold ornaments. Knowes of Trotty Barrow 1. Rameldry dagger grave. Finglenny>Migdale>Colleopard hoards.	
3. EBA 1950-1750	Bunrannoch
Beaker/Food Vessel/Urns Raised-edge and decorated axes, Armorico-British daggers. ?Barnhill dagger grave. Bunrannoch hoard.	
4. EBA 1750-1550	Gavel Moss
Collared/Cordoned Urns Long-flanged axes, Arreton daggers, tanged spearheads. Gavel Moss hoard.	
5. MBA 1550-1150	Caverton>Glentool>Mugdrum
Bucket Urn Short-flanged axes, few palstaves, Group I-III dirks and rapiers, few imported swords, eg Mugdrum, looped spearheads. Glentool hoard.	
6. LBA 1150-950	Poldar Moss
Bucket Urn Palstaves, earliest socketed axes, Group IV dirks and rapiers, looped spearheads, few gold ornaments, cauldrons, few imported swords, eg Poldar Moss.	
7. LBA 950-800	St Andrews
Bucket Urn/'Flat-rimmed ware' Various socketed axes, Ewart Park swords, spearheads, sheet-metal vessels and shields, bronze and gold ornaments. Many hoards, eg St Andrews. Earliest iron, if only ring from Balmashanner hoard.	

EIA 800-600	Poolewe
<p>'Flat-rimmed ware'</p> <p>Sompting axes, Gündlingen swords. Poolewe hoard.</p> <p>Any iron objects confidently datable to this period?</p>	

1.4 Research Recommendations

- Further work is required on intellectual history and the provenance of artefacts to provide the historical context to archaeological understanding for this period.
- Archival material, whether antiquarian, scientific (e.g. SEM) or previously sliced up artefacts, constitutes a valuable resource that would benefit from reanalysis.
- A specifically Scottish chronology that relates chronological data from many sources needs to be developed.
- The Scottish Chalcolithic requires better definition through further research.
- A textbook synthesis for the Scottish Bronze Age is required.

2. Overviews and interconnecting issues

2.1 Interconnecting Issues

Securely contextual metalwork in burials – ‘one-off’ associations - led to the emergence of sequential typologies in the south of England where most excavation had taken place in the 19th century, and, indeed, where most links could be observed with idiosyncratic, distinctive objects produced in communities established in NW Europe and, to some uncertain extent in the Mediterranean Basin. Such links led to a subliminal demand for rapid communication in order that the established chronology of that region could be extended to Britain. This ‘diffusionist chronology’ was, in the middle decades of the 20th century, extended through Britain on the basis of typological linkage. This procedure was brought to its pinnacle of achievement with Gerloff’s study *Early Bronze Age daggers in Great Britain and a reconsideration of the Wessex Culture* (1975) with her deferential regard for Christopher Hawkes, her supervisor and a champion of the diffusionist school.

Even by this stage at the middle of the 1970s Bronze Age studies remained relatively unimpacted by radiocarbon dating (when other periods were becoming concerned about the ‘chronological fault-line’ of Renfrew [1969] largely because it was felt that the accepted chronology was so tight and affirmed that C14 could do little to improve it. This illusion was shattered on Stuart Piggott’s own ground when Wessex was shown (Renfrew, 1968), on the chronological grounds of calibrated C14, to be ‘without Mycenae’. The relatively narrow chronological horizon of EBA/Beaker studies began to drift back in time and to widen to occupy the whole of the chronological span of the Neolithic as visualised by Piggott in 1954.

Thus was the narrative of the Bronze Age emancipated from the dominance of typochronology. But another important force was brought into play in the 1960s. The Stuttgart

programme of metal analysis (SAM) of bronze and copper objects proceeding alongside the *Prähistorische Bronzefund* series overseen by Herman Müller-Karpe initiated in 1965 out of the University of Frankfurt-am-Main.

It was thus in the 1960s and 1970s that the British Bronze Age began to move steadily towards a multi-contextual approach, with intersecting multiple data streams leading towards a chronological and societal narrative – using typological, metallurgical, isotopic and archaeological means. By 1964 John Coles was able to refine his view of the Scottish EBA by a substantial programme of metal analysis that enabled differentiation within the well established framework of typology. The isolation of the Migdale industry (Britton, 1963) was the first stage in the ongoing process of enrichment. Stuart Needham (2004) has brought that process to the ‘Sunburst’ that was further elucidated in his 2010 Rhind lectures.

Now the Chalcolithic and Early Bronze Age has expanded from 3-400 years to a millennium, work has begun to furnish that extended period with an appropriate sequential complexity. Sadly the archaeological resources have not changed unduly. Reliance is still largely upon the ‘closed’ context of the burial (although how ‘unclosed’ that can be is emerging), and hoards that, whatever the quality of the associations, are now routinely C14 dated by contextual association or, indeed, integral association (e.g. hafting materials) wherever possible. For this early period 2500 – 1500 cal BC, however, settlements are still a scarce component of the archaeological record. Yet the environmental record tells us that it is in the middle of this period, after 2000 but before 1500 cal BC that the major onset of landscape disturbance by farmers, usually greater, apparently, than the Neolithic *landnam* disturbances that preceded it, is encountered. Where did these farmers live? Are we compelled to look at nomadic solutions

(Fleming, 1971) or should we take a taphonomically qualified view that these early settlements have succumbed to later agriculture. And here Scotland may have answers to offer in the coastal machair deposits where accumulation may have prevented later eradication. It is interesting that settlements at Lintshie Gutter, Lanarks. (Terry, 1995) – an unenclosed platform settlement, set on a steep hillside in Clydesdale just above Crawford, produces dates between 2580 – 1530 cal BC that fill the chronological range in circumstances where later cultivation is most unlikely in a style of building carried forward into succeeding periods (see Green Knowe, Peebles. Jobey, 1980). Pottery at Lintshie can easily be seen as a material successor to Grooved Ware fabrics (e.g. those located at Whitton Hill, Milfield Basin, Northumbs. dated c.2200 cal BC).

By 1400 cal BC step changes are taking place in the economy over extensive tracts of these islands. Social organisation appears to stabilise in settlement that become, often, of some considerable longevity e.g. at Tormore, Arran (Barber, 1997) and at Lairg, (McCullagh and Tipping 1998), which saw occupation from 2000 -1200 cal BC.

By 1500 metal-working shows profound technical and resource changes against this background of evanescent settlement since the earliest years of the 3rd millennium. Bi- and multi-valve mould casting had been available for the manufacture of highly prestigious items (daggers, halberds, fine axes, and a few spears) before c. 1500. After that date, rapidly, this form of casting, and far more demanding versions of it, were carried out. Metal itself undergoes a series of alloy developments and for Scotland the focus of metalwork development appears to change away from a broadly Southern axis for the whole of Scotland in the full EBA to a predominantly western one dominated by Irish production. Axe and spear forms are very substantially derived from Ireland. England conversely switches to a NW

European focus – an illustration of the dominance of sea ways in the development and control of metal and its sourcing.

The standard mixed arable/pastoral patterns of farming continue within a changing social structure explored by Fokkens (1997) which sees the emergence of local family or clan headmen, strongly independent, who it seems were armed for 'gang warfare' – dirks, rapiers, light spears – lethal, sudden and cruel and small scale. The abundant evidence from farm steadings composed of round houses up to 10m in diameter, often set in co-axial field systems or in less formal clearance arrangements, furnish a wealth of C14 dating for this period between 1500 and 900 calBC, even if the very rare occurrence of metalwork on these sites leaves the metal and settlement components of our view of the Middle Bronze Age uneasy in their chronological (and social) relationship. Burials at this period tend to be often collective cremations in pottery (or steatite vessels in the far north) urns seldom accompanied by artefacts.

From this base, however, alliances may lead, in the face of a climatic decline (and possibly other volcanic impacts), to the formation of hierarchies that in turn may lead to a centralisation of power. Eildon Hill, Selkirkshire may illustrate what such a centre might have looked like (Owen 1992), and Hownam Law, Roxburgh and Yeaverling Bell, Northumbs. may well represent others, expressing perfectly by their location, the climatic optimum of the later 2nd millennium that was rapidly followed by (pretty universal palaeoenvironment consensus for) a climatic decline between c.1000 cal BC and c.500.

Radical change again. Sudden cruel assassination in defence of family interest may have shifted to equally cruel but intensive violence on a more specialised basis. This development of what has sometimes been called an heroic society is portrayed to us through its weapons. The advent of the

sword and its complex development into a fully competent, lethal weapon by the time of the transition to iron, the spear in its pike-like form, and shields as well as cups, cauldrons, buckets, fleshhooks, horns and dress paraphernalia associated with conspicuous, if not gracious, consumption. Wheeled vehicles (in the form of the Heathery Burn, Co. Durham wagon) and horse harness also occur in the record. This armed hierarchy can only have been supported upon the basis of a prospering economy and Scotland has not yet produced an impressive (or even an unimpressive) metal ore mining tradition. So farming must have maintained this advance into the future – whatever the difficulties of the environmental circumstances. More intensive exploitation of favourable areas and pretty horrifying demographic consequences, may have enabled a massive change, possibly under intimidation to the kind of economy that we see at the first understood stage of the “Iron Age”. The Late Bronze Age in the lowland zone will almost certainly be populated with settlement sites by excavation of monument types currently assumed to be Iron Age. This breakthrough was long ago established in the deep stratified circumstances encountered in the northern isles (e.g. at Jarlshof where one of the rare coincidences of metal working and settlement occur).

Chronology for this period of rapid development of prestigious warrior equipment has historically been based upon typology. C14 is, however, increasingly making a contribution with the dating of residual organic components of weapons (e.g. small fragments of wooden hafting left in spear sockets) or more importantly in a ‘new generation’ of sites revealed to us by rescue/developer funded excavation – teaching archaeologists to dig in places that they had not dug before. Valley bottom sites, burnt mound and associated structures and, in England circular Thwing - type forts and Flag Fen - type ‘crannogs’. These opportunities have yet to occur in Scotland but there is no reason why they shouldn’t.

Thus is our run down the tunnel from Neolithic cattle train we have a way to go before any precise understanding of the nature of the “tunnel process”, but progress is well under way.

2.2 Chalcolithic and Bronze Age Scotland: an overview

Chalcolithic (Early Beaker), 25th–22nd century BC [Period 1]

This is marked by the appearance of a range of novelties from the Continent, comprising the following:

- objects of metal (copper and gold – but see below regarding the gold);
- the Beaker pottery tradition (novel both in form and in its technology of manufacture);
- a funerary tradition featuring individual interment, initially in simple graves or in wooden cist-like structures, with gender-specific ‘rules’ regarding body position and status-specific rules concerning grave goods; an emphasis on portraying some men as warriors/hunters; and the provision of food/drink for the journey into an envisaged afterlife;
- novel archery accessories: barbed and tanged arrowheads, belt rings and wristguards (see below regarding bows);
- Continental dress fashion: the use of buttons as a dress accessory;
- (arguably) the use of a fire-making kit comprising a flint strike-a-light and iron pyrites/ore;
- (possibly) the use of oval houses (as seen in the Western Isles).

Figure 6: Archery equipment: a cannal coal belt ring and stone wristguard from near Craigiehall, Perthshire and Fyrish, Evanton, Ross-shire, respectively. The belt ring was likely from a quiver belt, while the wristguard would offer protection from the bowstring, © NMS

These Continental influences appear in a Scotland which, like most of the rest of Britain and Ireland, had apparently had no Continental contacts for several centuries (with Orkney voles, the earliest specimens from around 3000 BC currently offering the best candidate for the most direct links between Scotland and the Continent). There may indeed have been long-distance movements of objects, ideas and people within Britain, and between Britain and Ireland, in the centuries preceding the 25th century BC – as suggested, for example, by sharing of certain Grooved Ware designs across large parts of Britain and Ireland, and by the claimed similarity in house design, c 2600 BC, between Durrington Walls in Wiltshire and Skara Brae in Orkney. However, Late Neolithic Britain and Ireland are marked by an apparent lack of interaction with the Continent. It is this contrast with the strong Continental *comparanda* for every aspect of the Beaker ‘package’ and with isotope evidence for immigration into Britain, at least by the Beaker accompanied burials of the ‘Amesbury Archer’ and arguably also the ‘Boscombe Bowmen’ and a man found at Sorisdale, Coll, that points towards the introduction of ‘the Beaker package’ by small numbers of immigrants from the Continent. Why these people came, and whence they came, remain topics for debate but it seems likely that the reasons included: i) a

Continental ethos whereby male standing was measured not only by prowess as a hunter/warrior but also by the undertaking of heroic, long-distance journeys; ii) (in the south of England, and presumably subsequent to the above) the renown of inland Wessex, especially around Stonehenge, as a major centre for seasonal festivals; and iii) the search for sources of copper and gold to exploit. It may well be that people came from different parts of the Continent to different parts of Britain and Ireland: while the Amesbury Archer may have come from southern Germany/Switzerland/Austria (and note that the isotopic evidence is currently being revisited (Fitzpatrick 2011), and the Boscombe Bowmen could have come from northern France, in Scotland the artefactual and structural evidence suggests the Rhine delta and environs as a possible area of origin (at least for the Upper Largie, Newmill and Biggar Common individuals), with the Atlantic façade another possible candidate (for material found in western Scotland and Ireland, as Case suggested).

There is currently no proof that Scottish copper ores were being exploited at any time during the Chalcolithic or Bronze Age (even though exploitation of sources in the SW at some point during the 2nd millennium cal BC is suspected); analyses of the earliest copper items suggest that the copper used came either from south-west Ireland or from the Continental sources implicated in ‘Bell Beaker metal’ (and see O’Connor 2004, 206 on the copper used for some Scottish halberds, though note that the example said to be from Dunadd has since been shown to be from the Channel Island of Alderney). As regards the earliest metalworking in Scotland, Ian Shepherd proposed, in regard to the copper neck rings from Lumphanan, Aberdeenshire (Shepherd and Bruce 1986), that Dutch metalworkers settling in north-east Scotland may have been making copper objects from a date equivalent to the early Veluwe period in the Netherlands (i.e. c. 2300 BC). If that is correct, then there may well have been metalworking in this part of Scotland prior to

the 'Migdale-Marnoch' tradition of bronzeworking in Period 2 (cf. Cowie 1988).

It is not yet apparent when gold artefacts first appear in Scotland; a recently-obtained C14 date for the rich male grave at Culduthel, on the outskirts of Inverness, has revealed that the gold caps of the copper wristguard rivets date to 3735±35 BP (SUERC-26462, 2200–2040 cal BC at 1σ, 2280–2030 cal BC at 2σ), thereby suggesting perhaps that these are more likely to date to Period 2 than to Period 1. Similarly, it is a moot point whether the gold lunulae and the pair of gold basket-shaped hair ornaments found in Scotland (at Orbliston, with a lunula) pre-date the 22nd century, in view of the facts that: i) at Harlyn Bay, a lunula was associated with a Migdale (Period 2) bronze axehead; ii) the C14 date for a lunula box from Crossdoney, in Ireland, spans the Period 1–Period 2 time bracket; and iii) the Beaker designs found on lunulae relate to Beakers in use between c 2300 and c 2000 BC.

The earliest houses on the mainland, and the Northern Isles do seem to suggest continuity from the Late Neolithic period. One of the earliest houses on mainland Scotland is in the south-west at the platform settlement of Lintshie Gutter, and the platform settlements of Argyll also seem to hold much potential for deriving from this period and on the eastern mainland, three structures from Kintore may also date to this period. A pair of houses at Crossiecrown on Orkney date to this period (Downes and Richards 2000; Jones *et al.* 2010) with C14 dates indicating Late Neolithic, Chalcolithic, and Early Bronze Age phases, and both Beaker and Grooved Ware together in the same midden.

The distribution of the earliest Beaker finds in Scotland is remarkably extensive, with all-over-cord (AOC) Beaker having been found as far north as Shetland, for example. However, as Needham has argued, the impact of the 'Beaker package' may well have been relatively slight for much of this 'Period 1', with the alien people and their alien practices

being regarded as a curiosity, rather than as something to be emulated. In Shetland, evidence for the Beaker period is slight, while in Orkney it is unclear whether anything of the Beaker 'package' appeared until Period 2. Elsewhere, however, there seems to have been an uptake/flourishing of the novel tradition, especially in the Hebrides, where funerary, domestic and agricultural evidence dating to Period 1 is known, and in north-east Scotland. Furthermore, the presence there of metal objects made of Irish copper from Ross Island, Co. Kerry (with around 20 axeheads and several halberds known) suggests the establishment of an extensive network of contacts through which such objects circulated.

The key research questions relating to this period:

- **Did immigrants actually come from the area around the Rhine delta and the Atlantic façade?** And did they come as individuals, or as small groups? At present, owing to the shortage of skeletal material from the earliest Beaker graves (since most have been dug into free-draining ground, thereby eventually destroying the body), much of the argument for area/s of origin rests on artefactual and structural evidence. We need to find more examples of earliest Beaker graves containing preserved skeletal material (especially molar tooth enamel, for strontium and oxygen isotope analysis).
- A specific additional question relates to the oval-shaped houses known from (subsequent) Beaker settlements in the Western Isles: was this house form, introduced from the Continent, or does it represent a type with regional variants such as those in Shetland? More must be discovered about early Beaker domestic structures in general.

• Has the range of introduced innovations at this time been characterised correctly?

Several questions remain, such as:

- The date of the earliest gold objects in Scotland: do they date to Period 1, or to Period 2 (by which time bronze had been adopted)?
- Beaker bows: it is unclear whether Piggott was correct in suggesting that the short, composite, recurve bow was introduced as part of the Beaker 'package'. Until diagnostic traces have been found, the debate about Beaker bows has to continue.
- Were the earliest halberds in use before bronze began to be used? The currently-accepted currency, in Ireland and Britain, is c 2300–1900 BC. Can this be confirmed and/or refined?
- Now that Richard Bradley's fieldwork has demonstrated that Clava cairns, recumbent stone circles and 2-entrance henges were constructed during the second half of the 3rd millennium, it would be useful to be sure whether the first two monument types were built during Period 1 (i.e. before bronze began to be used) or Period 2.
- Any Scottish evidence for horses: now that the Newgrange domesticated horse bones have been dated to the Iron Age, is there any evidence from Britain or Ireland that domesticated horses were a Beaker period introduction, as previously thought?

• If people were prospecting for metal in Scotland at this time, did they find and exploit it? And was there any metalworking in Scotland during this period?

Figure 7: This copper head band, also known as a diadem, one of two found at Lumphanan in Aberdeenshire. The ends of the rod taper into spade-like terminals. A similar diadem, in gold, is known from the Netherlands, and the copper is a composition found in Dutch and Breton objects. The Lumphanan examples emphasise the existence of links across the North Sea at a time when the earliest metal objects, and knowledge of metalworking, was reaching Scotland. ©NMS

- **Just what was the context of Beaker 'novelties' in different parts of Scotland?** The nature, dynamics and tempo of related changes needs to be clarified, as does the character of the Late Neolithic society in different parts of Scotland, in which the Beaker 'package' appeared⁴. The question of what was happening in those parts of Scotland where Beaker pottery is rare or absent also needs to be addressed.

The earliest Bronze Age (22nd–20th century BC) (Period 2)

For parts of Scotland, the rapid switch to bronze-using during the 22nd century seems to have ushered in a period of great change, reflected mainly in the expression perhaps of marked status distinctions in funerary monuments. The adoption of bronze (and the

⁴ At Mye Plantation, Wigtownshire, for example, the dating of a timber from a probable pit-fall trap suggests that the Grooved Ware/Impressed Ware-like pottery found nearby may have been in use around 2300 BC; what non-Beaker pottery was being used elsewhere in Scotland?

inception of the Migdale-Marnoch bronze manufacturing tradition in the North East – the first unequivocal evidence for metal production in Scotland) necessitated the operation of a yet more complex network of contacts than hitherto, over which copper from south-west Ireland (and elsewhere(?)), and tin (almost certainly in ingot form) from south-west England, travelled. Status distinction – which, for the first time, includes female differentiation – is reflected in the following ways:

- For men (mostly senior adult males): continuation and elaboration of the Period 1 tradition, including daggers/knives (as, for instance, at Forteviot), ornate archery equipment and the use of jet and jet-like buttons; also bronze jewellery, and stone battle axeheads. In the case of the Migdale hoard – which seems to comprise a high-ranking man's possessions – evocations of Bavarian fashions (e.g. in the graded bronze bangles and the sheet bronze jewellery, possibly from a head-dress) suggest long-distance links;
- For women: jet and jet-like jewellery (especially spacer plate necklaces, skeuomorphs of Irish gold lunulae) and metal jewellery (e.g. bronze armlets, for instance from Melfort and Masterton).

Some 'rich' child graves are also known, as in the case of two from Doune (Hamilton 1957), one associated with a miniature battle axehead, the other with a miniature macehead.

Figure 8: Hoard of Early Bronze Age flat axes from Hill of Finglenny, Aberdeenshire © NMS Some of the axes have been deliberately broken. The hoard was deposited near the possibly contemporary enclosure of Wormy Hillock.

For both sexes, conspicuous consumption in the construction of the funerary monument is evident, such as in the size and/or construction of the cist itself, the siting of cist graves in pre-existing sacred monuments, or the construction of large and imposing cairns. If the Clava cairns and recumbent stone circles had not been constructed during Period 1, they would have been constructed during this period, and they appear to represent regionally-specific high status funerary monuments.

The areas in which burials display the most obvious evidence for status differentiation (such as the Kilmartin Glen and around the northern end of the Great Glen, parts of eastern Scotland) are areas that probably had greater access to key resources such as metal and agricultural surpluses respectively. Very active networks of interaction operated, with north-east Ireland/south-west Scotland/Great Glen/north-east Scotland being a major conduit for metal from Ireland, and south-west Scotland/east Scotland/north-east England being another network, around which jet jewellery made by specialist producers near Whitby circulated. The recent discovery (through isotopic analysis) that the aforementioned rich male from a cist at Culduthel, near Inverness had grown up in north-east Ireland is but one of several pieces

of evidence for links between Ireland and north-east Scotland (the others including the Irish Bowl Food Vessel from Seafeld West, near Inverness and the gold lunula and hair ornaments from Orbliston, Moray). In the heart of Argyllshire, to the south of the southern end of the Great Glen, rich and/or imposing graves in the Kilmartin Glen attest to links with Ireland, evidenced by Irish-style Food Vessels, and carvings of flat axeheads on cist slabs; with north-east Scotland (as in the partial infilling of the Temple Wood South stone circle to form a ring cairn, reminiscent of a Clava ring cairn); and with Yorkshire (as in the Whitby jet jewellery and in the unique footed Food Vessel from Upper Largie, which embodies both Yorkshire and Irish traits).

In terms of ceramics, this is the period during which most Scottish Beakers were manufactured (i.e. Needham's 'fission period' (2005) – which may have started as early as c 2300 BC), but it is also the period when the Food Vessel tradition was adopted, and when the first cinerary urns were used. It appears that the practice of using Food Vessels was adopted from Ireland and from north-east England (especially Yorkshire), probably as a fashionable novel alternative to Beaker pottery; there is no evidence to suggest that it developed within Scotland (although Scottish variants did subsequently emerge). In Aberdeenshire and Moray, it appears that most of the inhabitants preferred to continue using Beakers while further south, in Tayside and Fife, Food Vessel use became popular. The earliest cinerary urns – which developed as part of the Food Vessel tradition – were used in Scotland during the 22nd or 21st century BC and reflect the beginning of a trend towards cremation as the preferred method of disposal of the dead. A variety of funerary practices were in use: while the inhumation of unburnt, crouched bodies in cists, usually either in flat cemeteries or under mounds, is the commonest mainland practice, enclosed and unenclosed cemeteries featuring the deposition of cremated remains, either in-urned or un-urned, are known from this period, as are other practices. The sealing

of some Neolithic megalithic monuments may well have occurred during this period, as well as the re-use of such monuments for burial (as at Embo, Highland, for example). At Eweford, East Lothian, non-funerary ceremonial activity at an ancient, Early Neolithic long mound is attested with the deposition of thousands of barley grains, and their ceramic container, on the mound. Elsewhere, the deposition of metalwork in special locations in the landscape, presumably as a votive act, is attested (Cowie 2004).

Considerable regional variability existed, although its details tend to be unclear in many areas. The phenomena described above tend to apply to parts of mainland Scotland (although including the southern Hebrides and Clyde islands). Orkney seems to have been on the northern periphery of mainland developments and networks: there is little Beaker pottery (and what is there includes non-mainstream variants); 'classic' single crouched interments in cists are relatively rare, with cremation appearing to be the preferred funerary rite; and high-status objects are few (mainly comprising one bronze flat dagger, a spacer plate from a jet necklace and a V-perforated button of albertite). Shetland appears to have followed its own, insular trajectory.

For most of Scotland for this early Bronze Age period the evidence is heavily biased towards funerary and artefactual finds, with relatively little known about settlement and land use. The exception is the Western Isles, where the evidence is skewed towards the latter (e.g. at Northton, Dalmore and Cnip), and sandhills areas such as Glenluce (where the nature of the activities needs to be understood better). Occupation continues at the platform settlement of Lintshie Gutter, whilst in the east a solitary roundhouse is found at the long-term lowland site of Upper Forth Crossing. Overall, few houses currently date to this period.

Burnt mounds dating to Period 2 have been found near Crawford in Lanarkshire, and at

Stair Lodge in Dumfries and Galloway (Ashmore 1996, 83). A burnt mound dating to a little earlier than these (Period 1) was excavated on Machrie Moor, Arran (op. cit.)

Key research questions relating to this period:

- **What was the nature of settlement and land use?** Old finds of settlement evidence (as at Muirkirk, Ayrshire) could usefully be revisited; the question of where occupation associated with Kilmartin Glen monuments is located; and a round-up of all the settlement and land use evidence for this period from the whole of Scotland is recommended.

- **What was going on in those parts of Scotland where the main trends noted above are not evident?** In particular, the regional narratives for Shetland, Orkney, the north-west Mainland and the central Highlands need to be fleshed out (if indeed there was an appreciable presence in these last two areas).

- **What was the nature of the long-distance links (as in the case of the Lumphanan neck rings and ceramic influences on Beaker design in north-east Scotland) with Central Europe, southern Germany and with early Veluwe Netherlands?**

- **How did objects and materials circulate around Britain and Ireland?** Where there, for instance, materials and artefacts or even people, animals or secondary products, taken to Ireland in exchange for Irish copper, and how was the supply of material organised? Whilst the BPP/B&P projects have produced evidence for reciprocal human movement between Scotland and Yorkshire, what was the nature and scale of exchange activities or of specialist production, and what can the Scottish evidence contribute to these wider questions?

- **Burial and society – what can burial from this period tell us about how was society organised?** Can the funerary evidence can be taken as some indicator of the nature of social organisation, of women were being accorded

richly furnished burials, in apparent contrast to EBA Period 1?

Early Bronze Age, 20th century – 1700/1600 BC (Periods 3 & 4)

Ceramically and in terms of funerary practices, the trends observed for Period 2 continued, with a switch to cremation (mostly in-urned) as the preferred practice over most of Scotland, but with various practices remaining in use, and regional variability as evident as ever. In his Britain-wide re-evaluation of Beaker use, Stuart Needham (2005) characterised this period as marking the end of Beaker use: 'Beaker as past reference'. Late Beakers, and 'Beaker-Food Vessel hybrid' forms, belong to this period, as do the earliest Collared Urns – an urn design which was adopted from further south in England, and then adapted in northern and western Britain and eastern Ireland to become the 'Cordoned Urn'. In Orkney, the use of steatite urns attests to links with Shetland during this period. Differentiation in grave goods is less marked than in previous periods, although some high-status objects (e.g. daggers) are known from funerary contexts. Both flat (unenclosed and enclosed) and mound-based cemeteries were in use, with many of the latter constituting additions to pre-existing mounds.

Contacts between Scotland and other parts of Britain and Ireland continued, but patterns of interaction may have changed as the Ross Island copper source fell out of use and other copper sources started to be exploited. They also seem to have changed as the focus for design innovation and trend-setting switched from Ireland and northern Britain to inland Wessex, where particularly rich graves were being created. (See Needham 2000, 2009, 2010, Needham & Woodward 2008 and Needham *et al.* 2006 for a detailed and authoritative account of the complexities of this period in Wessex). It is a matter for debate whether a possible elite represented by the rich graves achieved control of resources of tin and copper (as well as on an

appropriation of the spiritual power of Stonehenge and related monuments), and whether those elsewhere emulated Wessex fashions— most strikingly at the Knowes of Trotty in Orkney. Here, in the principal mound in a linear barrow cemetery reminiscent of those seen in Wessex, cremated remains dated to the 20th –19th century BC were associated with components of an old and worn amber spacer plate necklace, several prismatic and hook-shaped amber ornaments (unique to this grave) and four gold foil discs. The latter had probably been mounted on low conical organic objects and worn, with the prismatic and hook-shaped ornaments, on a special garment, perhaps a cape. (cf. the Mold Cape, an elite garment that may have been made and used in Wales, in this case interpreted as a direct challenge to the authority of the Wessex elite, rather than as an attempt to emulate Wessex fashions.) The amber spacer plate necklace and prismatic beads, and the inspiration behind the decorated gold foil discs, could possibly have come directly from Wessex. Other evidence suggesting emulation of Wessex fashions in Scotland includes a cannell coal skeuomorph of a Bush Barrow-style belt hook found at Law Hill, Dundee, the sheet gold discs from Barnhill, Angus, and a handful of daggers with close parallels in Wessex; but these need not have resulted from direct contact between ‘Scottish’ and ‘southern English’ people. Similarly, the use of faience, and the know-how to make it, might have been adopted from southern England as part of the same general process of emulation (but see Sheridan & Shortland 2004 for a fuller account).

Other evidence relating to prestige objects is less obviously linked to an emulation of Wessex fashions. In terms of metalwork, this concerns Needham’s ‘Metalwork Assemblages IV and V’, and among its developments can be seen the evolution of the dagger into a dirk and then into a rapier, suggesting a change in the nature or style of combat.

Evidence for settlements and land use is again irregularly distributed around Scotland, with domestic assemblages within the Food Vessel tradition known from the Hebrides (e.g. at Kilellan and Ardnave on Islay, and Sligeanach on South Uist); elsewhere, the earliest unenclosed platform settlements were in use in the southern uplands, with their own, southern Scottish-northern English style of domestic pottery as in the ring-banks of Lintshie Gutter and Bodsberry Hill, which seem to demonstrate continuity from the Chalcolithic period in the south-west (Pope forthcoming). Meanwhile Blairhall Burn, as well as Lairg to the north, each has a new post-built house dating to this period. The stone-built houses at Crossiecrown in Orkney fall out of use within this period (Jones *et al.* 2010) The Ness of Gruting and Sumburgh timber built house (see the case study below), both in Shetland fall within this time range as does a solitary timber roundhouse at the Upper Forth Crossing site in the central valley. The key date for the settlement evidence in this period is 1800 BC, after which we see settlement and consequent arboreal clearance flourish in both upland *and* lowland landscapes.

Figure 9: Early Bronze Age hoard from Gavel Moss, Renfrewshire (Clarke *et al.* 1985) ©NMS
This hoard represents the final phase of the Early Bronze Age in Scotland and is part of a small concentration of metalwork on the modern boundary of Renfrewshire and Ayrshire.

In terms of non-funerary monuments, there is evidence from Upper Largie and from Broomend of Crichton for the construction of timber circles during this period; and the

practice of depositing precious items (especially of metalwork) in wetlands or other significant locations continued.

Key research questions include:

1. What was the overall extent of habitation during this period, and how many of the extant upland house structures, or antecedents of them, are likely to date to this time?
2. What was the nature of land use during this period? Are many of the sub-peat field walls likely to be of this date, and how were these land divisions used?
3. What other funerary and non-funerary monument types were constructed or used at this time?
4. What are the regional narratives for this period?

The Beakers and Bodies Project (University of Aberdeen Museums)

The Leverhulme Trust funded *Beakers and Bodies Project* undertook radiocarbon dating, stable isotope analysis (for diet) and constructed updated typo-chronologies and regional narratives. Some forty AMS radiocarbon dates were obtained primarily for Beaker burials but also for Food Vessel, bronze dagger and ‘unaccompanied’ burials (Curtis *et al.* 2008; Wilkin *et al.* 2009), the material being in the care of a number of museum collections. In addition, sufficiently preserved short-cist skeletons from eastern Scotland were studied by Dr Margaret Hutchison. The skeletons were analysed for sex, age-at-death, general anatomy and pathology and also to look for regional and temporal variations. Some of the project’s findings were also incorporated into Alexandra Shepherd’s important work (forthcoming) on the gendered position and posture of bodies in northern Beaker burials. Stable isotope analysis for diet was also undertaken. The results were consistent across grave-good traditions and did not show any noticeable regional patterns. Detailed discussion of these results by Dr Mandy Jay are incorporated within the AHRC-funded *Beaker People Project*. Finally, the high presence of white inlay on Beaker vessels in the collections of the University of Aberdeen was studied and initial chemical analyses were undertaken, identifying the material as calcium hydroxyapatite - the major inorganic constituent of bone (Curtis *et al.* 2010).

A dataset of all known Chalcolithic and Early Bronze Age burials in the study area was compiled in order to bring these various strands of data together. Regional comparisons between the development of funerary practices in North-East Scotland, the Moray Firth region and East-Central Scotland were developed (Curtis & Wilkin forthcoming a). Moreover, the data was used to approach typo-chronology of funerary Beakers with respect to a range of contextual factors (Curtis & Wilkin forthcoming b). The Bayesian modelling of these dates was incorporated into the construction and interpretation of these narratives.

Future avenues of research include drawing out the temporal and socio-cultural relationships between the now well established dataset for Beaker burials and less thoroughly charted traditions, including Scottish Food Vessel burial, Beakers from non-funerary contexts and recumbent stone circles. Additional work on the presence and identification of the chemical composition of white inlay in Beaker vessels is being pursued by members of the project team and has been initiated in other regions of Britain (Alistair Barclay pers comm.; Mary Davis pers comm.).

The Beakers and Bodies Project (Leverhulme Trust grant F/00 152/S) team, led by Neil Curtis with Neil Wilkin as Project Researcher, also included Dr Margaret Hutchison, Dr Mandy Jay, Ray Kidd, Alexandra Shepherd, Ian Shepherd, Dr Alison Sheridan, and Margot Wright.

Figure 10: A Beaker from Borrowstone, Kingswells, City of Aberdeen, cist 2 examined as part of the Beakers and Bodies project, © University of Aberdeen.

Middle Bronze Age, c 1700/1600–c 12th century BC (Period 5)

In this period the evidence for settlement and metalwork becomes more prominent while in contrast to the Early Bronze Age periods, the funerary evidence is less of a feature. The period sees the continuity of traditional unenclosed platform settlements in the south-west – such as Lintshie Gutter, Lanarkshire and Blairhall Burn, Dumfries and Galloway, – as well as establishment of new ones such as Green Knowe, Peebles and Fruid Reservoir in the Borders (Pope forthcoming). Much more evidence relating to settlement, including many round houses, has been found during developer-funded investigations (including Lairg which continues throughout this period).

During the Middle Bronze Age, the spread of Scottish settlement traditions further south into Northumberland and Durham can be seen. The period sees a far more intensive settling of the lowlands with coastally distributed ring-banks at Kintore/Deer's Den, Aberdeenshire in the east and Tormore and Kilpatrick on Arran in the west, as well as the establishment of a number of post-built houses (Auchrennie (Angus), West Acres (East Renfrewshire) and at the site of the Upper Forth Crossing). After 1600 BC the start of ring-ditch house settlements along the east coast within formerly occupied landscapes such as at Kintore and Upper Forth Crossing can be seen, as well as recently discovered examples at Ednie and Oldmeldrum (Aberdeenshire), and Hatton Farm, Angus (the latter two employing the newer post-built architectures). The period up to 1400 BC seems to have been one of experimentation visible through the expansion of settlement into new landscapes.

Few dates are recorded from the 14th century BC – particularly in more extreme landscapes, such as upland and coastal environments – and 1400 BC seems a likely juncture for major social change. At this point, a decline in traditional architectures (upland/lowland ring-banks and post-built structures) can be seen,

but continuity of the newer *lowland* types (ring-groove and ring-ditch structures). The large polygonal, timber-built ring-groove houses, with their more southerly focus, seem to survive the transition becoming more widely distributed, so that at around 1400 BC this eastern lowlands type is found in the *uplands* at Fruid Reservoir and in the *west* at Ross Bay (Dumfries and Galloway) and The Carrick. Ring-groove houses are then apparently lost to us between the 13th-10th centuries BC and not found again until the 9th century BC. The lowland ring-ditch house seems to have been more successful at surviving the 1400 BC transition in the eastern coastal plain with a good suite of dates across this period. Similarly, however, the ring-ditch house saw decline between the 13th-9th centuries BC: the site of Kintore alone providing evidence for continuity across the Later Bronze Age.

Following social change around and after 1400 cal BC, a return to greater architectural variation (and associated land use) in both upland and lowland landscapes can be found by c. 1250 BC; running alongside the decline of lowland ring-groove and ring-ditch houses noted above. Despite this, there remains far less *variety* in the uplands than there had been prior to 1400 BC, so that Middle Bronze Age land use appears more organised than during the Early Bronze Age, certainly with less experimentation in the settling of landscapes, particularly in the uplands. 13th century BC dates from coastal ring-banks in the north and west include Cladh Hallan (South Uist), Cnoc Stanger H5, Caithness, Cùl a'Bhaile Pd2 (Argyll and Bute), and Upper Suisgill H2, Sutherland; a key feature of these sites is their repeated rebuilding, which is taken to represent their episodic occupation (cf. Halliday 2007). Burnt mounds from the south-west of Scotland (Dervaid and Glenluce), and the west (Machrie Moor, Arran) date to this period (Ashmore 1996, 97).

Key dates for the Middle Bronze Age settlement evidence then are: 1) 1600 BC, when settling of lowland landscapes can be

seen; and 2) 1400 BC, after which follow lowland ring-ditch settlements, apparently associated with cattle-based pastoralism, which flourish at the expense of other more traditional upland settlement forms.

In terms of funerary practices: Cladh Hallan/Hebridean practice in general exhibits a distinctive regional variant, elsewhere, cremation still dominates, with Cordoned Urns morphing into Bucket Urns, and in Orkney, and Shetland, steatite urns still in use.

Monuments: four-posters probably built during this period; short stone rows and kerb cairns being built towards the end of this period.

After the end of the Early Bronze Age the metalwork types characteristic of Scotland were often distinct from southern Britain. The small number of hoards before the Ewart Park phase makes relative chronology difficult and there are still very few absolute dates for Middle and Late Bronze Age objects in Scotland.

Early Bronze Age long-flanged axes were succeeded by short-flanged axes (Bannockburn type, etc) rather than the palstaves which characterised the Middle Bronze Age in southern Britain and such palstaves found in Scotland were imports, like the small number of Irish palstaves. The earliest rapier forms (like the latest daggers types) were scarce in Scotland, the Perth and Pitcaithly dirks - probably imported from Ireland - being exceptions.

The finest rapier blades (with triple-ribbed sections) were also largely absent from Scotland, in contrast to Ireland and south-eastern England. The Taunton metalwork assemblage in southern Britain is characterised by hoards of palstaves and of bronze ornaments (so-called Ornament Horizon) which are not found in Scotland.

Later palstave types from northern England (Shelf type, etc) are found in Scotland but

were not the dominant axe type and short-flanged axes (Cargill type, etc) probably persisted into the Late Bronze Age. Most of the new types characteristic of the Penard assemblage in southern Britain, eg, swords and sheet-bronze vessels, did not reach Scotland; in particular, rapiers (with broad midribs) probably continued to be the dominant weapon. Gold ornaments, notably bar torcs, did occur in Scotland but much less frequently than in Ireland, Wales or southern England. Scottish finds of flesh-hooks seem to represent an extension of their distribution in the north of Ireland.

While some types characteristic of Wilburton hoards in southern Britain are found in Scotland, these were still scarce and swords in particular were probably still imported. The earliest sheet-metal vessel from Scotland (Hattenknowe cauldron) probably belongs to this phase.

Key questions:

Figure 11: Kintraw ©RCAHMS

- The date of individual standing stones is problematic. Some evidence (e.g. Kintraw) suggests that some may have been erected during this period, but what about the others? There is a likely wide time span for construction, from the Late Neolithic onwards and more research is required to date individual monuments.

- What are the land use systems of these three main regional settlement types (unenclosed platform settlements, ring-ditch settlements, and coastal ring-banks)?
- Can an MBA culture in Scotland be identified through metalwork in the same way as in southern England?
- Why did Scottish metalwork diverge from southern Britain 1500-1000 BC?

Figure 12: Bronze Age dirk from at Pitcaithly, Perthshire ©NMS.

Late Bronze Age, c 12th century –8th century (Periods 6 & 7) and Early Iron Age transition

Post-built structures became a feature of Later Bronze Age lowland landscapes along the east coast and, by the 12th century BC, were increasingly large and circular suggesting larger households. Settlement on the western mainland was predominantly coastal and focused south of the Firth of Lorn.

After 1000 BC, settlement became even more coastal, with inland areas only really occupied around the Forth: in Perthshire, Lothian and the Borders. Although unenclosed platform settlements saw occupation across the 2nd millennium BC, a C-14 gap is found in the 10th century BC, and it remains possible that upland settlement instead moved into palisaded enclosures at this time. Instead, the 10th century BC dates are from lowland ring-

banks and post-built structures. Settlement continued in many 2nd millennium BC lowland landscapes – as at Kintore and at the Upper Forth Crossing – with the re-facing of older coastal structures as at Upper Suisgill and Cùl a'Bhaile. By the 9th century BC, there was an apparent return to ancestral unenclosed platform settlements (Green Knowe, Kilearnan Hill). Platforms were again utilised as people began occupying ring-banks at very high altitudes (Carn Dubh and Eildon Hill North at 405 m) in high visibility/highly visible locations, in common with suspected Late Bronze Age occupation of landmark, hilltop sites such as Traprain Law.

Crannogs such as Oakbank Crannog, Loch Tay are a feature of this period. Two burnt mounds in Orkney, Liddle and Beaquoy, date to the late Bronze Age and have distinctive complex internal arrangements of tanks and drains (Hedges 1975).

Towards the end of the Bronze Age there is a period of disruption in the settlement record, beginning after 850 BC (Pope forthcoming). First is an apparent decline in occupation of the western mainland: the last upland date from Balloch Hill, Argyll at c 800 BC, slightly later in the western lowlands at Aird Quarry (Dumfries and Galloway) and Ednie (Aberdeenshire). Meanwhile in the eastern lowlands, by 800BC, traditional post-built houses and ring-banks disappear. An apparent 're-organisation' of lowland settlement takes place in favour of turf-walled ring-ditch structures, a type which had by this time been absent for two centuries. These structures occupy the east coast after c. 780 BC at Kintore, Aberdeenshire, Douglasmuir, Angus and Dryburn Bridge, East Lothian. Meanwhile occupation declined in the eastern uplands by c. 750 BC (Eildon Hill North, Selkirk and Kilearnan Hill, Highlands), after which no dated upland houses are known until the 5th century BC at Carn Dubh. Settlement contracted to the east coast, as these arguably more sedentary ring-ditch households engaging in mixed pastoralism came to characterise the Early Iron Age. This

LBA-EIA 're-organisation of settlement' utilises traditional sites and familiar landscapes, as well as an indigenous ring-groove house type.

Syntheses of settlement have always struggled with the chronologies of forts and other settlement enclosures. For 19th century antiquaries it was the general lack of artefacts, which made excavation such an unrewarding prospect, but despite some limited work by David Christison following up his exhaustive district surveys, and in the 1930s excavations by Gordon Childe (see Ralston 2009, 73-5, note 39), no real progress was made until the excavations of the Piggotts in the late 1940s and 50s. The chronology that emerged, however, familiarly known as the *Hownam Sequence* after the fort of Hownam Rings excavated by Mrs C M Piggott (1948) in the northern Cheviots, was severely compressed, and remained so despite Stuart Piggott's best efforts (1966) until the first application of radiocarbon dating to forts at Craigmarloch Wood in Renfrewshire, Finavon in Angus (Mackie 1969), and Huckhoe in Northumberland (Jobey 1968). While Jobey discussed the possibility that some of the palisaded enclosures of Northumberland and southern Scotland might be Late Bronze Age in date rather than Early Iron Age, the plateau in the calibration curve effectively prevented any precise resolution, and the main thrust of his own work concentrated on unenclosed round-houses to push the settlement record back into the Bronze Age.

Nevertheless, Jobey was well aware of the assemblage of bronze tools from Traprain Law (Jobey 1976), which at the very least seemed to attest a Late Bronze Age occupation if not a fortification, and radiocarbon dates from his excavation of the ramparts at Burnswark in Dumfriesshire also hinted that some of the other large forts known as minor oppida might well have their origins in the Late Bronze Age (Jobey 1978). More recent work at Eildon Hill North (Owen 1992) and Edinburgh Castle (Driscoll and Yeoman 1997) has also uncovered evidence of Late Bronze Age

occupation, but in neither case can it be demonstrated that there are contemporary defences. More recently still in East Lothian, however, Colin Haselgrove obtained a series of Late Bronze Age radiocarbon dates from enclosures at Standingstone and Whittingehame; two comparable dates were also obtained from an evaluation of a fort at East Linton (Haselgrove 2009); while the taphonomy of some of the samples is not without its problems (see Sharples 2011 review), at face value these dates relate to phases of enclosure.

The bulk of the settlement enclosures that contribute to the regional character of the archaeology of south-eastern Scotland are almost certainly Iron Age in date, but it seems likely that the origins of this regional character originate in the Late Bronze Age. Whether this holds more generally for the forts that are found across the rest of Scotland has yet to be tested. By far the majority of these latter are minor works, but amongst them there is a series of larger enclosures, often occupying prominent topographical features in the manner that is familiar from Traprain Law, Eildon Hill North and Burnswark (see Halliday and Ralston forthcoming); it would be surprising if some of these were not occupied in the Late Bronze Age.

Only with the Ewart Park assemblage (named after the sword find close to the Scottish Border) did the swords and socketed axes that traditionally define the Late Bronze Age become common in Scotland. Hoards also became common again only at this time. Alongside Scottish axe types (Highfield type, etc) occur types more common in northern England (notably Yorkshire type). Irish axes also occur (though thorough study of Eogan's corpus is still required to distinguish these from similar Scottish types).

Bronze ornaments distinguish Scottish hoards from those in southern Britain. Penannular bracelets are most characteristic. Pins probably derive from Ireland. Gold ornaments

also became common, though many appear to have been imports. Bracelets of British form are found in southern Scotland, while Irish forms are numerous in the west and north, like Irish dress fasteners.

Most types characteristic of Carp's Tongue (including copper ingots) or Broadward hoards in southern Britain are rare or absent from Scotland. One iron object belongs to this phase, a small ring in the Balmashanner hoard, consistent with the few small iron objects from probable Ewart Park contexts in northern England (see Collard, Darvill & Watts 2006, 406-16 for discussion of early iron).

Only two Scottish hoards (Poolewe, Lamancha) can be attributed to the Llyn Fawr assemblage, but moulds (Rosskeen, Dunagoil) indicate that Sompting axes were being made in Scotland and Gündlingen swords also occur. The sword from the Clyde near Renfrew has recently been identified as a rare import from continental Europe in Scotland. No iron objects appear to be associated with bronzes of this phase. No iron objects appear to be associated with bronzes in this phase, unlike in England and Wales where iron spearheads and sickles occur in associations and socketed axes can be dated absolutely. There is evidence for ironworking relatively early in the sequence at Jarlshof (Curle 1934, 303), but no absolute date is available.

Evidence is emerging for a variety of different monuments attributable to the Late Bronze Age. A type of henge monument identified by Richard Bradley, of which two examples have been excavated (Bradley 2011). Late Bronze Age dates have been ascertained from an earth house at Ness Breck, Mainland Orkney (Carruthers and Lee forthcoming). Burial evidence from the period is however, as in the Early Iron Age, scarce.

Key features

- The re-use of ancient monuments, especially recumbent stone circles; continuing construction of kerb

cairns. Cremation remains the main funerary practice, but at Covesea cave children's heads apparently used in ceremonial manner. (This is notwithstanding that the vertebrae with cut-marks have been found to be of Iron Age date.)

- Small, slightly oval stone circles being built early 1st millennium BC (as suggested at Croft Moraig).
- The emergence of hilltop enclosed settlements and other enclosed settlements; more roundhouses found from developer-funded excavations. This also includes Cladh Hallan with its distinctive practice of using preserved ancestral remains as foundation deposits.

Key features

- Further debate is required regarding the possible effects of further climate shift towards cooler, wetter conditions.
- What happened around 1000BC to revive metalworking in Scotland?

Figure 13: LBA sword hoard, Grosvenor Crescent, Edinburgh ©NMS This hoard from the West End of Edinburgh forms part of a group of sword finds in Mid- and East Lothian. Deposition of seven complete swords is significant on a European scale.

Sumburgh

Figure 14: Plan of Sumburgh (Downes and Lamb 2000, Figure 30, 73)

A pair of houses of Bronze Age crossing into Iron Age date were discovered during the installation of a new runway at Sumburgh, Shetland and excavated firstly by the local society (SANHS), and then by Raymond Lamb, being written up for publication by Jane Downes (Downes and Lamb 2000). Although lacking a sequence of radiocarbon dates, the site at Sumburgh provides evidence of architectural change from the early Bronze through to the early Iron Age, and enabled a re-evaluation of the Shetland houses such as the Benie, Yoxie and Gruting houses placing them in the Bronze Age rather than the Neolithic.

The stone-built pair of houses at Sumburgh sealed the remains of a probably sub-oval house built from timber associated with Beaker pottery and dated to the early Bronze Age. The occurrence of this timber-built house was also mirrored by similar findings at underneath later buildings at Kebister, Shetland (Lowe and Owen 1999), and serves to highlight issues of preservation of these slight buildings and their vulnerability to ploughing and other processes of erosion where they are not sealed by later activity, both on Shetland and further afield.

A hiatus occurred before a small round-sub oval stone house was built, probably in the middle Bronze Age, with its entrance orientated to the south and a courtyard or work area outside to the south. In the later Bronze Age, a larger oval stone built house was added onto the south of the northern house. This large house became the focus of domestic life with a large central hearth around which crafts were undertaken whereas the northern house was during this phase an ancillary space accessed through the southern house. Both the north and south house were laid out with a large central space surrounded by recesses built into the walls.

At the beginning of the Iron Age the walls of the buildings were rebuilt and the interior of the buildings were repaved, including the paving over of the hearth in the south house. The recesses were replaced by bays formed by the insertion of radial piers, and hearths were situated in these bays rather than being the central feature. The new walling enclosed the southern end of the buildings, and entrance was gained from paved passageways to either side at the point where the

buildings joined. A distinct change in material culture, as seen in the pottery and coarse stone tools accompanied the rebuilding of the houses.

Sumburgh is an example of the Bronze Age paired or conjoined houses which can be seen increasingly elsewhere, with several examples in Orkney such as Skaill, Deerness (where the remodelling in the early Iron Age is very similar to that at Sumburgh) (Buteux 1997), and at the Links of Noltland (2011).

2.4 Research Recommendations

- Research is needed into what distinguishes a Bronze Age way of life, including consideration of similarities and contrasts with the Neolithic and Iron Age.
- Comparisons, links and contrasts between Scotland and other countries should be explored. These will vary over time. In the EBA parallels should be sought with Ireland and England and in N. Germany and the Baltic in particular. Ireland and England remain significant influences throughout (Ireland particularly in the MBA). For the LBA parallels should be sought along the Atlantic façade and across the North Sea into N.Germany and the Baltic, as well as in N France and Central and S Germany.
- Scottish metalwork needs to be better dated and innovative approaches to this should be developed.
- The LBA-EIA transition needs better understanding – drawing together and characterizing the evidence as a starting point.
- More complete understanding of whole range of ‘ritual’ monuments is required, integrating burial, settlement and artefact evidence with the landscape context.
- What happened at 1400 BC? Why doesn’t the metalwork reflect this transition in the settlement evidence?

3. Lifeways and Lifestyles

3.1 Introduction

Reconstructing the landscape inherited at around 2500 BC requires one to imagine the landscape of Scotland after the principal period of blanket peat formation. River flood plains of wildly different appearance would have been braided with river courses, large areas of indeterminate drainage and a mosaic of tracts of grassland interdigitated with blocks of woodland, some of which may have been carefully controlled. Arable plots might have been visible near settlements (it remains difficult to estimate the importance of cereals and other crops in Neolithic farming). In areas of enhanced drainage, sheep may have been seen to graze while cattle were most likely more closely husbanded near to settlement *foci*. Pigs would have ranged for pannage in the woodland areas not reserved for timber supply. What remains is the same degree of heterogeneity with a landscape variably defined by exposure to or shadowed from westerly airstreams, by summer and winter temperature variations, by upland and lowland locations and littoral, loch-side, riparian, inland and ruderal locations. It was then, as now, a mosaic of natural vegetation and human landuse impacts; a mosaic of land-use potentials.

From the work of humans over the previous two millennia, people at the start of the Bronze Age inherited a working knowledge of the management of substantial wood and stone building projects, a similar knowledge of construction of domestic, and storage spaces, a deep familiarity with the surface geology, with soils, and with the inherent properties of vegetation and timbers that clad their surface. They would have been intimately familiar with the breeding requirement, behaviour and performance of various domesticated plants and animals. They would have been well versed in the requirements of winter survival, water transport, and the handling and manipulation of great weights,

whether live in the form of a half tonne bull or dead in the form of timber to be split or rocks to be cleared. All of this would have been conducted and managed in the constant realisation of a detailed but probably diverse relationship with the divine.

From a pattern of warm long summers and short intense winters, with latitudinal ameliorations or intensifications, there was a slow change to cooler summers and longer, wetter winters. Since 2000, a series of abrupt climatic “flips” have been identified and these comprise short, intensely dry phases alternating with similarly short, cold and wet phases and are recognised in pollen diagrams across the UK as marked changes in the nature and extent of woodland, heath and bog. There ought to be recognisable impacts from such changes in the landscape of settlement and landuse. However, the image that is constructed from archaeological evidence is of a seemingly inexorable spread of managed pasture and arable at the expense of woodland in the early centuries of the Bronze Age followed by a gradual retreat in the face of expanding acidification and peat cover. There is considerable credible evidence suggesting that humans resisted such changes and so a time-lag, sometimes of centuries in duration, occurred between the on-set of deterioration and the abandonment response.

3.2 Landscape, environment, climate

Climate Change

Much work since the end of the 1990s has led to a new paradigm in understanding when, why and how climate has changed in the Holocene, the last c 11 500 years (Chambers and Brain 2002; Mayewski *et al.* 2004). Very large climatic reconfigurations of the hemispheric or global atmospheric circulation occurred, perhaps with a tempo of around 1400 to 1500 calendar years, which were also abrupt, perhaps complete in decades, certainly noticeable to human populations

and of sufficient scale to impact on societies (de Menocal 2001; Berglund 2003).

The climate of Scotland is determined by conditions in the North Atlantic Ocean. The record of ice-rafted sand grains in the eastern Atlantic Ocean, just off western Ireland, has assumed major significance in defining periods of hemispheric-scale rapid climate change. Sand grains originating in only a few areas around the Arctic Ocean were periodically transported much further south than normal by 'armadas' of icebergs. At c. 2200 BC there is a modest peak in the proportion of such ice-rafted sand grains (Bond *et al.* 1997; Bond *et al.* 2001). The North Atlantic cooled, though it is unlikely that this event had a major impact on the strength of the "gulf stream" (Oppo, McManus and Cullen 2003) and so, little impact, perhaps on marine resources. However, a substantial change in the stratification of the southern Irish Sea after c. cal 1600 BC is explained by Marret, Scourse and Austin (2004) as reflecting a strengthening of the "gulf stream", leading to milder winters, possibly increased winter precipitation and reduced seasonal contrasts, which can only have benefitted agricultural productivity.

There is no record of past temperature change for Scotland. Pollen-derived estimates of seasonal temperature differences from present (Seppa and Birks 2001; Davis *et al.* 2003) cannot capture phases of rapid climate change: they define the slower rhythms of the Milankovitch cycle. Davis *et al.* (2003) suggest for Scotland that summer temperatures were warmer by around 1°C in this period. Winters were around 1°C colder at c. 2000 calBC but were close to the present by c. 1000 calBC. Seasonal contrasts were reduced through the Bronze Age. A long way north of Scotland, in northern Fennoscandia, and so used here with caution, summers warmed between 2000 and 1000 calBC by 0.5°C. Much finer resolutions come from speleothem data. The Crag Cave record in western Ireland (McDermott *et al.* 2001) is thought to reflect air temperature. Here mean

annual temperatures in general were colder than the Holocene average throughout the Bronze Age, as cold as the later Neolithic but warmer than the early Iron Age. Northern Fennoscandian *Pinus sylvestris* (Scots Pine) tree rings are correlated with July temperature (Helama *et al.* 2002). At centennial resolutions, colder than normal centuries were rare after c. 2000 calBC, only the 15th century BC ranking as one of the coldest in the record. The 12th century calBC was unusually warm.

The period 2500–2200 calBC was substantially wetter than average (Barber *et al.* 1994; Anderson 1998; Anderson *et al.* 1998; Tisdall 2000; Charman *et al.* 2006). Soil water tables in central and southern Scotland (data are few further north) were high at c. 2000 calBC, becoming lower by c. 1500 calBC, but rising to peak at 1400–1300 calBC (cf. Marret *et al.* 2004). Lower soil water tables and dryer conditions are then sustained until c. 800 calBC (Charman *et al.* 2006), markedly dryer after c. 1150 calBC (Swindles *et al.* 2010).

Periods of increased storminess should relate to the strength of North Atlantic atmospheric circulation, though also reflecting the greater availability of wind-blown sediment through relative sea level fall. Machair on the Outer Hebrides was frequently mobilised between c. 1800 and 1300 calBC (Gilbertson *et al.* 1999). Early Bronze Age dune construction is also recorded from the early Bronze Age on the North Sea coast (Wilson *et al.* 2001; Orford *et al.* 2000). Peaks in aeolian sand transport in southern Sweden were also at c. 2200–2100 calBC, and then between c. 1050 and 850 calBC (Björck and Clemmensen 2004), the last at least relating to dry soils and possibly drought conditions in Northern Ireland (above: Swindles *et al.* 2010). Dune instability characterised the northern Irish coast after c. 1400 calBC and before c. 1200 calBC (Wilson *et al.* 2004).

Landscape Change

It is conventionally assumed that relative sea level in northern Britain fell constantly from its highest altitude at c. 4500 calBC (Shennan and Horton 2002). Smith, Cullingford and Firth (2000) argued from data on the Carse of Stirling and in southern Scotland for the occurrence of a second relative sea level rise, the Blairdrummond Shoreline, which culminated within the Bronze Age, identified now at several localities on the Scottish coast (Selby *et al.* 2000; Smith *et al.* 2003) and dated to c. 1800 calBC on the west coast (Smith *et al.* 2007). At some localities the altitude reached by this event, the Blairdrummond Shoreline, was higher than that reached by its mid-Holocene predecessor. Recent revisions to the chronology (Smith *et al.* 2010) now suggest the duration of high sea level in the Blairdrummond Shoreline to have been short-lived, but nevertheless, GIS modelling of the Carse of Stirling in later prehistory by Smith *et al.* (2010) shows how the distribution of archaeological sites makes more sense when related to high relative sea level.

Figure 15: The issue of tracing sea-level change was central to work at the Early Bronze Age Pict's Knowe henge (Tipping, Haggart and Milburn 2007). There it was shown that the peak in sea level was of early Neolithic rather than early Bronze Age date. © RCAHMS.

By the beginning of the Bronze Age natural soil development had led to nutrient losses and podsolisation on most well-drained substrates (Davidson and Carter 2003). Soil erosion was occurring. Climatic deterioration

rather than human impact was probably causal in disrupting montane slopes and triggering soil movement across them in the early Bronze Age (Mottershead 1978; Reid and Thomas 2006). High energy debris flows cascading down steep bedrock or talus slopes appear to cluster in time around 1800 to 1500 BC (Ballantyne 2004). Alluvial fans in the western Highlands were constructed after c. 2000 calBC, most actively after c. 1300 calBC (Reid, Thomas and Tipping 2003). It is probable that on lower montane slopes and across the 'flow country' the cover of blanket peat we have today in Scotland was almost fully formed before the Bronze Age (Charman 1992; Tipping 2008). It is not an artefact of agricultural activity, though Bennett, Bunting and Fossitt (1997) argued that on Shetland, though formed prior to the Bronze Age, blanket peat spread accelerated due to agricultural change. Blanket peat could still spread across fields (Barber 1998; Carter 1998; Tipping *et al.* 2008) but this process was not as remorseless as once envisaged (Piggott 1972): farming communities could 'stem the tide'. On slopes under blanket peat or under lightly grazed grassland, soil erosion seems not to have been a problem (Edwards, Hirons and Newell 1991; Tipping 1995). Within farmed landscapes, however, soil erosion from cleared hillslopes and cultivated fields may have been widespread (Edwards and Rowntree 1980; Mercer and Tipping 1994; Terry 1995; Carter 1998; Edwards and Whittington 2001) but seems not to have impacted adversely on farming routines.

Figure 16: Blanket peat in Glen Affric (Tipping 2008) ©Richard Tipping

Some streams and rivers in northern and eastern Scotland changed their behaviour in the early Bronze Age (Macklin *et al.* 2005), usually constructing floodplains by depositing flood sediment, accompanied by lateral erosion and valley widening. Most are in montane and upland landscapes where climate drivers are probable (Robertson-Rintoul 1986; Tipping 2010). Lowland river systems do not display such behaviour, though they were capable of change before and after the Bronze Age, suggesting that woodland clearance and agricultural practice were not in this period causal in fluvial change. There is no evidence as yet for the scale of floodplain transformation described in central England where single channel meandering rivers emerged within the Bronze Age from natural, multi-threaded streams as a result of intensive agriculture and concomitant changes in fluvial hydrology (Brown & Keough 1992).

Figure 17: GIS model of blanket peat inception and spread in Glen Affric from a series of AMS ¹⁴C dates. (Tipping 2008) ©Richard Tipping

Knowledge Gaps

It is important to establish the precise altitudinal and temporal pattern of later prehistoric relative sea level change because, as Smith *et al.* (2010) have shown the distributions of later prehistoric archaeological sites make more sense when this is reconstructed. This is true not just for sites near the present coast but also for former estuarine regions.

There needs to be more awareness among the archaeological community of the extents of these estuaries in the past. Archaeologists need to talk to coastal geomorphologists if opportunities for collaboration are not to be missed. For example, the work of Ellis (2001) on the Carse of Stirling could have contributed enormously to an understanding of sea level change had ¹⁴C dated borehole data only been surveyed to OD.

Empirical data on relative sea level change still need to be collected because computer models cannot identify features that affect specific localities. There is a need for the construction of local relative sea level changes in important early Bronze Age landscapes such as the Kilmartin Glen.

Sea level affects the geography of coastal landscapes, and so the distribution and availability of marine resources: these are rarely researched in the Scottish Bronze Age. Does one assume there was no role for these resources or has no-one looked?

Sand dunes and sheets produce a wealth of artefacts (e.g. Cowie 1996) but current understanding of their construction and chronology is very poor. Yet these are key sources in understanding key environmental stresses like storminess. The perception of hazard from storms, even more than the actual hazard, probably influenced long-

distance connectivity and trade, and we need to understand this to explain the artefactual record.

People moving around was important, particularly as isotopic data show how distant were some of the movements. In this regard the navigability of rivers and estuaries is important (e.g. Strachan 2010). Whilst past behaviour and hydrological regime of rivers can be defined (Lewin, Macklin and Johnstone 2005) research has often ignored such basic attributes as channel width and depth, riparian woodland, natural log-jams and woody debris hindering movement, and the persistence of fording places.

Blanket peat spread in the uplands may have been important in the Bronze Age. Despite the sweeping statements above, there are very few localities in Scotland where the inception of blanket peat, its triggering mechanisms if any, its rate of spread and the role of farming communities in keeping it at bay has been measured. This is a central question for the understanding of later prehistory in Scotland. The time lag between acidification and blanket peat spread, and changes in the archaeological records needs much further research.

Natural Woodland Loss

Across the mainland of northern Scotland north of the Great Glen, populations of pine trees that had grown on blanket peat surfaces died between c. 2200 and 1900 calBC, seen in thousands of stumps across the Highlands (Birks 1975; Dubois and Ferguson 1985, 1988; Bridge, Haggart and Lowe 1990; Gear and Huntley 1991; Daniell 1997; Huntley, Daniell and Allen 1997) and as reductions in proportions of pollen (see reviews in Tipping 1994; Bennett 1995). The presumed regional synchronicity of this event has always encouraged explanation by a climatic driving force, but new data suggest considerable diachroneity, even in northern Scotland (Tipping *et al.* 2008). An attempt to show that pine woodland loss was anthropogenic at a

site above Golspie in north east Scotland proved this proposal to be unsubstantiated (Tipping *et al.* 2008). Early and middle Bronze Age metal axe marks showed people cutting through pine stumps and branches, but the trees themselves were already long dead.

On the Northern Isles much of the woodland, which was never dense and always tenuous, had been lost before the Bronze Age (Keatinge & Dickson 1979; Bunting 1994; Tipping 1994; Bennett *et al.* 1997), again perhaps principally through climatic stress. At Catta Ness in Shetland the earliest woodland reduction is dated to c. 2000 calBC (Bennett *et al.* 1992), possibly anthropogenic but being coincident with the pine decline the authors point out that “disentangling cause and effect at any one site is likely to be difficult” (p. 263). Birch, oak and hazel trees at altitudes above 350m OD in northern Scotland were also impacted by this climatic deterioration (Davies 1999; Tipping, Davies and Tisdall 2006), so that large expanses of the west-central highlands, Cairngorm and northern Highlands were probably changed at c. 2000 BC to open dry heath and grassland by woodland collapse.

In recent years it has been recognised that populations of oak trees growing on peat bogs also suffered abrupt, short-lived collapses, ‘dying-off’ phases, across north west Europe (Leuschner *et al.* 2002). Within the Bronze Age there were such phases around 2000, 1740, 1680, 1550, 1470, 1400 and 1030 calBC. These too must have been natural though cause is unknown. Oak trees regenerated following these events but a long term effect of their failure may have been more aggressive and persistent growth of adventitious hazel and birch trees. Such successional change would mimic the pattern created in, for example, the colonisation by trees of abandoned farmland. The impacts of climate and, possibly, disease, on tree populations make it harder now to attribute anthropogenic origins for some woodland changes: there are strong competing hypotheses. The impacts of climate stress probably decreased southward and

eastward, or more probably the deciduous oak-hazel woods of southern Scotland were more resistant to such stress.

Knowledge Gaps

There is a need to disentangle natural and anthropogenic impacts on fragile woodland in northern Scotland. This should come from analyses where climatic indicators are related stratigraphically to measures of tree abundance. There are a number of anecdotal and unexplored reports which describe pine stumps in peat bogs charred by fire. Fire can be natural in origin but can be set by people. This method of clearance would have been very effective given the flammable nature of pine. These reports suggest we should not yet dismiss human activity in causing losses of pine trees at c. 2000 BC or later in the Bronze Age.

Most palaeoecological work on the pine decline in northern Scotland has focused on tree populations that grew on climatically driven, temporarily dry peat bog surfaces. Only recently have we had pollen data to show that in some regions pine woodland was very important on well-drained mineral soils as well (Paterson 2011). This is useful to know because we can now recognise the need for them to be cleared for agriculture.

It would be good to know how much primary woodland, unaltered by people, still grew at the beginning of the early Bronze Age, and whether this was diminished at the end of the period. The 'gut feeling' is that very little deciduous woodland had not been altered by c. 2000 BC but that pine woodland was less altered. If correct, this might mean that there were far fewer resources within pine woodland, or just that they grew where there were few people.

Did primary woodlands comprise one dominant tree taxon or were they mixed with other trees? This is important because this affects the ease (a) with which resources (fuel and wild food) could be hunted and collected

by people, (b) how easy it was for people to move through woodland and (c) what the spatial extent and scale was of dying pine and oak populations. Davies (2007) has described the delicate relationship between naturally dying pine populations and farmers but we do not know what effect, for instance, 'great dying off' events in oak populations had on the landscape or on people. Palynological techniques are available to understand woodland dynamics at the stand scale. These need to be used more fully.

The relationship between people and trees in later prehistory is not yet fully understood. Too often it is assumed to have been an antagonistic relationship, and terms such as 'clearance' and 'impact' are used, but these terms reflect more recent thinking, arguably divorced from nature and human need.

Some aspects of agricultural development

Andrew Richmond (1999) argued from an extensive review of data on settlement and land use that the early Bronze Age was the first time when people committed entirely to agriculture as an economy: see also Parker Pearson (1993; 1999) and Brück (2002). Renewed focus now on the central importance of farming in the Neolithic (Rowley-Conwy 2004; Bogaard and Jones 2007; Jones and Rowley-Conwy 2007) throws into question Richmond's interpretations, but in Argyll and on the Solway Firth there was a markedly greater interest in farming only from the earliest Bronze Age (Macklin *et al.* 2000; Tipping *et al.* 2004).

There is in general no sharply defined decline in the birch-hazel-oak woods of northern and western Scotland (Tipping 1994; Edwards & Whittington 1998; Edwards *et al.* 2000). It was gradual, with individual trees dying and not being replaced. Anthropogenic woodland reduction through sustained low intensity grazing pressure (Buckland & Edwards 1984) is only one of several explanations. Natural attrition through exposure (Quine 2003), blanket peat spread (Tallis 1991; Charman

1992; Tipping 2008) and soil deterioration (Wardle, Walker & Bardgett 2004) can have been implicated, with all factors probably operative. Much deciduous woodland in these regions survived through the Bronze Age (Tipping 1994; Smith 1998; Carter, Dalland & Long 2005; Bunting, Middleton & Twiddle 2007).

Much of the oak-dominant woodland of central and southern Scotland also survived through the Bronze Age. The density of Bronze Age archaeological remains in the Cheviot uplands led Burgess (1984, 1985, 1990, 1995) to see the hills as treeless, highly populated and economically vigorous (cf. Gates 1983). Pollen diagrams show abundant trees still remained (Tipping 1997a; 2010) with farmsteads and field systems isolated within woodland, supporting a low population. The archaeological record probably overestimates the numbers of people creating it, and palaeoecologists probably overestimate the numbers of trees there were. Some, perhaps a minority, of the woodland was probably still primary, still unaffected by agricultural activities, but its survival in some instances need not represent woodland unaffected by people. Resource protection from livestock, conservation and management may have existed also (Tipping *et al.* 2008). Fuel was needed: Dickson & Dickson (2000, 70-75) show the wide range of species used for fuel in upper Clydesdale. Monuments used tall and straight oak trees. Some trees may have been sacred (Darwin 1994; Newman *et al.* 2007, the latter in an Iron Age context).

Within deciduous woods that suffered few natural setbacks, anthropogenic woodland clearance is almost ubiquitously described as 'small' and 'temporary', and in contrast to the slow attrition of woodland in the north and west, woodland clearance phases in central and southern Scotland were often short-lived, episodic, and always followed by woodland regeneration (Tipping 1994). Judith Turner (1965, 1970, 1975) tried to understand the spatial extent of woodland clearance from an

integrated network of pollen analyses, 'three-dimensional' pollen diagrams. By small, Turner (1975, 95) suggested that Bronze Age clearings were 'up to a few hundred metres in diameter at the very most'. Re-examination of her data in light of a better understanding of pollen transport might suggest that clearings were of several square kilometres, far larger and perhaps related to ground shared by several rather than single farmsteads. Tipping (2000) calibrated Turner's original ¹⁴C based chronology to conclude that the duration of each clearance event may have been c. 150 years, again longer than the duration expected of individual roundhouses (Halliday 2007).

This impermanence discerned in the palaeoecological record is at the scale of the farming unit (Gerritsen 1999). There are difficulties in measuring settlement shift archaeologically. At Lairg in northern Scotland it was nigh impossible to demonstrate that two roundhouses in a cluster were occupied contemporaneously despite a comprehensive dating strategy (McCullagh & Tipping 1998): this sequence might now benefit from Bayesian approaches to dating. Gerritsen's (1999) description of Iron Age 'wandering settlements' in Denmark, though from a later period and with buildings very different to Scottish roundhouses, does fit very well with the patterns of shifting land use described in pollen records from the Scottish uplands. Later prehistoric roundhouses may have been occupied for only a few decades before needing to be rebuilt (Barber and Crone 2001; Halliday 2007; Pope 2008) (but see Ralston & Ashmore (2007) for a critique of this idea) but the spatial scale of apparent settlement shift is bigger than implied only by the need to rebuild. 'Wandering' seems to indicate a freedom of movement unconstrained by rigid systems of land tenure: the organic growth of small patches of cultivation shown for the Danish earlier Iron Age by Sorensen (2007) would also fit well into Scottish Bronze Age landscapes. But why settlements 'wandered' is unclear. Slash & burn cultivation (Rowley-Conwy 1981; Huntley 2007) is an

inappropriate explanatory model borrowed from environments entirely different to Scotland's and from soils more vulnerable to nutrient loss. Besides, the routine application of domestic waste to restore soil nutrients is known from Bronze Age agricultural systems (Bakels 1997; Guttman, Simpson & Davidson 2005). Long term fallow is another possibility (Bevan 2007) with historical parallels in western Scotland (Dodgshon 1998) though not persisting over several human generations. It is, perhaps, to be borne in mind that disease or vermin might well become endemic in an old house leading to rational and/or superstitious desertion.

On cleared ground field systems were established. The emergence of cairnfields in northern Britain is most often seen as a process of gradual organic growth (Quartermaine 2002), linked to the beginnings of land tenure (Johnston 2002). Cairnfields have been seen as *foci* of sustained upland agriculture (Jobey 1968; Davies & Turner 1979; Hoaen & Loney 2007). Cayless (2000) found, however, from pollen analyses within and largely reflecting the use of the cairnfield at Stanishiel Rig in upper Annandale (RCAHMS 1997) that agricultural activity was intense but only brief, a century or so in the earliest Bronze Age, after which there was little further agricultural activity. Cairnfields need not have represented major or permanent transformations of the landscape. Other field systems have proved difficult to understand archaeologically. At An Sithean on Islay what was thought to have been a single field system was shown to be more fragmentary (Barber & Brown 1984). It is unclear how extensive was the small coaxial field system ¹⁴C dated to the Later Bronze Age at Tulloch Wood near Forres (Carter 1993). Cord rig (Topping 1989) probably has a long rather than a short chronology (Carter 1994; Tipping 2010). Away from Scotland, what was seen as a unitary landscape typified by coaxial fields on Dartmoor (Fleming 1988) is now being deconstructed, appearing far less coherent (Johnston 2005; Fyfe *et al.* 2008). Scotland has as yet nothing like the fully integrated

agrarian landscapes proposed for southern England (Yates 2007).

There is considerable pollen-analytical evidence for upland cereal cultivation from the early Bronze Age (Tipping 2002). The crop was almost entirely of barley: warm summers, particularly after c. 1600 BC may have encouraged this. There is little evidence for a specialisation emerging between lowland mixed or arable farming and upland livestock production (Tipping 2002). The impression from palaeoecological data is that Bronze Age farmers were doing much the same thing everywhere in a landscape without core areas and consequently with no margins.

At Lairg (McCullagh & Tipping 1998), however, soils were cultivated around the roundhouses but it could not be shown that cereals which were stored had been grown locally. Trade with specialist arable farms is possible. Preston, Pearman and Hall (2004) identified several arable weeds that appear in Britain for the first time in the later Bronze Age, which they tentatively attribute to increasing connectivity through trade, but specialist arable farms may have allowed more rapid spread through creating larger expanses of ploughed ground. In this model, upland areas were settled by people committed to predominantly pastoral activities. Pastoralism has been suggested to have been a Bronze Age specialism at Newton Mearns in the Clyde Valley (Toolis 2005), and in this and earlier discussion (Halliday 1985; Cowley 1998) a transhumant economy has been invoked. This remains speculative. The ubiquity of the phrase 'mixed farming' to describe the agriculture of these communities might be correct or might be a rather glib euphemism meaning little.

One of the dominant features to the Bronze Age of much of Scotland is the manner in which human land-use attempts to counter, but could often exacerbate, the trajectory of declining soil condition. A prominent footprint left by such behaviour are farming methods

which concentrate soil nutrients (either by transport of soil or by transport of animal dung) into smaller managed units. These may equate with fields, as recognised in other areas and in later periods; the establishment and maintenance of fields may have generated acute changes in perceptions of land tenure, inheritance and social hierarchy.

Knowledge Gaps

There is a need to question again the role of agriculture in the Bronze Age, and in particular how it developed from that in the later Neolithic.

There is still a mismatch between the landscapes imagined from archaeological data and those imagined by palaeoecologists. This is a particular issue in the Bronze Age as settlements become easier to identify and excavate. In part this is because archaeologists are describing evidence for settlement and palaeoecologists describe land uses, which are inevitably more extensive. Both disciplines are moving closer together: landscape archaeology has directed attention to recording at spatial scales that the palaeoecologist is happiest describing and the palaeoecologists are learning to adjust their reconstructions to smaller, human scales. But new issues emerge. The recent suggestion that houses had rather short lifespans has substantial implications for reconstructions of settlement density, although this idea makes more likely the interpretations from palynology of rather empty uplands in the Bronze Age.

How can the suggestion that core agricultural areas did not exist in the Bronze Age be tested? Re-evaluation of past work on, e.g. charred plant remains, might identify more sophisticated techniques (van der Veen 1992) employed in some regions and not others. What does the archaeological settlement record reveal: are there contrasts in the size or complexity of settlements?

It is difficult for palaeoecologists to recognise woodland conservation and management though it is likely that such techniques were practiced in later prehistory. Experimental approaches to recognising coppicing are ongoing but at present we continue to assume that woodland destruction was the only intention of farming communities.

The apparent mobility of Bronze Age farming communities at the temporal and spatial scales described by Judith Turner 50 years ago is not understood. Again, short-duration settlement might hold one key, although houses can be rebuilt on the same site. There seem to be few environmental reasons for this behaviour (above). The apparent impetus to move around every few generations needs to be explored from landscape archaeological approaches coupled with Bayesian or wiggle matched dating strategies from high temporal resolution, local scale pollen analyses.

If mobility is poorly understood, then sedentism is not clear either. How is sedentism identified?

Scotland seems not to have seen the large scale co-axial field systems recorded, for example, in the Thames valley. Why not? This cannot be because of site destruction: the Thames Valley is heavily disturbed yet still the field systems are found. But it might be through the lack of very large excavation projects in Scotland (see Catling 2011). Was their absence also through environmental constraints? The Lothians and Angus were surely sufficiently productive to lead to this scale of organisation. Might differences in land use relate to differences in social structure?

There is a need to develop techniques to recognise agricultural specialisms. Can the balance between arable and pasture be defined? Charred plant analyses rarely identify pasture (van der Veen 1992) and pollen records are biased against crop growing. Can one begin to identify what choices in agricultural techniques were

available at any one time? Is it possible to define why some techniques were known about but not chosen? When were innovative practices discovered? What motivated the innovation at that time? Are there techniques to define, for instance, the season a site was occupied, because only this can unambiguously demonstrate transhumance. There is a need to integrate the study of faunal remains and animal husbandry technique with evidence from soils, pollen and charred plant remains.

Possible human responses to climate change in the early Bronze Age

Between c. 2000 and 1500 BC there was a major and sustained colonisation of the uplands throughout Britain, into previously unoccupied or scarcely visited montane landscapes (Burgess 1980; 1984; Fleming 1988; Parker Pearson 1993; Ashmore 1996; 2001; RCAHMS 1997; Cowley 1998; Tipping 2002, 2010). This has usually been interpreted as an expansion of the population through population growth. ‘Expansion’ is a difficult term, because this implies the filling-up of a core area with people and the colonization of marginal ones: people were pushed uphill. There are, however, no data, palaeoecological or archaeological, from which to suggest increasing population pressures at this time (Tipping 2002). There is little reason to think lowland soils could be exhausted of nutrients given the evidence for manuring (Bakels 1997). There was no climatic ‘golden age’ at the beginning of the Bronze Age: instead there was a major climatic deterioration. A dislike for determinist arguments has led to lack of awareness of climate change, though the tide is beginning to turn again (Haselgrove and Pope 2007). There is however a need for caution (Tipping 2002; Coombes and Barber 2005): the scale of hemispheric climate change is stunning but climate change need

not automatically have led to societal disruption.

Burgess (1984; 1992; 1995) imagined settlers either pushed into the uplands because lowland soils became nutrient-poor or being drawn into the uplands through climatic amelioration, but these arguments can easily become circular (Bradley 2002). They are unlikely to have been correct. Lowland soils have always supported the highest populations, and there is no evidence that this was not true in the early Bronze Age. The second is very unlikely on palaeoclimatic grounds. Colonisation occurred not because climatic amelioration encouraged it but in spite of large scale climatic deterioration (above: Tipping & Tisdall 2004). Davies (2007) has elegantly theorised how the demise of upland pine dominant woods in northern Scotland at around 2000 to 1800 BC created landscapes with diverse soils and resources and the ‘right conditions’ for farmers to be drawn to the uplands. To paraphrase Baillie (1998): ‘bad for trees – good for humans’. What those ‘right conditions’ were remains to be defined. Davies (2007) argued that pastoral specialists were advantaged. Economic drivers may have promised a benefit that outweighed ecological and climatic risks (Walsh 2005). But it is not clear if such specialisms existed (above), and Davies (2007) identifies the lack of grazing in peat- and heath-dominated uplands, the short growing season for grasses and the absence of meadow and hay as the major limitations on economic growth. Dependence on trade may have had very high risks. An insular, subsistence economy, carefully constructed and honed, and purposefully simple, with no requirement to trade, may have characterised pioneer communities high in the hills. The simplicity of this tried and tested system may have made it most resilient to environmental stresses because there was little that could go wrong (Tipping 2005).

Davies’ (2007) model does not in all its characteristics apply to regions of deciduous woodland in central and southern Scotland. A

different driving force is required to explain the same colonisation of the uplands. This is not yet understood. Population growth is one driver, but is poorly understood because lowland areas are those most impacted by destruction of the archaeological landscape (Haselgrove 2002). The best measure of population density in lowland areas will probably come from securely dated pollen data but these are, to date, too few to synthesise.

Knowledge Gaps

There is a need to explain why the uplands began to be colonised in the early Bronze Age. Given that the early Bronze Age was characterised by increased waterlogging, probably a direct increase in precipitation, do we look to the explanation for late Bronze Age migration developed by van Geel: are the two periods analogous? The lowlands are the sources of most Bronze Age archaeological finds but not settlement (Cowie and Shepherd 2003). Did lowland settlement cease? Environmental evidence needs to be combined with a better understanding of society, in terms of kinship and cosmology.

There is a tendency to think of core areas for agricultural productivity, and therefore margins. Climatically, except in the early Bronze Age, around 1500 calBC and at the boundary with the Iron Age, there were probably fewer climatic contrasts between lowland and upland and between west and east, particularly after c. 1500 calBC as seasons became more similar. Perhaps one should think of a rural economy without core areas, in which upland farmers did not recognise themselves as being disadvantaged.

Possible human responses to climate change in the late Bronze Age

Arguments have been presented over many years that climatic deterioration impacted on large areas of the British uplands towards the

end of the Bronze Age, forcing their abandonment by farmers (for example Piggott 1972; Burgess 1984, 1985, 1989; Barber 1998; Robinson and Dickson 1998; Amesbury *et al.* 2008). Interpretations of abandonment from northern British landscapes focused on the downward depression of agricultural limits and so the abandonment of upland landscapes, influenced by Parry's (1975, 1978) work on 'little ice age' impacts in south east Scotland. Soil acidification through nutrient loss, and the spread of blanket peat are also postulated (Robinson and Dickson 1998).

Challenges to these interpretations have been made on archaeological grounds (Gates 1983; Young & Simmonds 1995, 1999; Young 2000; Bevan 2007), arguing for continuity of settlement across the Bronze-Iron Age transition. Cessation of anthropogenic activity is, of course, very hard to define (Caseldine 1999). Palynological evidence in the uplands of Scotland was synthesised by Tipping (2002), who suggested that there was little evidence for retreat. Dark (2006) reached the same conclusion from a larger data-set throughout Britain. Recent interpretations have, however, suggested that withdrawal from the uplands in the late Bronze Age can be recognised. This was characterised not by abandonment but by the re-organisation of farming practice, and in particular the decision to focus crop-growing at lower altitudes (Davies 1999; Tipping *et al.* 2008; Tipping 2010). This period may have seen the first differentiation of upland and lowland farming practices and the first time that some form of agrarian specialism emerged (Halliday 1993).

Burgess (1989) and Baillie (1989) saw this within the later Bronze Age, at c. 1250 BC. They related it to volcanic activity (see also Grattan, Gilbertson and Charman 1999). That model has not fared well (Buckland, Dugmore and Edwards 1997). The period 1200 to 800 calBC undoubtedly includes within it a phase of global abrupt climate change (Mayewski *et al.* 2004; Chambers *et al.* 2007) but Mayewski *et al.* (2004) 'fudge' the chronology by identifying the entire period 1200-800 calBC

as one of ‘rapid’ climate change. Closer dating of climate change in this period is difficult because it lies within a major radiocarbon plateau but van Geel and colleagues in The Netherlands used wiggle matched ¹⁴C analyses (van Geel & Mook 1989) to identify a short period around 850 BC as critical. This boundary is significantly different to that of c. 1250 BC that Burgess (1989) and Baillie (1989) envisaged as the crisis. Analyses of changing water tables in Dutch raised mosses have suggested that the greatest impact on people was likely to have been in lowland landscapes (van Geel *et al.* 1996), not in the uplands. Van Geel *et al.* (1996, 1998) have argued that climatic deterioration led to elevated water tables and population movement away from established farmland and out onto salt marshes. More recently van Geel *et al.* (2004) have explored the links in this period between climatic deterioration and population movements in central Europe. Van Geel & Berglund (2000) also argued that this climatic stress led after c. 500 BC to the restructuring of society and its revitalisation across north west Europe.

Knowledge Gaps

Was there a ‘retreat from the margins’ at the end of the Bronze Age? How could this be measured? Archaeological evidence for settlement abandonment and closure seem to have occurred towards the end of the Bronze Age (Barber 1998; McCullagh and Tipping (1998) but the difficulties in demonstrating these from absences of evidence requires no explanation here. By turning this issue around and looking for positives it should be possible to demonstrate that lowland areas were farmed more intensively or extensively. This was what Tipping *et al.* (2008) tried to show from pollen analyses, with equivocal success. Can we show this archaeologically? What competing hypotheses are there for this apparent abandonment? These need to be explicitly tested. Is climate stress the most economical explanation? Pollen analyses can suggest that the land did not become derelict:

in this sense nothing was abandoned and it becomes important in future to use more precise terminology. Even where crop-growing may have ceased (more absences of evidence) the hills were turned to livestock production. The difference between settlement and land use is critical here. Which would have been more important to people at the time?

There has been considerable confusion over when the ‘retreat from the margins’ occurred. This issue needs to be clarified.

Colin Burgess used in his interpretations what he saw as reductions in the amount of metalwork being circulated in the Ewart Park phase as evidence for populations under climatic stress. This needs to be re-evaluated. Understanding of late Bronze Age metalwork has changed. Is the Ewart Park phase still dated to the period Burgess thought it was? Is metalwork production/circulation a valid indicator of environmental stress? Plunkett (2009), for instance, has related metalwork production to the vigour of Bronze Age farming in Ireland, but has suggested that metalwork production was a measure of socio-economic or political factors rather than failures in subsistence.

Can van Geel’s model (van Geel and Berglund 2000; van Geel *et al.* 2004) be applied to Scotland?

Impact of the Environment: Orkney

Figure 18: Summary of environmental changes at sites investigated by Farrell (2009), © Michelle Farrell

The islands of Orkney provide an excellent opportunity to study the possible influence of environmental conditions on prehistoric human activity within a geographically defined area. Archaeological remains from the Orcadian Bronze Age are less visible than those from the Neolithic and Iron Age, leading to suggestions that the Neolithic-Bronze Age transition represents a cultural and/or economic 'decline' (e.g. Øvrevik 1985; Ritchie 1995). This has often been attributed to environmental factors such as climatic deterioration, soil exhaustion caused by intensive agriculture during the late Neolithic, effects of Icelandic volcanic eruptions, and the spread of blanket peat. The basis for these suggestions is unclear, since there is little published evidence for post-Neolithic environmental conditions in the islands and that which does exist comes from areas that are currently considered to be agriculturally marginal. In order to address these problems, new high-resolution palynological records were obtained from three small wetland basins situated within landscapes with differing degrees of marginality (Farrell 2009). Radiocarbon chronologies for these sequences show that events previously assumed to be synchronous across Orkney, such as woodland decline and the spread of heathland, are in fact highly variable.

These new records, when synthesised with existing palaeoecological and archaeological data, indicate that during the Bronze Age a pastoral specialism developed in the more marginal parts of Orkney while elsewhere arable cultivation intensified, for example at Blows Moss on South Ronaldsay (Farrell 2009). This seems to have occurred in response to the expansion and/or fragmentation of population which is argued to have begun during the late Neolithic (Richards 1998), resulting in the exploitation of more marginal landscapes. There are indications of a slight climatic deterioration and of the spread of heathland at some sites in the late Bronze Age, and it seems that farming practices were adapted in order to cope with changing environmental conditions. For example, the quality of heathland for grazing seems to have been managed by

deliberate burning at Whaness Burn on Hoy and Hobbister in Orphir (Farrell 2009), and there is further evidence for adaptation of agricultural practices from Tofts Ness on the island of Sanday, where intensive manuring was carried out to allow continued cultivation in an increasingly marginal environment (Simpson *et al.* 1998; Dockrill *et al.* 2007). There may also have been specialisation in stock-keeping at Tofts Ness, with an increasing emphasis on sheep rather than cattle developing throughout the Bronze Age (Nicholson and Davis 2007).

The gap in settlement evidence for the Orcadian Bronze Age is now beginning to be addressed, with a wider range of Bronze Age settlement types being recognised from the islands (e.g. Downes 2005). In addition, evidence from archaeological sites such as Crossiecrown (Jones *et al.* 2010) and Tofts Ness (Dockrill *et al.* 2007) demonstrates continuity of settlement location across the Neolithic-Bronze Age transition. Although there are distinct cultural differences between the Neolithic and Bronze Age, there is now no reason to suggest that Orkney underwent a ‘decline’ shaped by environmental deterioration during the latter period.

The evidence presented by Farrell (2009) suggests that differences in the way that land was exploited during the Orcadian Bronze Age were the result of several factors. Farming practices seem to have been modified to cope with a combination of increased population pressure, changes in social organisation, and changing environmental conditions, without any of these necessarily being dominant in driving the changes observed in the archaeological record. Overall, it now seems clear that the Bronze Age in Orkney was simply a period of change, rather than one of ‘decline’.

3.3 Settlement, Landuse and Resources

Human geography

The nature and extent of Bronze Age human settlement in Scotland was affected by two abiding constraints on settlement: the need to avoid in-breeding in domesticated plant and animal communities and human communities; and seasonal threats to survival. The spread of human settlement to every ecological niche in Scotland seems to imply that both constraints were overcome. It is likely however, that both constraints continually re-asserted themselves causing settlement to retract and domesticate and human populations to crash.

As the heterodox ecologies changed through time and the range of ecologies on offer shrank, it is likely that human populations developed specialist knowledge to cope with local variations and so one might presume social, technological, economic and political differences to become sharply defined as the Bronze Age progresses: highland and lowland

habitat boundaries reiterated in human geography boundaries.

What has become clear is the very long-term attachments to landscape and place during the Scottish Bronze Age, with continuity of settlement landscapes far more prevalent than previously supposed (Pope forthcoming). Whether the nature of this settlement represents settlement sedentism, however, is a topic for further research (cf. Halliday 2007). At some long-term sites – such as Green Knowe or Kintore – the impression gained thus far is that occupation might instead be considered ‘episodic’ and bound up with generational household shifts. Gaining an understanding of associated systems of land use is now paramount.

Some of the skills of building, especially the skills of initiating and managing large projects were no longer practiced, or were directed at less monumental communal structures (such as field systems, constructed terracing, enclosure construction). In contrast, the highly developed construction skills for domestic accommodation visible in some

areas (e.g. Orkney, NE Scotland) had become commonplace. The most radical change can be seen in the development of skills and capacity for changing landscape both at the local, probably intentional, level (excavation of stone and minerals) and at the much larger, and perhaps unintentional level (including loss of habitat, landform change, and water course changes).

By the end of the 2nd millennium BC, a large proportion of the landscape within the Highland zone, essentially anthropogenic in its foundation and organisation, had changed from land suitable for arable to land only useable as pasture. Within this degraded landscape, settlement and landuse strategies shifted from an expansionist approach, exploiting change, to one which expressed itself as resistance to change. The dominant impression is one of resilience and survival. Contemporary shifts in strategy probably occurred on lowland better quality soils but later erosive landuse has made any evidence relating to these areas very faint and uncertain.

Knowledge Gaps

How communities developed and communicated techniques of land husbandry and management is not understood. Furthermore it is not known if the model of expanding core areas of Neolithic farming and the consequent alteration of the Neolithic wildscape is well enough understood to furnish a reliable description of the base line from which Bronze Age landuse developed.

It is equally unclear whether the model for Bronze Age arable landscapes of initial expansion in the earlier centuries of the 2nd millennium calBC followed by contraction at the end of that millennium and in the early centuries of the next was a single event spanning the 2nd millennium or is a *post facto* amalgamation of many – perhaps single generation events occurring within that period. Currently developing techniques for the discernment of chronological subtlety in the

palaeoenvironmental record should be able to assist with this difficulty.

Neither is the role of land tenure and inheritance in the evolution of the landscape understood. It would seem probable that the local disposition of ‘fields and fences’ was implemented at family level but were there political agencies operating at a larger land unit (e.g. estate, territory or state level) within which tenure from generation to generation influenced the landscape. Very little is known about how settlements spread, took in and converted land and how that process worked within the constraints of seasonal survival and the avoidance of in-breeding. Did some populations live in isolation for many generations; did others compete, perhaps aggressively, to overcome such constraints? Careful inspection of areas where large tracts of prehistoric landscape survive, working out horizontal as well as vertical stratigraphical relationships, might well throw light on these important issues.

Understanding these land use systems associated with settlements through analysis which combines an understanding of architecture, landscape, and material culture assemblages, alongside an understanding of settlement temporality, and the relatedness of settlements across the landscape, must be a priority.

If such economic territories existed, were there means of exchanging surpluses (e.g. processed grain or butchered meat) across their boundaries? Could such a systems be recognized in the archaeological record? It is possible that refinements of isotopic analysis of animal or, indeed vegetational, remains may be able to tackle these problems in the future.

The final part of the Bronze Age may present the most extensive archaeological record of landscape abandonment from any period since the start of the Holocene. Little is known, however, about the processes or speed of abandonment – for which more

evidence may be expected from Palaeoenvironmental studies. Population statistics from before, during or after these abandonments are *terra incognita* and it is difficult, currently, to suggest proxies that would yield any reliable information in a circumstance where burials are virtually unknown. Without these data, and without the means of acquiring them, our understanding is seriously impaired. Current research is woefully ignorant of social relations within any Bronze Age context. For example, one may suspect that slaves existed but how power was accumulated, exerted and inherited to allow this is not yet understood.

The answers to such questions might be available to careful excavation but for much of Scotland there is a potential mismatch between the upstanding appearance of many Bronze Age settlement remains and the condition of their stratified deposits. The survival of such remains is often coincident to acid soils too wet and/or acidic for modern arable farming and these preserving conditions tend to be very hostile towards subtle archaeological evidence that leaves residues of information that are not easily recovered by current excavation techniques. The use of nano-techniques for the recovery of microscopic residues, even at the molecular level is absolutely essential in the struggle to gain as full information as possible from such sites.

Settlement forms

The settlement evidence is apparently the least responsive regional aspect of the record until the Late Bronze Age, when in the South-east at least a distinctive regional pattern of enclosed settlements seems to make its appearance. Across much of the South-east there is little to be seen of any settlement before this period, the notable exception being the unenclosed platform settlements of upper Tweeddale and Clydesdale. The appearance of these clusters of platforms, often on quite steep slopes, is

not immediately akin to the hutcircle groups of the Highlands, though in essence they are no more than groups of roundhouses, sometimes with traces of fields and stone clearance in attendance. The hut-circle is otherwise ubiquitous across mainland Scotland, with no distinguishing features, though in Galloway they tend to occur in ones and twos, sometimes with baffle walls around their entrances, while in Perthshire and Sutherland they often occur in larger groups of a dozen or more. The greatest contrast is to be found in the Northern Isles, where the buildings are often more oval in overall shape, while the interior is less regular, with a series of alcoves set back into the thickness of the wall.

Prehistoric houses exist in both Highland and Lowland contexts set either in solitary locations or clustered in the remains of a settlement. In general terms the houses survive in more immediately intelligible form in the Highland zone and, if these are typical of what existed elsewhere, the standard form was circular or oval, with an internal diameter between 5m and 12m and with a single entrance aligned to the South or East. In upstanding sites, the walls survive as a penannular embankment of stone and earth, often with evidence of numerous phases or stages of construction. Either as part of the original design or as a by-product of use, the interior contains a penannular hollowed area running concentric to the wall. In the lowland context, many examples have this gully more deeply cut forming perhaps a basement or cellar. In both zones many sites have the penannular gully infilled and surfaced with a slab pavement within the duration of occupation, perhaps indicating a cessation of one kind of use.

Teasing out regional settlement traditions

Pope (forthcoming) has identified three major regional traditions of settlement for parts of the Scottish mainland through the synthesis of the C14 dated roundhouses (currently c.100 dated structures):

- 1) unenclosed platform settlements, in the southern uplands;
- 2) ring-ditch settlements, predominantly along the eastern coastal plain; and
- 3) coastal houses in the north and west (largely Caithness and around Argyll). These broad regional traditions exist across the Bronze Age, but seem to reach their 'peak' during the Middle Bronze Age.

Within these broad settlement traditions Pope has identified three main Bronze Age architectural types:

- 1) *ring-banks*;
- 2) *post-built structures*; and
- 3) *polygonal ring-grooves*. Of these, the *ring-bank* was the major house type in some areas of Scotland. With later Neolithic origins, the ring-bank is first found at unenclosed platform settlements. From here the ring-bank went on to become a very versatile architectural form with diversity in both use of materials and building practices: largely upland, but also found in coastal lowlands; popular in the far north; and found in a real variety of landscapes during the Later Bronze Age.

The second key house type in Bronze Age northern mainland Britain was the *post-built* structure., Jobey was correct in re-asserting Steer's (1955-56) belief that post-rings were a Bronze Age type (contra. Feachem 1965). Now known to have Early Bronze Age origins on the lower slopes (120-130m) of hills in the north and west, post-built structures became a key feature of the eastern lowlands throughout the Later Bronze Age, increasing in size and circularity after 1200 BC. The question now is whether it is possible to see post-built structures as a structural variant of the more usual ring-bank type.

Both Feachem and Jobey saw large double-ring structures as an Iron Age development. In fact, it is now recognised that they have clear Early Bronze Age origins and became particularly common in the southern uplands, as simple rings remained popular in the eastern lowlands, particularly at older sites (Pope forthcoming). Similarly, Feachem and Jobey both saw the third house type – the *ring-groove* – as an Iron Age development. Whilst circular ring-grooves *are* an artefact of the Later Iron Age, the northern Bronze Age reveals a polygonal pre-cursor.

The 17th century BC origin of the polygonal ring-groove house heralds, simultaneously in upland and lowland landscapes, a phase of real architectural innovation. Ring-grooves, however, became a key feature of the lowlands – contemporary with the formation of the first ring-ditches. Unlike more traditional types (ring-banks and post-built structures), lowland ring-grooves survived social change around 1400 BC; however by the 13th century BC they had become rare, replaced by the more traditional post-built structure as the main lowland type. At the same time we see repeated rebuilding at coastal sites in the north and west and a return to upland platform settlements.

The distribution of settlement is now hard to reconstruct. Subsequent land use seems to have eroded almost any upstanding settlement at lower altitudes (say below 100m OD) but in general most buildings do not occur much above 300 m OD.

This interpretation of settlement form and development (see Teasing out regional settlement traditions above) may apply to parts of northern England and mainland Scotland, but there is variation elsewhere, particularly in the Northern and Western Isles – and these island groups differ from each other. Early Bronze Age timber built houses occur in Shetland, the Western isles, and possibly Orkney, and, as referred to above these are more oval than round in shape. Early Bronze Age stone built houses also occur in Shetland and Orkney, where their form can be paired houses of either oval form or, in Orkney at Crossiecrown, of a form similar to Skara Brae house plans. Although the Crossiecrown houses are built to traditional late Neolithic design they are an isolated pair similar to other Bronze Age houses (cf Sumburgh below) rather than being part of a village settlement like Skara Brae. In the middle and late Bronze Age, terraced stone built houses occur at Cladh Hallan, and at Jarlshof. In Shetland and in Orkney paired stone built oval and round houses are found, such as those in Shetland at Sumburgh (above), and in Orkney at Skail, Deerness, Links of Noltland, and numerous unexcavated examples are apparent.

Rarely do the undamaged archaeological remains of Bronze Age settlement show any evidence of defence by suitable enclosure against wild beasts or aggressive neighbours. Yet it seems reasonable to suspect that both were sometimes real threats, especially in times or seasons of shortage. Large communal defences are not yet recognised as present in the Scottish Bronze Age, but some late Bronze Age instances, such as Eildon Hill, may be defensive. If the general absence of defences is real then should such a simplistic reconstruction of the primary drivers of Bronze Age life be challenged? Were the perceived threats or risks resolved or averted by procedures that lie beyond current powers of reconstruction.

Figure 19: Burnt mound at Liddle, South Ronaldsay ©RCAHMS

While in Ireland burnt mounds seem to have been recognised as a distinct class of monument from a very early date, in Scotland there was no such recognition. While a number of Scottish sites, now identifiable as burnt mounds, were subject to antiquarian investigation, (Black 1854-7, Hunt 1866), these were generally identified as tumuli or burial mounds. The first explicit reference to a ‘burnt stone tumulus’ does not come until the late 1860s (Mitchell 1870). In 1873 Anderson made the link between mounds in Caithness and Shetland, and the Irish *fulacht* tradition, but despite this connection there were doubts expressed as to their function as a cooking place, and the continued implicit interpretation in many of these early accounts is that they form a part of a funerary tradition. Following this period of early antiquarian activity there was little work carried out on Scottish burnt mounds until that of Hedges in Orkney (1977). Hodder and Barfield (1991) edited a volume on burnt mounds, and several of the interpretations within are worthy of further pursuit.

There are currently over 1900 burnt mound sites recorded in Scotland, with the highest concentrations occurring in Shetland, Orkney, Caithness & Sutherland, and in Southern Scotland around Dumfries and Galloway. It has been suggested that this distribution is representative of the original spread of hot stone technologies (Hedges 1977: 61), however it is noted that these concentrations coincide with areas where the Royal Commission has recently carried out survey. It

should also be noted that while fewer sites have been from the west of Scotland, many of these have been discovered through developer-funded work, rather than systematic survey, therefore much greater concentrations may exist than are currently recognised. Historically there has been a significant degree of variability in the recognition and recording of burnt mound sites in Scotland. Prior to the revision of mapping in Orkney in Shetland undertaken in the late 1960s and early 1970s, the OS field sections had little experience of burnt mounds, and consequently very few were recorded in the mainland. The Royal Commission's survey teams also underwent a similar process following the survey of the East Rhins, as a result of which a greater number of burnt mounds were recorded in 1986 than had been recognised the previous year (Halliday 1990, 61). These factors make it difficult to come to any meaningful conclusion in relation to the overall distribution of the sites at present.

Over half of the records of burnt mounds include information about shape, however the terminology employed in describing this is variable. The classic crescent shape is described variously as U-Shaped, Crescentic, Kidney Shaped or Banana Shaped. Other significant shapes recorded include oval and circular, while shapes such as pear or triangular make up less than 1% of the recorded material. Around 65% of the sites recorded also contain information about mound size, which allows us to build up an overview of their relative volume. The value of this data in determining the number of firings that took place is contestable, however it does present us with some interesting considerations. The majority of mounds are found to be smaller than 20m³, but can range up to 900m³, at Vaassetter in Fair Isle. Mounds in the South are found to be smaller than those in the North. Likewise smaller mounds are found in greater densities than the larger, suggesting repeated phases of short lived activity rather than continued usage over a period of time (Anthony 2003).

Although less than 3% of the sites recorded have been examined in any detail, those which have reveal an array of complexity and variation between the sites. Excavation of sites in Orkney (Hedges 1977), Shetland (Moore & Wilson 1999, 2001, 2008; Hedges 1987) has revealed complex internal structures, as well as a range of associated finds. Survey and excavation in the Northern Isles has also revealed a complex series of relationships between mound sites and other prehistoric monuments that warrants further attention (Dockrill, Bond & O'Connor 1998, Hedges 1986, Owen & Lowe 1999: 35-37,). Work undertaken by Anthony (2003) in mounds from the Northern Isles has not only expanded their temporal range beyond the Bronze Age, but has also been instrumental in illustrating successive phases of construction and use at the sites, and can provide insight into the complex timelines which these sites can possess. Programs of geophysical survey have demonstrated the suitability of magnetometry in identifying burnt mound structures (Hunter & Dockrill 1990).

A number of directions can be identified which would aid and develop an understanding of burnt mounds and their contribution role in understanding the Bronze Age of Scotland. Although a number of excellent programs of excavation and survey have been carried out, much of the current knowledge is still reliant on work being carried out in rescue or developer funded contexts, and it is argued that targeted research driven investigation is required in order to fully understand the role of these sites within a wider Bronze Age context. It is also noted at present literature on Scottish burnt mounds is dominated by work being carried out in the Northern Isles, and it is suggested that similar programs of research are required elsewhere to determine the relevance of this material in relation to mounds elsewhere in Scotland. In particular, the following are suggested:

- Targeted survey is necessary to build up an accurate picture of distribution, particularly from

those regions where mounds have not previously been recorded.

- Analysis of deposits through lipid and chemical analysis would throw fresh light on the function/s of these monuments
- Further dating, including where possible stratigraphic sampling to determine the processes of site formation and the number of sites which can in fact be attributed to the Bronze Age
- Surface sampling from areas surrounding the mound to determine the relationship between sites and other nearby prehistoric monuments.
- Geophysical exploration of areas surrounding burnt mound sites to determine the presence of any other related features.
- What is the relationship, if any, between mound size, shape, and output?
- Does the type of water source (running, standing or groundwater) reflect on the possible function or outputs of these sites?
- Is there variation between activities undertaken at mounds with internal structures, and those without?
- Is the high proportion of excavated mounds with structures in the Northern Isles reflective of the overall characteristic of sites in this region?
- How do burnt mounds relate to other activities being undertaken in the Bronze Age (in particular, mound building, votive deposits, cremation?)

chronology. It remains practically impossible to identify contemporaneity between two adjacent buildings or temporal difference between two stratigraphically sequenced structures.

The archaeological remains of post-holes and earthen walls do not usually retain enough evidence of the duration and intensity of use of any structure. It might be more accurate to say that they do not contain the kind of evidence that is currently often recognized and nano-archaeology may well have a great deal to offer here. Occasionally excavation chances upon remains that are revealing, for example a building destroyed by fire, but the prospection techniques required to increase the chances of detecting such sites are currently under-used in Scotland. It is also true that archaeologists are seldom resourced well enough to handle the wealth of bio-chemical information that can exist in well preserved contexts – opportunities need to be maximized for such analyses (as in Cladh Hallan).

How buildings were utilized and inhabited is under-researched and needs to be considered on an intra- and inter- regional basis.

A synthesis of settlement evidence for the whole of Scotland is required.

Settlements need to be considered more in terms of their relationship to landscape (as in Lairg below).

Knowledge Gaps

Sites with concentrations of structures in close proximity still present huge difficulties in

The Lairg Project

The close dovetailing of field archaeology with a detailed reconstruction of how soil profiles evolved in the area and narrow and broad-view vegetation histories combined to create a powerful, testable model for prehistoric upland landuse and settlement reconstruction at Lairg. Although the monuments are dominated by Bronze Age remains, the three dimensional approach revealed much deeper history of human activity set against a back drop of mostly gradual but sometimes swift landscape change.

The underlying geology of this undulating landscape – sandy and sandstone derived metamorphic rocks – was not parent to nutrient rich soils. The dominant character of the land was a drainage system which produced and still produces a patchwork of dry and wet, responsive and indifferent, areas. Conditioning these patterns was a general climatic deterioration after 2200 to 1800 BC as well as abrupt, short-lived drier and wetter phases.

Figure 20: Aerial shot of Lairg under excavation ©Rod McCullagh

Signatures for human interference (e.g. charcoal in pollen diagrams) in the landscape are abundant after about 5000 BC. Good evidence for agriculture is apparent in the pollen record from about 4000 BC and in some vestigial archaeological contexts from about 3600 BC. The project could not resolve the evidence into a single wholly unambiguous explanation but it seems that the Bronze Age emerged after a long period of woodland clearance and recovery. What emerges at around 2000 to 1800 BC is a population with a vigorous approach to soil husbandry involving, for example, extensive cross-ploughing, manuring and soil damming with stone dykes. It is important to note the absence of evidence for soil exhaustion at any stage in a place where this might be reasonably expected and in a project which was reasonably certain to detect it.

From 2000 BC and for the next 800 years the project area contained extensive, upstanding evidence for settlement, landuse and ritual. Domestic architecture ranged from circular and oval buildings with a range of construction techniques and a hierarchy of entrances that begs to be interpreted as status display. As impressive, was good evidence for the construction of a dwelling built on farmland, and of its subsequent flattening and return to farm land. The site was then reclaimed as a house site before being ploughed over again, possibly in the Iron Age. Finally, one structure was detected as only a circle of small post-holes less than 5m diameter; invisible to survey, this building type could well represent a significant missing element in the domestic archaeology of the study area.

Complementing the settlement evidence was an archaeology of clearance cairns, burnt mounds, dykes or field-edge cairns, simple burial and sites involving the complex use of human remains. Cremations were discovered in almost every kind of context but the best candidate for a burial cairn turned out to be more a circular enclosure for ritual, involving cremated bone. This was capped by a domed cairn and it seems that current attitudes towards this site merely repeated that of the persons unknown who dug into the centre of the capping cairn in about AD800.

Lairg soils are acidic, meaning no organic remains survive except burnt material. The project team found it hard to determine whether this caused, in all cases, the absence of expected evidence. Certainly, the minimal vestiges of Neolithic remains was largely a product of the vigour of the Bronze Age presence. But the ceramics show a different trend. The dominant fabric of the Bronze Age was talc-tempered, forming crude bucket-like vessels but quite a lot of highly abraded small sherds of Beaker hint at a reverence and use of this fabric beyond the purely functional. No metalwork was found and the dominant tool type was various forms of crude blades made from quartz.

Settlement comes to an end within the project area by about 1000 BC but the pollen and soils evidence suggests this may have had more to do with settlement type and distribution, rather than any lessening of human impact on the land. Gradually the evidence for cereal cultivation gives way to a kind of managed pasture which finally gives way to blanket peat between 500 AD and 1000 AD as that management ceases.

This short account does not do justice to the richness of the evidence, the degree of debate within the team and the profound feeling of all that the work was just the first step in understanding that human-landscape relationship that northern Scotland seems so very well equipped to fuel.

Figure 21: Roundhouse at Lairg under excavation ©Rod McCullagh

Models of Bronze Age Land-use

There is little surviving tradition of demarcating territories with built boundaries in the Scottish Bronze Age landscape, and until the creation of the improved landscape some two to three hundred years ago the bounds of landholdings marched largely 'where wind and water shear'. Distinctive natural features might also be pressed into service, but only occasionally were these

supplemented with artificial markers. Thus, in contrast to the landscape of south-west England, where extensive Middle Bronze Age boundary-systems suggest the existence of fixed territories at several scales, for most of Scotland it can only be an assumption that such territories may once have existed. As a result, interpretations have tended to focus on the exploitation of the resources in the landscape, firstly through the proxy records provided by the excavation of settlements,

and secondly through the locations of those settlements within the landscape and the traces of farming activity around them. More recently these have been integrated into a third category of evidence drawn from palaeoenvironmental analyses and reconstructions, operating at both local and regional scales.

Traditional approaches to the settlements of the Bronze Age landscape have assumed that the groups of hut-circles and platforms found in the uplands represent the remains of farms that occupied their sites continuously for hundreds of years and variously cultivated and grazed the ground round about. Implicit in this interpretation is that their presence in numbers in the uplands is testimony to the extent of settlement in the lowlands by the Middle Bronze Age, and that they therefore represent the expansion of a relatively dense and static pattern of sedentary settlement on the better lowland soils.

In this model it is assumed that each settlement had a specific area of relatively fertile land for cultivation, pasture for grazing, and woodlands for fuel, structural timbers, pannage and other forage; to these basic requirements for settlement and agriculture can be added water – seldom far away in the Scottish landscape. From what is known about manuring practices at this time, it is clear that cultivation and pasture went hand in hand, the one in part dependent on the other for the transfer of nutrients into the arable soils. In some cases this was by deliberate inclusion of composted household waste, animal manure and turf, in others probably by management of the grazings. Difficult to demonstrate either archaeologically or from palaeoenvironmental sources, this traditional practice in historical times, operated by pasturing the beasts on the hill by day and folding them onto the next years arable by night; known as ‘tathing’, this could have operated from after harvest to cultivation in the spring, and possibly explains the interwoven fence-lines and ploughmarks discovered beneath two stone circles on

Machrie Moor. In the documented farming systems of post-medieval Scotland each holding required a ratio in excess of 10:1 between pasture and arable to work successfully, though as the population increased in places like the island of Tiree it fell to 5:1 shortly before clearance and massive depopulation and reorganisation took place (Dodgson 1998).

The widespread palynological evidence that the Bronze Age landscape was extensively grazed, and the general absence of systems of stockproof fields with permanent boundaries, suggest that once the crops began to sprout the beasts were driven to pastures at some remove from the parent settlement, though it should probably be anticipated that they were always tended to prevent them straying. This raises the possibility that there were also temporary settlements occupied only in the summer months. In some cases this may provide a role for the enigmatic burnt mounds (see above) that are found scattered through the landscape.

In the uplands, the mix of the farming systems may well have leant more heavily towards beasts than arable crops, but though it is conceivable that in some places landuse was driven by wholly pastoral communities, nowhere has this been demonstrated. Indeed quite the reverse; evidence of arable farming seems to go hand in hand with hut-circle settlements, with the caveat that the crops that were being grown around them cannot necessarily be identified. If any farms specialised in cereal production for export, these will have been mixed farms with large herds to maintain the fertility of their soils. In part, the idea that grain was exported to some settlements rests on the absence of chaff from the carbonised plant remains recovered from settlements, but this is a general pattern across north Britain and is more likely to relate to the nature of the evidence and the conditions required for its preservation (e.g. the burnt hut-circle on Tormore, Arran; Barber 1997, 6-25).

More recent syntheses, however, have challenged this model (Halliday 1999; 2007; Barber and Crone 2001), emphasising that the duration of occupation of individual buildings is at best uncertain, perhaps representing periods as short as ten years, and that a characteristic of some of the multiperiod buildings that appear to represent longterm occupation is that their use is episodic and punctuated by periods of abandonment of equally unknown duration. While it is still possible to argue that a group of hut-circles represents longterm settlement on a hillside, this needs to be demonstrated rather than assumed. Equally possible is that the group of hut-circles as a whole represents episodic occupation of that hillside in a much more complex and dynamic pattern of settlement and land-use, in which clusters of apparently separate hut-circle groups represent a series of locations successively occupied and cultivated by a single settlement.

If these new approaches have any value, they disrupt the idea that each hut-circle group formed a relatively static agricultural unit, standing with its arable fields within a mosaic of grazings and woodlands in its immediate vicinity. All the various elements of the farming system – the settlement, the arable, the pasture and the woodland – are still present, but rather than being immediately around the occupied hut-circles, they may be spread over a much wider area containing half a dozen or more other hut-circle groups, to say nothing of the numerous discrete scatters of small cairns where there is no visible evidence of settlement. Presumably the arable ground would move round with the settlement, if only so that the crops could be protected from wild herbivores, but the arable plots left fallow around each of the unoccupied hut-circle groups represent the prime grazings. To some extent the management of these grazings would see some nutrient transfer onto this ground year on year; to make the comparison with the locations of the huts of later shielings, these are often distinguished by more verdant vegetation than their surroundings. The active

folding of beasts onto next years arable would only be seen around the occupied settlement, after they had been brought back from the more distant pastures.

The implications of which of these two models is closest to an archaeological truth for the typical Middle Bronze Age settlement in mainland Scotland are far-reaching. With the abandonment that seems to be visited on so many upland hut-circle groups towards the end of the 2nd millennium BC, it raises the question of what changed. In the traditional model, the population collapsed catastrophically, though the post-medieval comparison drawn above for the ratios required between arable and pasture hints at one route to abandonment without recourse to natural events. In the second model, however, the impact of the whole system of settlement and land-use on the landscape is archaeologically exaggerated, with each community moving around multiple settlement foci, while continuing to graze and forage throughout the rest of the landscape. Within the resolutions of the palaeoenvironmental record, such impacts are as yet indistinguishable from those of settlements occupying single sites, but implicitly in this model neither the archaeological nor the palaeoenvironmental records need be the result of the large upland population that the traditional model demands to populate the extant settlements; after all, the Middle Bronze Age seems to be the period of most extensive settlement in either prehistory or history. But if this was an *in extenso* system of settlement and land-use in the first place, it could be as easily reorganised and supplanted by more intensive practice operating from a single site. Thus, the apparent abandonment at the end of the 2nd millennium BC is possibly about economic change rather than population collapse, but until Late Bronze Age settlements are discovered in the uplands the hypothesis remains untested. If there is any continuity in the settlement record into the Late Bronze Age in the uplands, sufficient work has taken place to indicate that it is unlikely to be found

on the visible hut-circle groups, which do not seem to be re-occupied until later in the 1st millennium BC. Routinely the most favourable locations, and thus the most likely sites for more intensive farming, are occupied by modern farms and their improved ground, where nothing is now visible above the ground. Notably, the palynological record at Lairg (McCullagh & Tipping 1998) shows grazing continuing after the abandonment of the visible hut-circles; even if the people left, beasts apparently remained.

Irrespective of the model of land-use that is favoured, the question arises as to how far the evidence from the uplands is representative either of the whole Bronze Age, or of the entire area of Scotland. To some extent the lowland settlements that have been excavated reveal similar chronologies, with this same focus of occupation in the mid to late 2nd millennium BC, though at Kintore, Aberdeenshire, after a statistically significant hiatus in the sequence of radiocarbon dates, the site was re-occupied early in the 1st millennium BC in the Late Bronze Age and Early Iron Age (Cook and Dunbar 2008). In this same part of North-east Scotland, the recumbent stone circles that have been excavated also seem to show a sudden burst of activity at the end of the 2nd millennium BC, with the insertion of cremation deposits after an interval of 1000 years or more since they were constructed (see Welfare 2011, 164-5, 167, 260-3). In the case of the undated circle at Loanhead of Daviot it appears that the cairn was reconstructed as a ring-cairn at this time, as if it was believed that this was its original form. South of the Dee at Cairnwell, a small ring-cairn was newly built on the site of a small timber enclosure and again associated with cremation burials (Rees 1997). The creation of monuments that replicate those built a millennium before is extraordinary, and suggests powerful forces at work. That it seems to coincide with the abandonment of so many hut-circle groups from Arran to Sutherland and Caithness is surely no coincidence and hints at a widespread

dislocation of society. The new chronologies of settlements enclosed by palisades, banks and ditches that have been established on the Lothian Plain, which now can be traced back into the Late Bronze Age (Haselgrove 2009, 193-6), reveal the equivalent change in the South-east of Scotland, heralding the new regional settlement patterns that emerge in the Iron Age, with the striking contrasts between the drystone architectures of the north and west, and the timber and earthwork architectures of the east and south. Indeed, the end of the 2nd millennium BC is probably the key period of change that shapes the regional character of the Iron Age settlement record.

Figure 22: Loanhead of Daviot, Aberdeenshire © RCAHMS

While mainland Scotland presents a general impression of synchronous periods of Middle Bronze Age settlement expansion and then collapse, particularly in the uplands, it would be a mistake to assume that this was the case everywhere. In Shetland, for example, the general tenor of the settlement record seems to run some 500 years in advance. The moorland settlements there, none of them at any great altitude but nonetheless subsumed into peatlands, seem to represent Early Bronze Age settlement, and at Scord of Brouster, for example, are falling into disuse in the middle of the 2nd millennium BC (Whittle *et al.* 1986), though this is not

necessarily the case everywhere in Shetland. With a relatively low-lying landscape, the differences between upland and lowland, coastal and inland, moorland and pasture are probably finely drawn in complex patterns that do not lend themselves to simple generalisation. The extensive systems of stone dykes round the moorland settlements also hint at different land-use models, as do the areas of deepened soils, some of which seem to be of this early date. These relationships are only poorly understood.

In the Western Isles too, the records of buildings associated with Beaker pottery and agricultural soils in the machair on the coast of South Uist (Parker Pearson *et al.* 2004), for example, may represent different models of settlement and land-use, adapted to the local environment and its capacity for agriculture. The inland areas of many of the Western Isles appear unremittingly bleak in agricultural terms, the moorland peats often lying directly on to little more than bare rock. Thus physical evidence of Early Bronze Age settlement and fields is otherwise largely missing from the mainland, though at Cnoc Stanger, in Caithness, in a coastal setting there also seem to be deep cultivated machair soils of comparable antiquity (Mercer 1996).

With the exceptions of the Northern and Western Isles, however, the Bronze Age settlement and land-use archaeologies seem remarkably homogenous. The caveat that might possibly be offered concerns south-eastern Scotland, where the clusters of house platforms on relatively steep hillsides in the headwaters of the Clyde, the Tweed and other rivers, strike a contrast with the scatter of ring-banks found in the large cairnfields of northern Lanarkshire. The significance of this is uncertain, for elsewhere in the South-east the succession of later land-use seems to have largely erased any visible evidence of Bronze Age settlements, upstanding examples of which only re-appear in north Northumberland. The recently published palynological work in the Bowmont Valley in the northern Cheviots, however, clearly

demonstrates Bronze Age farmers were moving into the uplands (Tipping 2010). At Swindon Hill, for example, at an altitude of about 365m OD, Tipping recovered near continuous records of Barley cultivation from c. 2850 to 1150 cal BC, albeit with a relatively low temporal resolution, and at Sourhope at 260m OD from 1800 to 1350 cal BC, while he more tentatively suggested cultivation was also taking place at the higher Cocklawhead plateau, above 500m OD, from 2100 to 1250 cal BC (2010, 174). The archaeological evidence for the settlements and fields from which the pollen is derived is as yet more tenuous. But while some of the pollen diagrams clearly show Early Bronze Age farming impacting on the uplands, it is notable that the arable farming at all these locations had ceased by the end of the 2nd millennium BC (Tipping 2010, 177), though grazing generally continues into the Late Bronze Age (Tipping 2010, 178), reflecting the broad trends noted elsewhere in Scotland.

Figure 23: Example Pollen diagram from Carn Dubh, near Pitlochry (Tipping 1995) ©Richard Tipping

Settlement technology

It has to be assumed that settlements were located with some regard to drainage, shelter and water. However, as many societies studied in recent centuries demonstrate, such considerations often lie well hidden within often magical or religious locational choice processes.

The two major imperatives of avoidance of in-breeding and survival of winter impose

requirements of scale and complexity on Bronze Age buildings. In principle, the fully developed Bronze Age tool kit would permit sophisticated joint and trenail carpentry but for most buildings the limitations of binding and simple lap-joints impose limited ranges of ground-plan and roof forms. More sophisticated technologies were rapidly developed for soil management and perhaps the defining signature of the Bronze Age was the retardation of the declining trajectory of soils through relatively sophisticated land management (ploughing, manuring, land protection, etc).

Within the life experience of people living in Bronze Age Scotland, the life-span of buildings was governed by the short-life span of the wood, thatch, turf and stone building components. It is unlikely that any building constructed mainly of wood could last, as a coherent structure, for more than 5 to 10 years without repair, and replacement of some components. Although Pope (2003) suggests a more generous estimate of 30-50

years for the majority of structures, this study should not be used to generalize across Scotland as there is great variation across time, and regional differences as outlined above. Indeed in the Northern Isles the large paired or double houses could have been occupied (with modification and repairs) for several hundred years.

Knowledge Gaps

There is a gap between the well exercised ability to micro-reconstruct the location for a Bronze Age settlement (e.g. using geomorphological and mapping techniques) and the little that is often done generally to model the topography within settlements.

It is necessary to undertake research to challenge the current architectural models for Bronze Age buildings, to test their applicability for various regions of Scotland.

Cladh Hallan

At Cladh Hallan, on the island of South Uist, a row of substantial roundhouses with central fireplaces and sharing party walls was built around 1200 BC; three of these have been excavated (Parker Pearson *et al.* 2004, 64-82). Foundation deposits comprising human remains marked the construction of each building: a pit in the central house contained the crouched burial of a young teenager, while the infant buried beneath the southern house had died some 2-3 centuries before this building was erected, indicating – as we have seen at Covesea – the curation of human remains, including those of children. Perhaps most significant were two burials from the northern house. One of these was an adult woman whose body had been kept tightly wrapped for some 300 years prior to deposition in this building. The second burial comprised a ‘body’ made up of bones from three different individuals who had also died several centuries before burial: the head and neck belonged to one man, the jaw to another, and the rest of the body to a third. It has been suggested that the two burials from this house may have been mummified. The lack of bacterial damage to the bones of the second burial suggested evisceration, while demineralisation of the bone surfaces hints that preservation of soft tissue (which would have kept the bodies intact) may have been facilitated by temporary deposition in an acidic environment such as a peat bog (Parker Pearson *et al.* 2005).

Further depositional activities marked the rebuilding of the houses, including the burials of two dogs and a newborn baby beneath the floors of the central and northern houses respectively. The abandonment of the dwellings was also a significant event: for example, a bronze bracelet was placed on the floor of the northern house (in its north-eastern quadrant) as an offering at the end of one stage in the life of this building.

Belief systems and ritual practices were not only of relevance at important events such as the foundation or abandonment of a dwelling. The organisation of space within the houses at Cladh Hallan suggests that daily activities were also informed by cosmological concerns. These buildings, like others of the period, faced roughly east, towards the rising sun – an orientation that may have been considered auspicious. Evidence for tasks that would have been carried out by day, such as cooking and craft activities, was largely found on the southern and eastern sides of the roundhouses, while sleeping appears to have taken place in the northern halves of these buildings. The human and animal burials were also predominantly deposited on their northern sides, as were abandonment deposits. As such, the ordering of domestic space is thought to reflect broader conceptual divisions between light and dark, day and night, life and death. The circular architecture and the orientation of Bronze Age houses linked these ideas into beliefs regarding the cyclical regeneration of life that we have already seen expressed in monumental contexts.

Figure 24: The row of houses at Cladh Hallan showing the location of the human foundation burials (after Parker Pearson *et al.* 2005, fig. 3). The site has also produced important finds of clay moulds for Late Bronze Age bronze objects

3.4 Agriculture

Fields in Bronze Age Scotland

Since the beginning of the 1970s and Richard Feachem's (1973) summation of the work on highland zone field-systems by the OS Archaeology Division, it has been clear that there are extensive traces of prehistoric agriculture across the uplands of Scotland, represented by scatters of small cairns, stony

banks and lynchets. Following excavations in the late 1970s on Arran (Barber 1997) and more recent work at Lairg, Sutherland (McCullagh & Tipping 1998) it is also irrefutable that the majority of these remains are probably Bronze Age in date. However, by the yardstick of lynched field-systems and other enclosures taking in huge blocks of countryside in southern Britain (Fleming 1988; 2008; Yates 2007), the Scottish field-system has always appeared comparatively small-scale and incoherent, so much so that

individual fields with four sides are unusual, and recognisable systems of fields so rare that they can only be presented as exceptions rather than any rule. By way of example, Drumturn Burn in Perth & Kinross (RCAHMS 1990, 47-9), with its photogenic trackway wending down between fields to a cluster of hut-circles often appears as a text book illustration of a Scottish field-system, and yet it is the only one of its kind amongst the dozens of hut-circle groups of north-east Perthshire. Another half dozen have a recurrent arrangement of banks in the immediate vicinity, but none of these define any fields as such. Small wonder that Stuart Piggott's 'Celtic Cowboys' (1958), written at a time when Celtic field-systems were thought to date from the Iron Age, proved an enduring explanation of subsistence strategies in northern Britain.

This same contrast between northern and southern Britain has to some extent been recast by more recent work, most notably by David Yates (2007), albeit that the data are fuller and the analysis draws on more sophisticated social and economic arguments. Yates's model couples the coincidence of large tracts of enclosure in southern Britain with concentrations of metalwork deposition to argue the case for the intensification of stock production in a competitive prestige goods economy. On the basis of the random sampling of commercial excavation he has established a reasonably robust distribution for the extensive enclosure of parts of the southern English landscape in the Middle Bronze Age. This pattern, which roughly echoes the division between lowland and highland Britain coined by Sir Cyril Fox in *The Personality of Britain* (1932), leaves little doubt that settlement and agriculture in northern Britain developed on a different trajectory without resorting to large scale enclosure, though whether this can be equated with non-intensive farming systems is more contentious, particularly when developed into core periphery models that emphasise the relative importance of one area above another in the manner that

Kristiansen has argued in Scandinavia (1987). The work on Arran (Barber 1997) and at Lairg (McCullagh and Tipping 1998) is now amongst a host of excavations revealing the massive expansion and intensification of settlement in the Middle Bronze Age throughout the Scottish landscape (e.g. Kintore; Cook and Dunbar 2008). As in southern England, this expansion of settlement does not extend unbroken into the Iron Age, and in the uplands at least is suddenly fractured at the end of the 2nd millennium BC. While Iron Age settlements in southern England reveal evidence of much larger quantities of cereals than their Bronze Age counterparts, it is far from clear where these were being grown. In southern England, it seems, cereal production in the Iron Age did not require extensive enclosure as such and earlier Bronze Age field-systems were only brought back into use in the late Iron Age (Yates 2007, 110), the same period when settlement reappears on many Bronze Age settlements across Highland Scotland (e.g. Lairg).

Despite the contrast between north and south, Scotland has a rich and varied record in a wide range of environmental settings. In many of these there is also the huge potential to exploit palaeoenvironmental data as a proxy record of local vegetation cover from which to reconstruct the history of land-use and contemporary farming systems. The majority of the visible remains lie in areas of rough pasture in the margins of the modern landscape, often under a blanket of peat. Inevitably, their equivalents are largely missing from the areas that now comprise Scotland's best agricultural land. Though skewed in this way, the excavation of settlements in advance of development in the eastern lowlands is providing records of the agricultural economy in the form of carbonised plant remains. At Kintore, Aberdeenshire, for example, small quantities of cereals were recovered, but little evidence of chaff, echoing the findings at Lairg, while stratified beneath the Early Bronze Age barrow at North Mains, Perthshire, a ridged field surface was uncovered (Barclay 1989).

The potential of large standing Bronze Age monuments to preserve fragments of earlier field surfaces across the lowlands is an important resource.

The accretion, survival and destruction of sediments is no less an issue in the Highlands, where the ongoing succession of settlement and land-use prior to the growth of blanket peat differentially preserves earlier soils and surfaces. Hut-circles are often found to have been built on previously cultivated soils, and may equally be ploughed over after their abandonment, as can be found at both Lairg (McCullagh & Tipping 1998) and on Arran (Barber 1997). Indeed, at Tormore on Arran ploughing also encroached upon one of the hut-circles between two major phases of occupation (Barber 1997,8-11), while at Cnoc Stanger, in a machair environment, a cultivated soil was found separating two phases of a hut-circle that used elements of the same stonework at the entrance (Mercer 1996). Occasionally, a series of banks give the impression of greater order, such as the example noted already at Drumturn Burn, or Tulloch Wood in Moray (Carter 1993), but in general there is no tidy Bronze Age landscape preserved in these remains as such, so much as fragmentary archaeological deposits providing insights into complex histories of settlement and land-use over long periods of time. The field remains simply do not conform to concepts of field-systems driven by southern English models. Essentially, the field-system of Bronze Age Scotland is an untidy, cumulative and haphazard piece of ground, shaped on the one hand by the presence of earlier remains, and on the other by the intensity and extent of the cultivation practices that have taken place successively within its compass. Cumulatively, through time and the ongoing process of successive cultivation, it consumes its own history, and while relatively deep sediments may accumulate as a record of this history, trapped against an undisturbed baulk or an earlier boundary, dating the beginning of the process is as fraught with difficulty as dating its end. Field soils are by their very nature

stirred and mixed contexts, and in Scotland rarely yield any cultural material that may assist in the establishment of a coarse chronology. As often as not the cessation of cultivation is conferred by a basal peat date and the assumption that the onset of peat growth followed the final season of cultivation in relatively short order (see Carter in McCullagh and Tipping 1998, 157).

The apparent absence of large scale landscape enclosure is not universal. On Shetland around settlements such as Scord of Brouster (Whittle *et al.*1986), which although often referred to as Neolithic settlements are probably mainly Early Bronze Age and later, there are extensive enclosure walls which can be followed for hundreds of metres, dipping in and out of the peat blanket. As has happened in mainland Scotland, detailed investigation will probably reveal a more complex history, but at face value the Scord of Brouster field-system, with its enclosing walls, low lynchets and clearance heaps, seems to form part of a much bigger enclosed landscape (see also Whittington 1978). In Argyll, on the Atlantic seaboard, the dykes beneath the Black Moss of Achnacree, at Black Crofts, North Connell, hint at a series of large enclosures of perhaps 10ha extending back from the shore, but this is very unusual and has no immediate parallels (Carter and Dalland 2005).

Evidence of Bronze Age arable farming, though rarely of the form of the plots themselves, is also routinely recovered from machair deposits. These blown shell sands are found mainly around bays in the Northern and Western Isles, and though prone to catastrophic deflation, equally accrete in ways that with the addition of midden material create long and deep sequences of successive field soils with finely preserved evidence of the tools that were used to till them. Such soils underlay the hut-circles at Cnoc Stanger, Caithness, and have been found extensively in Orkney, such as at Tofts Ness, where there is evidence of the addition of manures including heathland turf (Dockrill *et al.*2007, 386). Many

of the deepened soils found in the Northern Isles around Iron Age settlements at places like old Scatness are also likely to have their origins in the Bronze Age. Examples of hut-circles and field enclosures are also beginning to be discovered in the moorland in the interior of some of the large Orkney islands, whereas in the Western Isles there is little sign of settlements penetrating inland. Again the evidence of ploughing and manuring is extensive, for example on South Uist at Cladh Hallan or at Rosinish, Benbecula (Shepherd and Tuckwell 1977). This sort of evidence, however, is found everywhere that there are coastal sands, for example at the mouth of the River Ythan at Rattray, Aberdeenshire, where in addition to ploughmarks and cultivated soils, part of a burnt and carbonised hurdle fence was found (Murray *et al.* 1992). Machair seems to have attracted farmers throughout the Bronze Age.

The rig uncovered at North Mains also holds the possibility that there were ridged field surfaces, although the successive restatement of the agricultural landscapes has effectively erased what evidence may once have been visible. The recorded stratigraphic relationships of cord rig in the Border counties (Halliday 1982; Topping 1989; Halliday 1993) suggest that this form of cultivation is mainly of Iron Age date and later, and it remains absent from the traces of fields that occur around several unenclosed platform settlements. In south-eastern Scotland it also seems likely that several of the field-systems normally considered Romano-British in date are probably Bronze Age, such as on Ellerslie Hill in Lanarkshire, where an unenclosed house platform belonging to an adjacent settlement is apparently cut into the leading edge of a lynchet. Elsewhere, the only stratified rig that is significantly earlier cuts across a deposit probably dating from the Late Bronze Age or Early Iron Age in the machair at Kilellan Farm, Islay, Argyll (Ritchie 2005, 38fig. 46).

The final category of evidence worth considering is provided by the artefactual

record, in the Northern Isles principally represented by stone ard points and other bar tools that have probably been used as hoes and mattocks (Rees 1979; Clarke 2006). Many of these are probably Bronze Age in date, including those ard points found broken off at the ends of ploughmarks at Kebister, Shetland (Owen and Lowe 1999, 263-5), though how they were mounted is open to debate. Waterlogged deposits elsewhere have also preserved a number of remarkable wooden agricultural implements. Although perhaps Iron Age rather than Bronze Age, the Milton Loch share and the Lochmaben plough beam have been long known (Fenton 1968), together with several ard tips from peat in Shetland, but the dating programme of the National Museums Scotland has also taken in several older discoveries with surprising results. These include an ox yoke from Loch Nell, Argyll, and a swingle-tree from Shapinsay, Orkney (Hedges *et al.* 1993; Cowie and Shepherd 2003, 164) both of which are firmly Bronze Age in date.

The combination of sources – palaeoenvironmental, excavation proxies, deep stratified soils and visible field remains – suggests that Bronze Age arable agriculture in Scotland was not only extensive, but in places sustained and intensively practiced. There was almost certainly some regional variation in agricultural practice, which in the Northern Isles gave rise to large patches of deepened soils; these were artificially created through intensive manuring regimes and the addition of moorland turf. The benefits of these practices and the addition of domestic rubbish were evidently understood throughout the Bronze Age, the adding of turf and peat representing an extreme form of nutrient transfer from grazing land. Whether this latter practice, which persisted throughout Scotland into the post-medieval period, was limited to the arguably hostile farming environment of the Northern and Western Isles remains to be demonstrated. The equivalent locations in the mainland have been intensively cleared, dug over and improved for at least the last two centuries. Although areas of deepened soils

have been mapped in the lowlands of eastern Scotland, these are generally believed to be of medieval date. On higher ground, the emphasis of the agricultural regime may well have leant more heavily towards stock farming, and it is known from palynology that the uplands were extensively grazed. In these areas arable farming may have been more akin to gardening, though it is still a persistent feature wherever there is settlement. The general absence of fixed field boundaries is probably the most significant contrast with the evidence from southern England. Possibly the pattern of arable farming was part of a much more dynamic and flexible approach to farming in which arable may have been constantly shifting in location and extent. This seems to be manifested in later cord rig plots recorded in the southern uplands, where the visible rig seems to represent the last season of cultivation within much larger areas of turned and smoothed ground demarcated by fainter traces of cultivation scars (Halliday 1993). This too is perhaps the explanation of the multiple lines of stake fencing and the intercutting ploughmarks found beneath the stone circles on Machrie Moor (Haggarty 1991). Enclosure, such as it was, was temporary, designed for folding beasts onto the next year's arable rather than to formalise the layout of the farming landscape.

To return briefly to Yates' model of farming in southern England, the supposed contrast with the north may be more apparent than real. While enclosure can be used to increase stocking ratios on downland, this is only achieved by intensive management of the pasture within the fields. Indeed, the hypothesis that enclosure *per se* represents intensification rests on the ideas of improved farming in the historic environment. As yet, there is no other yardstick of the use of these fields by which direct comparisons can be made into the integrated palaeoenvironmental and archaeological datasets that have been recorded in Scotland. The greater contrast is probably between the implicit long-term stability implied by current interpretation of the enclosed landscapes of

southern England, and the sheer complexity of land-use pattern that the Scottish datasets reveal. In themselves, these latter may well hold a lesson for researchers further south. The use of recent remote sensing techniques, traditional survey and examination of the aerial photo archive, would help unravel this complexity.

Figure 25: Archaeologists often associate feasting with the Iron Age because of literary evidence for the Celts, but a range of equipment was present during the Late Bronze Age: Scottish finds are represented by the bucket from Cardross, ladle from Corrymuckloch, both Perthshire, and cups from Glentinar, Aberdeenshire, for drinking, with the cauldron from Hattonknowe, Peebleshire, and flesh-hook from Killeonan, Argyll, for eating. © E O'Riordan

3.5 Demography of the Bronze Age population in Scotland

Demography is the statistical study of human population which seeks to explain variations in population size, structure and dynamics by considering the population of a given area or chronological period as a single object for quantitative analysis (Chamberlain 2006). Changes in the number of individuals in a population through time will depend on a balance between birth and death, as well as movements of people into and out of the population.

Detailed demographic analysis of the Bronze Age population in Scotland has yet to be attempted although several aspects have been addressed, mainly as part of individual excavation reports. The lack of dedicated demographic research into this period is due to a number of complex challenges. Not least amongst these is the fact that there is still little idea of population numbers or structure. This is because much of the evidence derives from excavated assemblages of human remains which show remarkable bias in terms of age and sex as a result of selective burial practises, as well as incomplete preservation (Bradley 2007; Chamberlain 2000, 2006).

Population

Attempts to estimate the population size of Scotland in the Bronze Age have been fraught with difficulties due to the long chronological period of time that this era encompasses. A population of 2,500 for Scotland has been suggested, contrasting sharply with overall British population estimates which range from between 20,000 to 100,000 (McEvedy & Jones 1978; Brothwell 1972).

These now outdated estimates were based on known burial populations which are likely to be severely biased due to selective burial practices (Bradley 2007). They also fail to take into consideration that it is unlikely that population numbers would have remained static over such a long period of time,

particularly due to increasing evidence of climate change, shifting patterns of land-use and movements of people within northern Britain. All of these factors would have had implications to the Bronze Age population, namely the economy and diet, spread of disease and its effect on mortality rates.

Population structure: age categories and distributions

It is common practice to split age distributions into discrete biological age intervals, measured in units of months, years or multiple of years since birth. The simplest subdivision is to separate the lifespan into three groups based on chronological years and physiological development: sub-adult or child, adult and mature adult (Chamberlain 2006). The boundaries between these basic age groups can vary between the sexes but are thought to be founded on biological indicators, such as the development of sexual maturity in females.

There is little agreement on the definitions used to describe the age of children within archaeological populations (McLaren, forthcoming; Sofaer Derevenski 2000), however, demographic conventions define children as individuals less than 15 years of age (Chamberlain 2000, 2007). Within a stable population, demographic models suggest that the segment of the total population constituted by children could vary from about 36% in a low life expectancy population to about 19% in the highest life expectancy populations (Chamberlain 2000, 2007). This has profound implications to the wider population, as a higher infant mortality rate will result in fewer individuals reaching adulthood.

Survivorship

Survivorship is a useful demographic concept that expresses the probability that an individual will survive to a specified age. This is a contested subject; some argue that the small number of individuals over 45 years of age identified amongst the population is an

indication that people died young. Others suggest, that this paucity of older and elderly individuals is, in fact, a product of bias in skeletal-age estimation which has failed to recognise old-adult individuals (Chamberlain 2006, 34). This is clearly an area which needs more work to clarify.

Health and disease

As the accuracy of osteological analysis of Bronze Age skeletal remains advance, the recognition of markers of disease, injury and dietary problems increases. Such palaeopathological studies provide important information for Bronze Age lifestyles and health and are vital to gaining an understanding of the demography of early prehistoric populations. In very few cases can the cause of death be determined, but useful information can be observed regarding joint disease due to physical stress, chronic infections, trauma and deficiency in diets (Shepherd & Bruce 1986, 17).

Degenerative joint disease

Osteological analysis of skeletal remains has demonstrated an increase in the frequency of joint disease during the Bronze Age, indicating increased stress on the joints due to strenuous physical activities, believed to be related to intensification of farming and exploitation of the land (Roberts & Cox 2003, 77). This includes evidence of spinal joint degeneration such as that on a 35-40 year old adult male at Cnip, Lewis (Bruce & Kerr 1995, 283) and Blackhills, Tyrie (Shepherd & Bruce 1986, 36), osteoarthritis of the wrist of an adult male at Grainfoot, Longniddry (Lorimer 1991, 114), degeneration of the hip joint such as that of a young adult male from Keabog, Pitdrichie (Shepherd & Bruce 1987, 37). Spinal lesions known as Schmorl nodes, a further indicator of degenerative spinal disease either due to age or as the result of heavy manual labour is known in a small number of individuals such as two adults from Grainfoot, Longniddry (Lorimer 1991, 113-4), Boyndlie, Aberdeenshire, Culduthel, Invernesshire and

Kilspindie, East Lothian (Shepherd & Bruce 1986, 36-7).

Infection

Infection is likely to have been a major cause of death at all ages, but rarely leaves traces on the bones of the skeleton (Shepherd & Bruce 1986, 19).

Dental disease

Severe dental wear and disease is a characteristic feature of the Bronze Age population, reflective of the stresses inherent in a coarse diet (Roberts & Cox 2003, 80). Dental caries and abscesses have been observed on numerous individuals including a 35-40 year old adult male at Grainfoot, Longniddry (Lorimer 1991, 114) and adults from Boatbridge Quarry, Thankerton (Clarke *et al.* 1984), Mains of Leslie, Borrowstone and Persley Quarry, Aberdeenshire (Shepherd & Bruce 1986, 36), to name a few.

Trauma

Evidence of physical trauma is limited in the Scottish burial population during this period, but a few examples are known. Severe injuries could either as the result of repeated physical exertion, accidental injury or deliberate violence but is impossible, in most cases, to determine the cause (Roberts & Cox 2003, 80). Possible skull fractures have been noted in adult males from Hillhead and Ord, Aberdeenshire (Shepherd & Bruce 1986, 36) and a severe and extensive facial injury was noted on the skull of an adult male from Cnip, Lewis (Bruce and Kerr 1995). A healed skull fracture and a possible fracture of the thoracic spine has been observed on an adult male from Keabog (Shepherd & Bruce 1985).

Dietary deficiency

Indications of childhood illness and possible dietary deficiency can be observed in some instances from the skeletal remains in the form of enamel hypoplasia (banding on tooth enamel), cribra orbitallia (pitting on the roof of the orbits), harris lines (banding on long bones). These can only be formed during childhood, whilst the skeleton is still growing

and typically indicate a period when growth has been severely impaired. Although not common, examples have been noted from a child at Auchlin, Aberdour (Reid 1924; Shepherd & Bruce 1986, 36). A peak in occurrences in children around 2-3 years of age has been suggested as the result of weaning (Fuller *et al.* 2003). Possible instances of scurvy and rickets have been noted in south-west England (Mays 2007; Keith 1920).

Mortality

Mortality, or death rate, is defined as the proportion of the population that dies within a specific chronological interval. Although no accurate mortality figures are available for Bronze Age Scotland, high infant mortality is expected (Goodman & Armelagos 1989). It has been suggested that up to 40% of children born in prehistory, died before reaching 5 years-of-age (Goodman & Armelagos 1989, 225). Mortality rates are expected to peak at this early stage of childhood, then decrease to minimal levels in late adolescence and early adult, and then rise steadily into old age (Chamberlain 2006, 25).

One notable exception to this is high death-rates in young adult females. Margaret Bruce's study of Beaker associated burials from North-East Scotland identified a greater proportion of young-adult females amongst the deceased. Greater quantities of adult males appear to have survived into middle-age or later which is in contrast to adult females, a greater proportion of which appear to have died in early adulthood, between 15-25 years of age (Shepherd & Bruce 1986, 18). It is likely that this is directly related to childbearing and childbirth.

Mortality rates are not only tied to age and biological sex but would also vary according to socioeconomic status and other population parameters. This is more challenging to interpret in the case of Bronze Age Scotland due to the possibility of selective burial practices.

Migration and movement

There is increasing evidence for large-scale movement of peoples in the Bronze Age. In Scotland, indications of movement of individuals to and from Ireland are suggested by similarities in material culture. This movement of peoples into and out of Scotland could have had a profound affect on the population depending on the extent of such migrations, not only creating the possibility of increased pressure on settlements and resources but also effecting the distribution of disease.

Particularly during the Earlier Bronze Age there is evidence of the movement of peoples within and outwith Britain, demonstrated by Jane Evans and Janet Montgomery's strontium isotope analysis programme conducted through the Beaker People Project. Strontium isotope analysis looks specifically at tooth enamel which is formed during early childhood. This enamel retains the isotopic signature of the underlying geology, absorbed by the body through water consumption, which relates to the early years of the individuals life (Fuller *et al.* 2003). Unfortunately, this process has its limitations as it is not possible to detect individuals that move between regions that have the same underlying geology (Chamberlain 2006, 9).

3.6 Transportation and Movement

The consequences of human mobility in the Bronze Age archaeological record of Scotland are widespread. They can be traced by mapping the distributions of imported phenomena including: exotic raw materials such as jet (Sheridan and Davis 2002) from their source at Whitby, East Yorkshire; distinctive object types such as bronze swords (e.g. Colquhoun and Burgess 1988) or Food Vessels (e.g. Sheridan 2004; Brindley 2007) and technologies such as tin-bronze alloying (Needham 2004) and complex bronze sheet metalworking (Gerloff 2010); and specific funerary practices such as Beaker graves (e.g. vander Linden 2006; Sheridan 2007b). The increase in strontium isotope analysis with projects such as *Beakers and Bodies* and the

Beaker People Project is beginning to allow the identification of individuals who moved into and subsequently died in a region different from that of their birth and early development. Identifying where they came from is still a matter of scientific debate (Pollard 2011). The evidence for Bronze Age settlement, funerary and agricultural activity throughout the vast majority of mainland Scotland as well as on the largest of the 790 islands (although only 62 exceed 3 square miles) including the Shetlands, Orkneys and Outer Hebrides implies that widespread land and maritime movement by people and animals had to have been occurring. Recent surveys of the maritime connections across the Irish Sea (Waddell 1992) and the North Sea (Van der Noort 2011) demonstrate substantial movement on Scotland's exceptionally long coastline of 9,911 km. The marked similarities in many aspects of the Bronze Age archaeology of adjacent regions would have required regular movement whether over water as with northeast Ireland and southwest Scotland (Waddell 1992) or over land or water such as southeast Scotland and northeast England.

The problem in interpreting Bronze Age mobility is that there is so little surviving evidence for how it occurred. This strongly influences questions regarding the difficulty, scale and meaning. For instance, key questions that can only tentatively be addressed include:

- Was mobility a rare, specialist and ritual endeavour or a common, widely practiced and everyday activity?
- Were wheeled vehicles used only in ritual contexts or did Bronze Age farmers use wagons on a regular basis?
- When were horses first ridden and what role did they play in warfare?
- Was movement dominated by maritime and riverine activity as is frequently argued or were there major land routes?
- How mobile were Bronze Age communities? Were most people

staying put whilst a minority travelled widely?

It is assumed that maritime and riverine movement would have been fundamental in Scotland yet there currently are no surviving sewn plank boats as in England and Wales (van der Noort 2006) and, less surprisingly, no surviving hide boats (McGrail 2004, 63-4). There is the recent discovery of the c. 10m long oak Carpow log boat from the river Tay dated to 1130-970 BC has prompted its comprehensive analysis and publication (Strachan 2010), in contrast to many of the 150 logboats from Scotland whose dating clusters in the mid 1st millennium BC- end 1st millennium AD (see Mowat 1996). There is an earlier logboat fragment from Scotland – an oak fragment from Catherinefield, Dumfries and Galloway which dates to c. 2000 BC (Mowat 1996, 18-20) but these two sites presumably represent a fraction of the Bronze Age logboats which were made and used. In addition to the logboats, there are also several known potentially prehistoric paddles and oars, although none in Scotland appear to have been directly dated (see Strachan 2010, Chapter 8). The potential association of paddles with crannogs at Loch Kinord and Oakbank Crannog, Loch Tay represents the closest discovery confirmed dating – albeit to the very end of the Bronze Age at best (Mowat 1996, 97-101). There have only been a few attempts at assessing the performance of logboats. With a maximum of one paddler and 133kg of cargo or four light adults, a top speed of 2.5 knots could be achieved in the Carpow logboat (Strachan 2010, 120). It does not seem likely that these vessels could have regularly crossed the Irish or North seas, let alone made the notoriously difficult crossing to St Kilda which first occurred during the Bronze Age (Fleming and Edmonds 1999) although proper experimental voyages would be required.

The evidence for land transport is equally fragmentary. The surviving tripartite wooden wheel made from ash found in a bog at Blair Drummond, Perthshire has been dated to

1255-815 BC (Piggott 1957; Sheridan 1996) and represents the only surviving wooden evidence for wagons or chariots. There are no surviving Bronze Age trackways in Scotland which would have accommodated wheeled vehicles. The dating of the domestication of the horse for riding rather than straightforward consumption is still under debate. The discovery of bronze horse- and chariot- gear in Late Bronze Age hoards such as at Glentinar, Aberdeenshire (Pearce 1971) and Horsehope, Peeblesshire (Piggott 1955) together with the far more extensive evidence in continental Europe during the late 2nd-early 1st millennium BC indicates that chariots or wagons were being drawn by horses (see Pare 1992, 18-42). Presumably horses were being ridden in some capacity.

The gap between the transport technology and the evidence for mobility of people, animals and goods is substantial. Rather than wheeled vehicles, land transport could be dominated by human carriers who would

probably have been able to manage c. 20km a day with 20-35 kg or possibly by ox-drawn wagons which might cover 24-28 km an hour with heavier loads but would obviously require easier terrain (Piggott 1983, 89f; Uckelmann forthcoming). When compared to continental Europe, it is striking how few objects relating to horses, wagons or chariots are found in Scotland or, indeed, the British Isles (cf. Balkwill 1973; Hüttell 1981; Piggott 1983; Uckelmann forthcoming).

Figure 26: Carpow log boat under examination
©Trevor Cowie

3.7 Research Recommendations

- There is a need for a comprehensive overview of settlement forms and variety, dealing with both the wider context and regionality. Specific questions include:
 - How is society reflected in the settlement record/land organisation? Can it be 'read off'?
 - Were settlements permanently occupied and how can this be investigated?
 - How to build and challenge architectural/construction models and how to best utilise experimental archaeology to do this?
 - Were they 'settlements' or 'houses' as they have come to be seen?
- A synthesis of information for food and drink is required, drawing together evidence for husbandry, processing, storage, cooking, consumption and feasting through integrating archaeological, environmental and biological data. The relationship with flora and fauna, including both wild and domestic species, would benefit from the creation of a database of the Bronze Age evidence.
- How population was structured and other demographic topics forms important research areas that require quantification in terms of data: ideally a database of human remains. The enormous potential of burnt bone, the possibilities of DNA/Isotope studies, as well as experimental archaeological approaches to inform on the breadth of human practice should be harnessed to establish the Bronze Age as a strong period in which to explore the history of disease, as well as questions including mobility and the nature of the 'family'.

- The difference between a Bronze Age way of life and a Neolithic or Iron Age one should be explored, including questions such as:
 - Does a Bronze Age way of life lead to a decrease in biodiversity?
 - What was the system of land tenure/landuse?
 - What was the nature/structure of transportation and movement?

- A major study linking new work in palaeoclimatology and archaeology is of immediate importance and Bronze Age Scotland, with sites often found in upland, peaty locations where good preservation of palaeoecological materials such as pollen, plant macrofossils, fungal spores, testate amoebae are to be expected currently provides one of the strongest data sets for such work. Such a project must tackle issues of matching the chronologies and scale of the two sources of data and address whether climatic changes are uniform across Scotland as well as if the reactions (in natural and human systems) are also uniform. The relationship between natural changes and human behaviour requires further work to move beyond coincidence matching and explore possible causal connections (or whether other factors, such as political change, are creating an illusion of determinism).

4. Material Culture and Use of Resources

4.1 Introduction

The study of Bronze Age material culture in Scotland has traditionally been dominated by metalwork (copper, bronze and gold) and mainly Chalcolithic-Early Bronze Age ceramic vessels due to their relative ubiquity and 19th century concerns of value and aesthetics. Until recently, only Late Neolithic-Early Bronze Age flint and coarse stone ‘prestige’ objects such as barbed and tanged arrowheads, bracers and battle-axes received comparable attention. There is now a welcome emphasis on quartz as well as on later stone/flint assemblages. Rarer materials such as amber, faience and jet ornaments were frequently recorded and discussed but it has only been in recent decades that they have been researched systematically. The Bronze Age material world would have been dominated by objects made from wood textiles and animal/vegetable/plant fibres which generally do not survive in the archaeological record in Scotland. However, the preservation of these materials in many waterlogged contexts has ensured that their contribution has not been ignored. Less fortunately, it is also probable that bone objects would also have played a significant role but their preservation is rare in mainland Scotland. The concept of a ‘Bronze Age’ misleadingly suggests that bronze metal immediately replaced other materials. In reality, it appears that copper objects were initially imported from Ireland from c. 2500-2200 BC and were only subsequently supplanted by bronze objects. However, if the depositional record from hoards and single finds is representative, then it is only in the mid-late 2nd millennium BC that bronze objects were genuinely widespread in all activities which would coincide with the eventual decline in the expertise and organisation in the production of flint objects.

Research relating to Bronze Age material culture in Scotland has sought to analyse production materials and techniques, form,

decorative motifs, use-wear, movement and deposition. In recent decades, cross-craft and cross-material relationships have been explored due to the relatively rare phenomenon of prolific scholars having expertise in two or more materials. The bridging of the traditional metal-ceramic-flint-organic scholarly divides is welcome as there is little evidence to imply that such separation reflected prehistoric realities. Multiple materials were used to make virtually all objects whether they were reflected in the final form (e.g. Early Bronze Age daggers and dagger hilts) or were discarded as debris (e.g. ceramic, stone or sand moulds for all cast bronze objects). The clear implication is that the majority of Bronze Age craft involved expertise that was cross-material.

Where it is possible to assess, communities obtained raw materials and/or finished objects with a combination of local exploitation of resources (e.g. coarse stone in the Northern Isles) and connections to far-flung regions beyond Scotland (e.g. tin from southwest England or jet from northeast England). However, it is assumed that the majority of material culture made from wood, bone, plants and animals would have been locally sourced and worked with widespread expertise being evidenced or suggested during the preceding Neolithic. The virtual absence of Bronze Age material workshops reflects a broader pattern throughout Britain as well as the barely visible archaeological consequences of many manufacturing practices such as (re-)casting metal in sand/clay moulds, the firing of ceramics, the carving of wood or the weaving of textiles. The use of local materials for a new or more complex production technology (e.g. firing of thin-walled Beaker vessels using locally available clay) or the deposition of objects involved in manufacturing (e.g. stone and clay moulds for metal objects at the sites of Jarlshof and Cladh Hallan or in the Migdale-Marnoch region) strongly suggests local craft expertise. This is harder to demonstrate where the objects are found in Scotland and elsewhere, are relatively rare and require a

very high level of craft expertise (e.g. complex sheet metalworking for shields, cauldrons and buckets).

Establishing the patterns of circulation and use of objects prior to deposition remains a challenge although significant progress has been made (e.g. see copper/bronze below). This is mainly due to the difficulty in: tracing the source of the material; the place where an object made; finding and interpreting use-wear. The growing awareness that objects could have been in circulation for generations before being deposited, possibly as 'heirlooms', raises complex possibilities. Modern excavation techniques in research, developer-funded and public-related excavations (e.g. finds through Treasure Trove) have dramatically improved the recording and publishing of the contexts of object deposition. For instance, it is now possible to make accurate comparisons of the arrangement of material culture and the body at funerary sites or the landscape context of bronze hoards. The bias towards objects which were deliberately placed in the ground rather than recycled, inorganic rather than organic materials and the regions with high, rather than low, levels of archaeological activity will naturally remain.

4.2 Ceramics

Early Bronze Age pottery

See *The earliest Bronze Age (22nd–20th century BC) (Period 2)* in Section 2.2.

Middle to Late Bronze Age pottery

Radiocarbon dating has revolutionised understanding of Bronze Age funerary ceramics; Collared and Cordoned Urns were once virtually type fossils of the Middle Bronze Age, but with the principal exception of Bucket Urns, the various cinerary urn traditions can now be seen to have originated in, and largely come to an end by the mid-second millennium (Sheridan 2003). Across most of Scotland, Middle and Late Bronze Age

pottery is dominated by plain wares – for nearly a millennium decorated pottery becomes a rarity, with embellishment limited to the occasional application of cordons or horizontal finger-tipped grooves. It generally tends to be assumed that the predominantly coarse and plain ceramic traditions of the later second and earlier first millennia BC is unresponsive to detailed analysis: describing coarse wares recovered from palisaded sites in Scotland, for example, Anna Ritchie was forced to conclude that the material that did not appear 'susceptible either to typology or chronology' (1970, 54). Certainly such pottery – often encapsulated as 'Flat Rim ware' consisting of coarse, plain, long-lived and widespread and generally of simple often bucket shaped forms has often seemed defiantly intractable. However it has long been recognised that there were elements to be teased out (eg Longworth 1967; Coles & Taylor 1970; Halliday 1988) and more recent doctoral research by Catherine McGill holds out some prospect of recognition of regional variations and some broad chronological trends (Ralston & Ashmore 2007).

One longstanding problem has been the limitation of the inventory of material in Scotland – for too long, study of the pottery of this period involved revisiting well-trodden paths to a relatively limited range of excavated groups of pottery recovered from old excavations, generally unsupported by absolute dates or detailed stratigraphic contexts. That situation is now changing across Scotland as contract archaeology is significantly expanding the overall picture of second and first millennium settlement archaeology – not only in terms of structural evidence in the form of house plans but also associated material culture, particularly domestic pottery. While small by Southern British standards, significant assemblages, mostly supported by absolute dates, have been recovered from a number of settlement sites – especially in the lowland zone of Scotland (eg Drummyocher, Aberdeenshire (Johnson & Richardson in prep); Kintore, Aberdeenshire (Alexander 2000, Cook &

Dunbar 2008); Oldmeldrum, Aberdeenshire (White and Richardson 2010); Hatton Farm, Elliot, Angus (Gray & Suddaby 2010); Alloa, Clackmannanshire (Mitchell et al 2010) and Upper Forth Crossing, Clackmannanshire (unpub pottery report by Alison Sheridan), but important groups are also emerging further afield (eg Portree, Skye: M Johnson pers comm). In Atlantic Scotland especially, predominantly Historic Scotland-funded excavations on a number of key, well-stratified sites (eg Cladh Hallan, S Uist: Parker Pearson in prep) offers the prospect of much finer characterisation of the often subtle trends and variations in plainwares until the eventual re-appearance of decorated Iron Age ceramic styles during the 1st millennium BC

The inventory of material available for study is therefore expanding, both in terms of the number of the sites and the size of individual assemblages, but the results has yet to be fully synthesised. In considering issues relating to production and distribution, there is certainly scope for further research into various aspects of ceramic technology along the lines explored recently by Daniel Sahlen for his doctoral research (Sahlen 2011). Hitherto relatively little work has been done on ceramic petrology in Scotland, for example – perhaps because so much of the pottery in question has seemed so coarse and unresponsive to analysis. All too often, such analysis has simply confirmed local procurement of raw materials; however pottery from the excavations in Achany, Glen Lairg has been shown to include distinctive talc inclusions most likely from exposed rock bosses up to 30km distant (McCullagh & Tipping 1998). Several other groups of pottery from northern Scottish sites (Kilphedir: Fairhurst & Taylor 1971; Suisgill: Barclay 1985; Delny, Ross-shire: CFA 1993 & T Cowie pers comm) contain similar talc inclusions and hint at the possibility of interconnections within the region, although only future research will show whether this reflects more complex strategies for acquiring raw materials or actual of distribution of finished vessels. Research potential exists elsewhere too: for

example, at the recently excavated settlement site at Upper Forth Crossing, Clackmannanshire, crushed quartz dolerite temper in the pottery appears to derive from dykes up to 10km distant (Alison Sheridan, pers comm). Turning to questions of form and function, the increasing availability of larger and more representative assemblages offers greater scope for analysis and classification by vessel shape and size, a clearer understanding of the range of contemporary decorative features and specialized surface finishes, and thus the recognition of potential functional categories. Although yet to be deployed widely, lipid and other organic residue analyses offer further possibilities for getting to grips with traditionally unresponsive material. In summary, detailed analysis of the pottery, coupled with investigation of local clay and mineral resource surveys, the deployment of scientific analyses and experimental archaeology all offer scope for the recognition of particular potting recipes or specific pot forming/building techniques and eventually the possibility of recognition of subtle variations between superficially similar assemblages and comparisons both between sites and through time.

As well as the marked expansion of the inventory of domestic pottery, the increasing number of settlement excavations is leading to the recovery of other categories of ceramic artifact, at least some of which may in turn shed light on other aspects of Bronze Age technology (for example loom weights or the wide range of ceramics associated with metalworking ranging from clay moulds, crucibles and heating trays to furnace and hearth materials and tuyeres (Hunter et al 2006).

Finally of course, modern large-scale excavations also offer possibilities for more refining understanding of the chronology of these plainware traditions. More good quality C14 dates are required for well contexted material associated with the pottery (including further cremated bone dates for the related 'bucket urn' series); in particular,

C14 dating of organic residues has yet to be fully deployed as a means of directly getting to grips with the chronology of plainware tradition (cf Berstan et al 2008). A particular strength of dating adhering residue is that the resulting date applies to the final use of the vessel and so dates the pot itself irrespective of its survival following breakage; this has real potential especially in the benign preservation conditions offered by many deeply stratified settlement sites in western and northern isles. There is also scope for the wider application of other dating techniques such as TL/OSL dating of minerals within the fabric of pottery. In summary, at present the picture of Middle to Late Bronze Age ceramics is regionally very uneven: in many areas, each new excavation still has the capacity to change the picture radically (a situation comparable to the transformation of the inventory of Neolithic pottery in Eastern Scotland over the space of less than 20 years). For too long, the pottery of the period has tended to be consigned to a Cinderella category (Flat Rim Ware being the usual catch-all); however as noted above, the increasing quantities of data offer opportunities for better characterisation of assemblages, and particularly if scientific analysis is deployed, for addressing questions of function.

4.3 Stone artefact traditions

Stone artefact traditions would have encompassed work in a range of materials, including prestigious items made of jet and amber, as well as stone tools in use in everyday life. Stone-working would have been employed alongside a range of other technologies, and applied to monuments and rock art (see section 5.4). Sourcing of material forms another important area of research.

Figure 27: Jet buttons, belt ring and fastener from a mortuary context in Harehope, Peeblesshire. Jet was used for high status items in the Bronze Age, and these items were highly crafted dress accessories made from Yorkshire jet, © NMS

4.3.1 Coarse Stone Artefacts

The term 'coarse stone artefact' is used in archaeological discussion as a blanket description for what is really a wide and disparate range of tools and objects. Many potential functions are represented including butchering tools, grain processors, craft tools of all types, agricultural implements and sculpted pieces. Widely different types of rock were selected and some artefacts were deliberately shaped prior to use whilst others, particularly the cobble tools, were used for jobs which left distinctive task-specific wear traces. These artefacts had many and varied roles to play in prehistoric lifeways and for this reason they must be a valuable component of any research framework.

Research into the stone tools of Neolithic and Bronze Age Scotland is heavily biased towards the Northern Isles partly because of research priorities and partly because Orkney and Shetland are the only areas in Britain where non-siliceous stone is used for manufacturing artefacts to any great degree; consequently large assemblages of different types of coarse stone artefacts are recovered. Elsewhere, in the Western Isles and Mainland Scotland the coarse stone assemblages tend to be limited to cobble tools and querns (though see

remarks on St Kilda below). Until recently work on stone tools in Scotland has been confined to recording their presence in excavation reports; even that is patchy with no recognised terminology and little discussion of context. Scholarly attention has been paid to individual tool types such as the flaked stone bars and ard points from the Northern Isles with attempts to classify them by shape and to date their use (Rees 1979, Rees 1986a, Rees 1986b, Hedges 1986). With the exception of a recent work of synthesis in the Northern Isles (Clarke 2006) stone tools have never had a role in regional or national discussions of material culture; consequently most of the remarks made below are based on this publication.

Nature and development of the repertoire of stone artefacts over time (see Clarke 2006, 124-126 for summary)

A major change in tool types and manufacturing methods of coarse stone tools took place at the start of the Bronze Age. Flaked stone bars and ard points which had already been made and used in Shetland in the Neolithic began to be used in Early Bronze Age contexts in Orkney e.g. at Tofts Ness, Crossiecrown and Links of Noltland (Clarke 2007, Clarke forthcoming b) and presumably marked a change in agricultural practices in the islands. Large assemblages of these tools also occur in Shetland e.g. Sumburgh, Kebister, Scord of Brouster during the Bronze Age (Whittle 1986, Clarke 1999, Clarke 2000). At this point too there is a development in the manufacturing techniques applied to stone assemblages from Shetland with a greater emphasis on grinding the sandstones to more intricate shapes e.g. handled clubs (Clarke 2000, Clarke 2006) and there is a simultaneous development in the production of finer ard points (Clarke 2006).

Skaill knives, which were very common during the Neolithic, continued in use at many Bronze Age sites e.g. Crossiecrown and Tofts Ness in Orkney and Sumburgh, Shetland whilst a new tool type, the flaked cobble,

utilised a chopper edge which may have been associated with extracting marrow from split bones at Tofts Ness (Clarke 2006, 2007). Tools made on laminated stone such as schists and shale became widespread in Shetland including various handled forms such as knives and cleavers/ choppers (Clarke 2000, Clarke 2006). Flaked stone bars were also manufactured on St Kilda but it is not yet known whether they are from the Neolithic or later occupations; the presence of flaked cobbles and Skaill knives alongside the flaked stone bars but in redeposited contexts suggests that they may date to at least the Bronze Age (Fleming 2005).

Agricultural implements played an important role in the funerary ritual of this period in particular the placing of ard pints and flaked stone bars around the kerbs of burial mounds (Clarke 2006). Along with occasional deposits of grain (e.g. at Ness of Gruting) flaked stone bars and ard points were also commonly found deposited in house walls demonstrating close links with arable farming and life and death cycles.

A much narrower range of stone tool types occur outwith the Northern Isles and these comprise mainly cobble tools such as pounder/grinders and trough querns. This implies that wood and bone must have substituted for stone for larger tillage implements. Links between Ireland and the west coast of Scotland at this period are demonstrated by the presence of grinding slabs from Kilellan, Islay that can be most closely compared to those from Dun Aonghasa, Aran islands, County Galway (Clarke 2005, Clarke forthcoming a).

It is not understood how the repertoire of stone tools may have changed throughout the Bronze Age. Certainly, at Bayanne there is a change in the stone used for the ard points in phase 3 suggesting that access to resources had changed (Clarke 2006, Clarke forthcoming c) but in reality there are not enough well-dated published sites to investigate the

subtleties of resource use throughout this period.

In Shetland the end of the Late Bronze Age and the beginning of the Early Iron Age is marked by structural and ceramic changes e.g. at Sumburgh and Bayanne but there appears to be no immediate change in the composition of stone tool assemblages implying that the means of production essentially stayed the same over the period of style change (Clarke 2000, Clarke 2006). Structural changes at this point involved new arrangements for cattle stalling and the heart-shaped stone objects specifically found in these contexts may be directly linked to tethering animals. In contrast, at Tofts Ness the Early Iron Age round-house phase marks an abrupt drop in the use of stone agricultural tools so there are clearly local and regional differences as to how changes were made and incorporated at this time.

Key research questions

- Not much is known about the use of coarse stone tools across mainland Scotland and the Inner and Outer Hebrides. There is a need for a proper programme of recording the assemblages from these sites in order to be able to look for similarities or differences and to bring the analysis to the same level as that achieved for the Northern Isles.
- Research is needed that is designed to overlap the boundaries of the 'Three Age System'; these are points at which there are significant changes in the production and use of coarse stone tools e.g. Late Mesolithic/ Early Neolithic; Early Neolithic/ Late Neolithic; Late Neolithic/ Early Bronze Age.
- A programme of experimental archaeology could attempt to address the range of craft and processing activities that involved these stone

tools. Microwear analysis is now possible on large coarse stone tools because of new designs of microscope.

- More specifically for the Bronze Age there is a need for more excavations of multi-phase habitations that span the Neolithic through to the Bronze Age and from the Bronze Age through to the Iron Age e.g. Scord of Brouster and Bayanne and Sumburgh, Shetland as these are the types of site from which one can observe change through the various phases of activity. In Orkney these cross-over phases and continuation of occupations are not so commonly observed – why?
- Dating is required for quarry sites on St Kilda and in the Northern Isles to refine the phases of use of these sites.

4.3.2 Flaked lithics of the Bronze Age

From the beginning to the end of the Bronze Age there is a radical change in the manufacture (and presumably use) of flaked lithics. This is marked by reductions in the size of assemblages, a different and smaller range of tool types and by less controlled manufacturing techniques.

Lithic assemblages from the Early Bronze Age (EBA) are not easily separated from those of the Late Neolithic, unless by virtue of a securely dated context and these are usually funerary in nature. A few lithic types are considered as classic EBA forms: barbed-and-tanged points and thumbnail scrapers because these have Beaker funerary associations (Edmonds 1995) whilst retouched tools from contexts with Food Vessels and Collared Urns often include knives and end scrapers (Shepherd and Cowie 1977). More often than not these retouched types, particularly the latter two also occur within larger assemblages linked with Late Neolithic Grooved Ware occupations (Suddaby and

Ballin 2011, Clarke 2012). So unless there is pottery with which to more closely date the activity a lithic assemblage such as this is normally dated only broadly by specialists to the Late Neolithic/ Early Bronze Age (LN/EBA).

There are indications that a wider range of local materials was being used in the Bronze Age than in the Neolithic. Quartz is often found in lithic assemblages of this date and at many sites it is the most common material, supplemented by only a small amount of flint e.g. The Udal, S Uist (Clarke 1997), Rosinish, Benbecula (Clarke 1982), Kebister, Shetland (Clarke 1999a), Dail na Caraidh, Inverness-shire (Clarke 1999b) and see Ballin 2009. Recent excavations on the Shiant Islands produced a probable LN/EBA assemblage of baked mudstone which was most likely derived from immediately accessible sources (Clarke 2008) as well as flint. In Aberdeenshire Ballin notes the use of local flint at this time (Ballin 2011). Can we recognise this in Bronze Age assemblages in the south of Scotland where local cherts were an important resource throughout the earlier prehistoric period?

Towards the end of the Bronze Age and into the Iron Age lithic working became less organised and assemblages are characterised by the dominance of unsystematically produced flakes a high proportion of them with pebble cortex, pronounced bulbs of percussion and hinged terminations as well as a narrow range of particular retouched tools including chunky scrapers, denticulates and notched pieces (Ballin in White and Richardson 2010, Ballin 2011, Young and Humphreys 1999).

Key research questions –include:

- How does the use of lithics differ between occupation and funerary contexts in the LN/EBA?
- How were lithics used in the cremation ritual – some are heavily burnt before incorporation in or around vessel, others not.

- How does the selection of lithic material for knapping compare with the Neolithic – has the ‘value’ of particular rock types been diminished with the use of metal? How has access to these resources changed?
- At what point was the knowledge of organised flint knapping lost? And when do flaked lithics become ‘secondary’ to other materials e.g. metal?

4.3.3 Jet and jet-like materials

4.3.3.1 Introduction

Although jet and similar-looking materials had been used in Scotland since around 3600 BC, objects of these materials had been rare. However, from c 2200 BC, a significant increase in their use (by the elite) is evident in Scotland. Jewellery and dress accessories of jet, made by specialists based in the Whitby area of Yorkshire (where the only substantial source of good quality jet in Britain and Ireland exists), were imported, and copies and substitute pieces were made in Scotland using similar-looking, locally available materials (i.e. cannel coal, oil shale, lignite and albertite – the last known to outcrop around Strathpeffer, Highland).

The use of jet and jet-like materials in pre-Iron Age Britain is the subject of a current, long-term research project led by Dr Alison Sheridan of National Museums Scotland (NMS), working with Mary Davis (National Museum Wales) and with other colleagues including Lore Troalen and Dr Susy Kirk (Sheridan & Davis 2002; Sheridan 2008). The results of this work – which include compositional analysis to identify raw material – are summarised in this section. The dating of jet and jet-like artefacts has partly been achieved through the NMS’ radiocarbon dating programme (for results of which, see annual reports in *Discovery and Excavation in Scotland*), and partly through the *Beaker People Project* (Jay *et al.* 2012) and *Beakers and Bodies Project* (Curtis & Wilkin 2012),

with additional dates coming from developer-funded excavations.

Jet – the semi-fossilised remains of wood of the *araucaria* species (i.e. the species to which monkey puzzle trees belong) – is an unusual substance in that, like amber, it is a stone that can float; a stone that can be burnt; and it has electrostatic properties. In addition, it is aesthetically pleasing and rare. All these properties – and a belief in its special powers – are likely to have lain behind its use and popularity (Sheridan & Shortland 2003). Jet is known to have been used as an amulet in the Roman and Viking periods, with late Roman writers claiming that it could be used to heal toothache, close up bloody wounds, heal gynaecological problems and even determine whether a person was feigning virginity (Allason-Jones 1996). Still used as an amulet around the world, jet is highly likely to have been attributed amuletic powers in prehistory.

4.3.3.2 Chalcolithic use of jet and jet-like materials

In Scotland there is no jet and jet-like object that can be attributed with certainty to the Chalcolithic period (i.e. 25th – early 22nd century BC), even though evidence from elsewhere in Britain (at Chilbolton, Hampshire and Devil's Dyke, Sussex) suggests that tiny disc beads of these materials may have been in use – as part of composite necklaces, along with tubular sheet metal beads – during this period. These beads are associated with Beaker pottery in graves and represent a Continental fashion: their shape echoes that of copper spiral beads in central Europe.

4.3.3.3 Early Bronze Age use of jet and jet-like materials, 22nd century – c 1750 BC

This period saw the greatest use of jet and jet-like materials in Scottish prehistory, with the following objects in use:

- V-perforated buttons (Figure 28, Figure 29, Figure 30; Shepherd 2009; Sheridan & Davis 2003)
- Disc-bead necklaces (Figure 31, Figure 32; Sheridan & Davis 2001)
- Belt rings (**Error! Reference source not found.**; Sheridan & Davis 2002)
- Spacer-plate necklaces and bracelets (Figure 34, Figure 35, Figure 36; Sheridan 1998; 2008; Sheridan & Davis 1995; 2002)
- Disc-and-fusiform bead necklaces (Figure 37)
- Disc-and-fusiform bead belt, at Culduthel, Highland (Figure 38)
- Fusiform-bead jewellery and individual fusiform and disc (and biconical) beads;
- 'Napkin ring' garment fasteners (Figure 39)

Virtually all of these have been found in funerary contexts, usually cists, most often with inhumed bodies but sometimes with cremated remains (in which cases the artefacts must have been kept apart from the body during cremation).

Figure 28: V-perforated buttons and pulley belt ring from Harehope, Scottish Borders. Photo: ©NMS

V-perforated buttons are a type of dress accessory that was adopted from Continental Beaker use, and some have indeed been associated with Beaker pottery in graves in Scotland (Kirkcaldy, Fife and Limefield, South Lanarkshire: Shepherd 2009, Cat. Nos. 125 and 130), as elsewhere in Britain (ibid., Appendix).

Figure 29: V-perforated buttons from Rameldry Farm, Fife: top: the decorated button; bottom: the set of buttons. (Note: No. 2 is of lizardite, not jet.) From Sheridan & Davis 2003

Others have been found in a 'dagger grave' at Rameldry Farm, Fife (Figure 29; Sheridan & Davis 2003); some with no artefactual associations (e.g. at Harehope, Scottish Borders: Figure 28; Shepherd 2009, Cat. No. 134); and some used as a fastener for a spacer plate necklace (as at the head of Campbeltown Loch). Their Scottish distribution is shown in Figure 30.

Figure 30: Distribution of V-perforated buttons (squares) and pulley belt rings (triangles). From Sheridan & Davis 2002, with addition

The gender associations and various uses of V-perforated buttons have been discussed by Shepherd (ibid.); most of the Scottish examples had been associated with males, although their occasional use as fasteners in spacer plate necklaces (see below) indicates some use by females. Some had clearly been used to fasten jackets, as at Rameldry Farm; here, a set of six were found (including one of lizardite); it appears, from finds elsewhere in Britain, that six was the standard number of buttons used in this way. At Harehope, one exceptionally large button may have been used to fasten a cloak, as Shepherd has suggested (2009), while some of the other buttons in the cist in question may have been decorative studs, rather than functioning buttons.

Some V-perforated buttons are decorated, and at Rameldry Farm one of the jet buttons (Figure 29) has a unique form of decoration, consisting of selective dulling of the highly-polished surface to pick out a design including zig-zags, together with inlaid metallic tin. The significance of this button is discussed in Sheridan & Davis 2003.

The materials used for V-perforated buttons are jet, cannel coal/oil shale and albertite. Albertite (most probably from Strathpeffer near Dingwall) had been used to make the button found at Isbister, Orkney. It is a naturally shiny material, and its identification through analysis by Mary Davis puts paid to a long-standing *canard* trotted out to thousands

of visitors during tours at Isbister, where it is claimed that this button was dull when found by farmer Ronnie Simison, but when it came back from the National Museum of Antiquities of Scotland laboratory in the 1950s or 60s, it had been ‘polished up’: in fact, it had simply had the covering sediment removed, to reveal the natural brilliance of the raw material. This is not the only artefact known to have been made of albertite: an object found on Culbin Sands, Moray, is also of this material.

Figure 31: Disc-bead necklace from Barbush Quarry, Dunblane, Stirling. From Sheridan & Davis 2001

The Scottish examples of disc-bead necklaces – of which just over 30 are known – feature beads that are between c 5 mm and c 10 mm in diameter, subtly graded in size, with the largest ones at the front of the neck – as in a fine example from Barbush Quarry, Dunblane, Stirling (Figure 31; Holden & Sheridan 2001). Where the sex of the deceased has been reliably identified, in every case in Scotland it has been female. In most cases, these necklaces have been made from cannel coal or oil shale rather than jet; their ceramic (and other) associations have been discussed in detail in Holden & Sheridan 2001. Essentially, where pottery has been present, it has been either late Beaker (as at Stoneykirk, Dumfries & Galloway: Mann 1902) or Food Vessel. One remarkable example of a disc-bead necklace,

with a second strand made of metallic lead beads, was found associated with an infant aged 3–5 at West Water Reservoir, Scottish Borders (Figure 32; Hunter & Davis 1994).

Figure 32: Disc-bead necklace with second strand of metallic lead beads, from West Water Reservoir, Scottish Borders. From Hunter & Davis 1994

These size-graded disc-bead necklaces appear to represent a development from the Chalcolithic necklaces comprising tiny disc beads of uniform (or nearly so) size – although the use of tiny disc beads certainly continued into the Early Bronze Age, as discussed below.

Figure 33: Early Bronze Age jet pulley belt ring, from Nr Kirriemuir.

Pulley belt rings (Figure 33) are a male dress accessory; like the aforementioned objects, belt rings formed part of the Beaker assemblage of prestige objects, with one such example (of Kimmeridge shale) having been found associated with the famous ‘Amesbury Archer’, near Stonehenge (Fitzpatrick 2011). Fewer than ten have been found in Scotland, and all seem to be of cannel coal or oil shale, rather than jet; other Chalcolithic/Early Bronze Age belt rings, made from bone, are also known (Stevenson 1957). The distribution of pulley belt rings is shown in Figure 30.

Figure 34: Spacer plate necklace from Inchmarnock, Argyll & Bute. Photo: Alison Sheridan

Figure 35: Spacer plate necklace and bracelet from Kinkharrie, Angus. Drawing by Helen Jackson for NMS

Figure 36: Distribution of spacer plate necklaces and bracelets in Scotland. From Sheridan & Davis 2002 TO COME

Spacer-plate necklaces (Figure 34, Figure 35, Figure 36; Sheridan 1998; 2008; Sheridan & Davis 1995; 2002) are a form of Early Bronze Age female jewellery that appeared as a deliberate skeuomorph of gold lunulae in the 22nd century BC. (Note that recent attempts to play down the ‘skeuomorph’ idea (e.g. Roberts & Frieman 2012) ignore the fact that the surviving examples include some old necklaces that, through loss and mixing of components, have deviated from their original shape, and others that constitute

regionally-distinctive versions that are not as close copies of gold lunulae as the ones found in Scotland.) Some have decorated spacer plates, others have undecorated spacer plates; and the maximum number of strands ranges from three to 10. Fasteners range in shape from flat triangular, to boat-shaped and cuboid; as noted above, in a few cases, V-perforated buttons have been re-used as fasteners. Their distribution is shown in Fig. 9. In a few cases, spacer plate bracelets have also accompanied the necklaces, as a *parure* (matching set); at Melfort, the bracelets took the form of a pair of bronze bangles.

Where pottery has been associated, it has been of Food Vessel type. Where the sex of the deceased has been reliably determined, it has been female. In some cases, the necklaces were not very old when buried (as at Mount Stuart, Bute, for example); in others, they were old and worn, and in some cases (as at Inchmarnock, off Bute) they have been made up from parts of several necklaces. Clearly, then, some of these treasured possessions were passed down the generations; components such as individual beads (e.g. at Scalpsie, Bute) or spacer plates (as at Inchmarnock cist 2) would be buried on their own.

Figure 37: Fig 10 Disc-and-fusiform bead necklace from Greenhill, Fife. Photo: © NMS

Disc-and-fusiform bead necklaces (Figure 37) comprise beads taken from pre-existing spacer plate and disc-bead necklaces, strung together and closed with a fastener, usually boat-shaped. As with their 'parent' necklaces, these appear to have been worn as female jewellery. Where pottery has been associated, it has been of Food Vessel type.

One slightly unusual disc-and-fusiform necklace was found in a probable double-interment cist at Masterton, Fife (Henshall & Wallace 1963). Here, the disc beads are tiny and of uniform size, like the ones previously noted from Chilbolton and Devil's Dyke. In fact, the use of tiny disc beads of jet and jet-like (and indeed other) materials had a currency spanning several centuries; they were popular in Early Bronze Age Yorkshire (e.g. at Garton Slack) and have been found to date as late as the 15th century BC (at Amesbury Solstice Park, Wiltshire). The Masterton necklace also has two terminal plates, like those seen on spacer plate necklaces.

Figure 38: Disc- and fusiform-bead belt from Culduthel, Highland. Photo: © NMS

An alternative use for disc and fusiform beads is attested at Culduthel, Highland, where they were found as a belt (Figure 38), in the waist region of a female crouched skeleton (Low 1929). Here, both tiny disc beads, and others that are comparable in size with those seen in

graded-size disc-bead necklaces, are present. The individual in question has recently been radiocarbon dated, as part of the *Beaker People Project* project, to 3697±33 BP (OxA-V-2166-45 S-EVA 1130, 2200–1970 cal BC at 95.4% probability).

Figure 39: Squat, gently biconical jet bead from Cairnholy, Dumfries & Galloway. Photo: NMS

In a few cases, as indicated above, individual fusiform or disc beads have been found as grave goods; in most cases these will have been heirloom pieces, originating in necklaces. However, at Poltalloch in Kilmartin Glen, a bracelet of small fusiform beads seems to have been made specifically as an accompaniment to a jet spacer plate necklace. These beads are of cannel coal or lignite (Sheridan & Davis 1995). Similarly, at Balneaves, Angus, a relatively large fusiform bead found in a Collared Urn with cremated bones might not have been an heirloom object; charcoal from another Collared Urn in the same cemetery urn was radiocarbon dated to 3430±40 BP (GU-2446, 1880–1620 cal BC at 95.4% probability; Russell-White *et al.* 1992). At Cairnholy chamber tomb, Dumfries & Galloway, a single biconical jet bead was found (Figure 39; Piggott & Powell 1949). This is reminiscent of some biconical beads found in rich graves in Wessex; whether it dates to the first or second quarter of the second millennium is a moot point. Other similarly-shaped beads are known from

Mouswald, Dumfries & Galloway (Anon 1889) and could conceivably be contemporary.

Figure 40: 'Napkin rings' from Camps Reservoir, South Lanarkshire: top: *in situ* (photo: Tam Ward); bottom: side view (photo: Alison Sheridan)

Finally, 'napkin rings' (Figure 40) are a regionally-specific object type, found only in northern England and southern Scotland (Hunter 1998). A pair found (by Biggar Archaeology Group) *in situ* at Camps Reservoir, South Lanarkshire, suggest their use as giant eyelets for a cloak fastener: it is likely that a thong had passed through them. All the examples so far discovered appear to have been of cannel coal or oil shale, rather than jet. Examples known to 1998 are listed by Hunter (1998); the example from Blairhall Burn, South Lanarkshire, comes from a round-house dated to between 1880 and 1530 cal BC, so the possibility that this object type may date to the second, rather than the first quarter of the second millennium BC must be borne in mind.

What has not yet been found in Scotland – and indeed might not have been used, bearing in mind its geographical distribution – is the ear stud or labret. (See Yates *et al.* 2012

for recently-discovered examples from Norfolk.)

4.3.3.4 The use of jet and jet-like materials, c 1750 – c 750 BC

The use of these materials seems to have declined after the 18th century BC, although a new artefact type – the bangle of cannel coal or oil shale – appeared, probably during the second quarter of the 2nd millennium, as indicated by the evidence from Bodsberry Hill, Elvanfoot, South Lanarkshire (Terry 1993). Bangles continued to be used into the 1st millennium BC, with fine examples having been found in the St Andrews Hoard (Fig. 13; Sheridan & Davis 2002).

Other post-18th century BC Bronze Age artefacts of jet/jet-like materials in Scotland are rare, and include the following:

- A single, squat fusiform bead of jet with sinuous incised decoration from a bucket urn at Glenluce, Dumfries & Galloway (Davidson 1952, fig. 2); the associated cremated bones have been radiocarbon-dated to 3210±60 BP (GrA-18304, 1630–1310 cal BC at 95.4% probability: Sheridan 2007)
- A toggle-like object of cannel coal or oil shale from a Bronze Age roundhouse at Rhiconich, Highland
- Beads cannel coal or oil shale of from a Late Bronze Age necklace from Balmashanner, Angus (Fig. 14).

4.3.3.5 Outstanding research questions

The outstanding research questions relate to the refinement of the information already available:

1. Sourcing: there is scope for obtaining a more precise idea of the source of the cannel coal and oil shale used for the objects mentioned above, using the minimally-destructive technique of oil-emersion reflectance microscopy, with reference to the National Coal Board raw material reference

collection. The benefit of this approach has been amply demonstrated through the research undertaken by the late Dr J M (Mick) Jones, on artefacts from Yorkshire and Scotland; this work should be continued.

2. Sexing: wherever possible, the sex of the human remains associated with jewellery and dress accessories of jet and jet-like materials needs to be established. The use of aDNA may help in cases where diagnostic bones are not present.

3. Position in graves: wherever new finds of jet/jet-like jewellery are encountered, very great care needs to be employed in recording their exact position, especially in the case of spacer plate necklaces. The benefits of block-lifting and laboratory excavation have been demonstrated in the case of the West Water reservoir find (Hunter & Davis 1994), where it is debatable as to whether the tiny lead beads would have been recognised in the field.

4. Dating: although we have a fairly good chronological ‘handle’ on the currency of individual artefact types, there is always scope for improving matters with more high-quality AMS dates, so every opportunity to date them should be taken – especially in the case of new finds.

4.4 Organics

Organic material surviving from the Bronze Age serves as a reminder of the considerable elements of prehistoric life currently only glimpsed. Woodworking was undoubtedly important, as was boneworking. Basketry is highlighted by finds such as at Langwell Farm and textiles were another important component of the Scottish Bronze Age (see below). The use of organic material would have involved similar technologies and speaks of the economic basis of the period, while their use throws light on the nature of society.

Figure 41: Image of Langwell Farm burial taken before police intervention in the cist © John White

Textiles

British Bronze Age textiles were first seriously considered in the mid 20th century when Audrey Henshall compiled her comprehensive account of all known textile evidence from prehistoric Britain (Henshall 1950; 1951). The sparse evidence from Scotland comprised six examples which she reported were made from plant, and animal fibres: Stromness, Orkney; Antabreck, North Ronaldsay, Orkney; Ferniegair, South Lanarkshire; North Cairn Farm, Wigtownshire; Grantown, Moray; and Greenoak Hill, Glasgow.

Since the 1950s further research into British Bronze Age textiles has been conducted (Bender Jorgensen 1986, 1992; Wild & Pritchard 2005; Wincott Heckett 2012), although analysis and research of Scottish material has been limited. Few new examples of animal, vegetable or plant textiles have been found since Henshall's initial study, despite the archaeological potential offered by commercially-led developments. Old evidence needs to be re-assessed and new evidence discovered to further the

development of Bronze Age textile research in Scotland. Known examples tend to be analysed in isolation and there is a need to consider the wider social, economic and cultural aspects of textile production, and the role and impact it had on people's lives.

A pottery sherd found at Glenluce Sands in Wigtownshire bears the impression of woven cloth on its outer surface. The pot is dated to between 3000 and 2250 BC, and is the earliest example of the existence of woven textiles in Bronze Age Scotland (Henshall 1968). The impression of a weave is also preserved on a Neolithic pottery sherd from Rinyo, Rousay, and was interpreted as an impression of the mat on which the pot stood when unfired (Childe & Grant 1947).

The evidence for textiles will be discussed in relation to what the textiles are made from because different materials bring with them different ways of acquiring the raw material, treating it, and crafting it: all of which are bound by different cultural and social associations. For example, wool needs to be plucked or shorn and carded before it can be spun into a yarn and woven into a cloth; hemp and flax need to be grown, harvested, broken, scotched, hackled before it can be spun into yarn and woven into a cloth; and grasses need to be cut, sorted, and woven/tied.

Animal Fibres

The only woollen textile found in Scotland during the time of Henshall's study was a small length of plaiting found in a cist near Grantown, Morayshire in 1890. Fifteen threads of Z-spun wool are worked into a plait of three. However, the date of this piece is ambiguous. A robust piece of cloth made from drop-spun sheep's wool woven in 2:1 twill was discovered in the 1980s during the underwater excavation of Oakbank Crannog, Perthshire and dated to the late Bronze Age/Early Iron Age.

Only one textile fragment of secure Bronze Age date (radiocarbon dated to 1190–915 cal

BC at 1σ) has been found within the last 30 years. It was discovered in Sheshader, Isle of Lewis during peat cutting. It consists of a pad of compressed (nearly felted) cattle hairs, with one or more cord made from twisted strands of wool plus several cords made from plaited horse hair (Alison Sheridan pers comm.) One of the horsehair plaits measures c.30cm long, and another may have originally been longer. The 'Sheshader Thing' is a unique and odd discovery. It is evidence of different textile crafts practiced at the time: plaiting, twisting, cording, and felting; as well as the different combinations of fibres that can be used in the creation of one item. Contextually it was discovered c. 10m away from a sub-peat field wall, but apart from this it was an isolated find with no other clues as to its true nature. Wincott Heckett (2007, 31; 2012, 432) suggests that the piece may have been worn tied to the face, leg or body of a small person or used as a mask at dances, other festivals, or on ceremonial occasions.

Wincott Heckett (2012, 432) also states that if the Sheshader Thing was in use at the earlier date range of around 1300 BC then it would be contemporary with a horsehair net worn by the woman buried at Skrydstrup (Broholm and Hald 1940, 20; Mannering et al 2012, 97), and a wool mesh hairnet found with the Egtved girl (Glob 1973, 58), both from Danish Bronze Age mound burials dating to the second half of the 2nd millennium BC.

A hoard dating from the Late Bronze Age was found in St Andrews, Fife (Cowie *et al.* 1991, 45). As well as containing over 200 tools, weapons and ornaments; specimens of animal and plant fibre textiles were recovered. Identified was a tabby weave in wool made from Z-spun single yarn with a thread count of about 6-8 threads/cm; a bast fibre tabby weave, possibly in hemp, made from Z-spun yarn with a thread count of 6/16 threads/cm; and a bast fibre textile measuring 7cm x 4cm, also in a tabby weave with a 14/12 thread/cm count (Wincott Heckett 2012, 432; Gabra Sanders 1994; 34-41).

Figure 42: Textile fragment from late Bronze Age hoard from St Andrews, Fife, © NMS

Vegetable Fibres

Three examples of vegetable fibre textiles have been discovered in Scotland; one is made from flax, one from flax or nettle and one from hemp. All are associated with metal work where salts associated with corrosion products tend to assist with the preservation of these vulnerable materials. The first is a piece of flax cloth used to plug the socket of a Late Bronze Age spear-head from Pyotdykes, Angus (Coles 1964, 178-8). It has a thread count of 10-11 threads per cm in a Z-spun yarn in both systems (Wincott Heckett 2012, 432). The second is a small piece of cloth found inside the socket of a Late Bronze Age knife in Nydie Mains, Fife. It is made from plain woven flax fibres, and measures 17 mm in length and 6 mm in diameter. It has a thread count of 8 to 9 threads per cm in a Z-spun yarn in one system, and a Z twisted single yarn in the other (Hedges 1972, 293-295; Wincott Heckett 2012, 432). Hemp string and fabric specimens woven in a tabby weave is preserved on the blade of a bronze razor from the St Andrews hoard.

Plant Fibres

In comparison to animal or vegetable fibres, there is more evidence for plant fibre textiles dating from this period, with the majority found within funerary contexts: woven wicker and grass funerary mats/coverings and containers/bags within inhumation and burial cists. Contextual evidence for plant fibre

textiles/crafts is misrepresented due to poor preservation of organics, difficulty of identifying settlement sites, and antiquarian bias towards burials. The craft of weaving plant fibres to create a variety of objects e.g. mats, baskets, and bags, was by the Bronze Age probably an ancient and perfected craft skill – an indication of this glimpsed through the woven imprint on the pottery sherd from Rinyo, Rousay (Childe and Grant 1947, 34).

There are four examples of cist inhumations containing fabrics/mats made from plant fibres, which partially cover the body. A Bronze Age date is likely for a fabric made from *Scirpus Lacustris*, Bulrush, found in a crouched cist burial of a woman at Firths Park, Stromness, Orkney. The fabric was made using a cross-twisted technique and was reportedly swathed over the burial (Henshall 1950, 153). Similar fragments of fibrous plant material have been reported at Greenoak Hill, Mount Vernon, Glasgow (Ibid 1950, 153), Ferniegair, South Lanarkshire (Welfare 1975, 5); West Puldrite, Evie, Orkney (Corrie, 1929); and the most recent discovery at Langwell Farm, Strath Oykel (Lelong 2009).

On Langwell Farm, a partial inhumation burial was discovered in a cist along with fragments of woven wicker, fur and other unidentified organics. Unfortunately most of these were destroyed when police compromised the archaeological evidence and partly cleared out the contents of the cist. However, a photograph of the inside of the cist was taken shortly after its discovery, and clearly shows the wicker covering the skeleton in patches. The farmer has since described the wicker as a ‘woven material resembling a basket in the lower leg region and additional basket-like material around the head’ (Lelong 2009, 7).

Cremated remains and ashes are also found placed on top of plant fibre mats within cists, such as at Antabreck, North Ronaldsay (Traill 1885). Most recently, a mat or bier made of birch bark was found in a cist at Forteviot, dated to 2199–1977 cal BC, but it is unknown if it showed any sign of having been woven

(Brophy & Noble 2011, 798). There were also hints of some form of organic bag and coverings – including a sheath on the dagger (Brophy, pers comm). Much of this material is currently undergoing post-excavation analysis.

In 1999 an unusual cist was excavated at Sand Fiold, Orkney (Dalland 1999). It contained decomposed plant remains of grass and sledge covering an un-urned cremation deposit and unburnt bone deposit. A Food Vessel Urn containing cremated bone had been lined with basketry also made from grass. Apart from the remains of a basket lining the urn, there is no indication that the grasses placed within the cist were woven in any way, and it is thought they are the remains of wild grasses which were carefully placed and arranged to cover the unburnt bone and cremation deposits within the cist (Dalland 1999, 373). There are other accounts of unidentified plant matter found within Bronze Age cist burials, which could be of the same ilk as the Sand Fiold burials at Roseisle, Moray (Shepherd and Murray 1987, 23); Links of Skail, Orkney (Lysat 1974, 228); Barnhill, Angus (Hutcheson 1887); Lunanhead, Angus (Galloway 1877, 290); and Broomend, Inverurie (Chalmers 1867).

Textile production

There is very little evidence for textile manufacture; a result of preservation problems and limited settlement excavation in the past. Manufacturing tools such as whorls, weights, shears, combs, bobbins, shuttles, looms, and tablet weaving plaits. are hardly represented. These items were made out of a variety of different materials, organic and inorganic. For instance there are lots of different ways to make a loom weight: stone, clay, or a cloth sack filled with dirt; the latter not represented in the archaeological record due to preservation or problems in recognition.

Evidence for a loom was discovered in one of the houses at Cladh Hallan, South Uist. Paired

posts indicating where a loom might have stood, and a single loom weight were identified. Spindle whorls were also found at this site (Parker Pearson *et al.* 2004, 73).

There are more examples of clothing accessories from Scotland, such as buttons (Clark *et al.* 1985) and pins. The examples that survive to the present are usually made from stone or metal, and usually found in hoard (Ashmore 1996, 266) or funerary contexts (Jospeth 1989, 68-9; Jobey 1978-80; Childe *et al.* 1944, 106-19).

Bone/antler pins have been found associated with cremations on all parts of the British Isles (Longworth 1984). They are commonly found in a calcined state within cremations found throughout Scotland (McCullagh & Tipping 1998, 132; Cowie *et al.* 1981), which suggests they were used as pins for funerary garments as opposed to pins used to secure cremated remains within a bag (Kirby 2011, 34).

Research Questions

A number of research questions (and how to study them archaeologically) arise from this, including:

- Did breeding sheep and cultivating vegetable crops for the production of materials for textile manufacture take place, and, if so, on what scale? How to recognise and study it archaeologically?
- How important was the textile/craft industry to Bronze Age society and was there trade and exchange in textiles/plant crafts? How to recognise and study it archaeologically?
- The 'Sheshader Thing' demonstrates the use of different fibres and techniques: what animal, vegetable, and plant fibres were available?
- Re-analysis of known textile fragments [see Ryder (1999)] and the secure dating of samples from bog contexts would improve the data set

considerably and help enable the questions above to be answered.

- Are burnt mounds connected with clothing and textile production – e.g. fulling, dyeing, tanning? Analysis of residues (lipids, chemical analysis) within tanks would help address this question.

4.5 Metallurgy

4.5.1 From raw material to reduction to treatment to craftsmanship

Bronze Age Metalwork in Scotland c. 2500-800 BC

This section reviews the current state of knowledge concerning metal production, circulation, use and deposition in Scotland during the Chalcolithic/Bronze Age (c. 2500-800BC). This encompasses copper, copper alloys such as arsenical copper and tin-bronze, gold, tin and lead. It does not seek to duplicate the research on the historical development of Bronze Age typochronological sequences (see section 1), propose typological connections beyond Scotland (see Gerloff 2007; Roberts *et al.* in press) or provide a historiography of metal and metallurgical research in Scotland. This section follows the evidence for the prospection of the potential ore and native metal sources through to the final deposition of the metal objects (see Ottaway and Roberts 2008). It builds on the recent review of research priorities for archaeometallurgy in Scotland which encompassed the Bronze Age (Hunter *et al.* 2006).

Prospection, Extraction and Ore processing

There is currently no conclusive evidence for metal prospection, extraction or ore processing dating to the Bronze Age in Scotland. Lead and copper ores are found throughout the country (Wilson & Flett 1921) and there are also widespread alluvial gold deposits. Most of these deposits occur as surface outcrops and could have been

prospected for and worked in prehistory. Copper ore sources accessible to prehistoric prospectors and miners (Rice 2004) as are currently being surveyed at Tonderghie, southwest Scotland (Sheridan 2008, 69) have yet to be subjected to the intensity of fieldwork seen in Wales and Ireland (see Timberlake 2009). Museum collections and antiquarian accounts provide tantalising potential evidence for Bronze Age mining. There were also alluvial gold sources as at Leadhills and Wanlockhead, south Lanarkshire and Helmsdale, Sutherland exploited during the post-medieval period and later⁵ which have been extensively surveyed and accompanying micro-chemical characterisation led by Robert Chapman at Leeds University⁶.

During the last twenty years there have been major advances in our understanding of Bronze Age metal mining in Britain and Ireland. Excavation at Ross Island, Co Kerry, has identified a major Early Bronze Age mine which is the probable source of A-Metal copper while fieldwork and excavation in mid

⁵ During the late eighteenth and early nineteenth centuries lead mining was a significant rural industry in parts of Scotland. The principal lead mines were in Galloway and the Wanlockhead-Leadhills area of the Southern Uplands, in Islay and mid Argyll and at Tyndrum and Strontian in the West Highlands. Copper ores are found in Galloway and the Southern Uplands, in the Ochills, in mid Argyll, around Loch Tay and on Shetland. Most of these copper deposits were worked, albeit as trial prospects, during the eighteenth and nineteenth century but none were very productive. The alluvial gold deposits of the Southern Uplands - principally in the Wanlockhead-Leadhills area and at Glengaber Burn close to St Mary's Loch - are some of the most extensive in Britain and were worked during the sixteenth and seventeenth centuries. The small but locally rich alluvial deposits at Kildonan in Sutherland have also been worked and were the focus of a mini-gold rush in the late nineteenth century.

⁶

<http://www.see.leeds.ac.uk/research/essi/people/chapman/index.htm>

and north Wales and the English Midlands have led to the discovery of eleven copper mines with radiocarbon dates in the Early Bronze Age (Timberlake 2003). All these sites have produced a distinctive range of stone tools used in rock breaking and ore crushing and which are often found in association with charcoal, burnt rock and other debris from firesetting.

A single nineteenth century account of stone and bronze tools from mines at Leadhills and a handful of coarse stone tools from Galloway have been proposed as putative mining implements. Additional indirect evidence for Bronze Age mining includes a now lost copper axe or ingot hoard found near a copper ore deposit at Tonderghie, Dumfries and Galloway and the Early Bronze Age lead beads from West Water Reservoir, Scottish Borders, which have a lead isotope signature suggestive of a Southern Uplands lead source (Hunter, Cowie and Heald 2006). There is no evidence for Bronze Age gold mining although the recent discovery of a looped spearhead within or close to the alluvial gold deposits at the Menck Water (Cowie 2008), Wanlockhead is of potential interest and can be paralleled with the items of Bronze Age metalwork recovered from alluvial tin deposits in Devon and Cornwall.

Figure 43: Aerial image of the remains of Tonderghie copper mine, Dumfries and Galloway ©RCAHMS

The identification of ore sources exploited during the Bronze Age through the analysis of

surviving objects has been the subject of fierce, and as yet unresolved, debate. The compositional analyses of Bronze Age copper and copper alloy objects found in Scotland is dominated by the *Studien zu den Anfängen der Metallurgie*, or SAM Project, (Junghans *et al.* 1960; 1968) which subsequently also included gold objects (Hartmann 1970, 1979, 1982). The original purpose of the SAM project was to trace objects back to ore sources and therefore reconstruct Chalcolithic and Bronze Age trade routes. The inability to address issues such as the complexities created by the recycling and mixing of metals or the heterogeneous nature of ore sources led to their findings being challenged. The introduction of more sensitive techniques also led to questions regarding the accuracy of the original measurements (see reviews in Northover and Rychner (1998) for copper alloy objects and Warner (2004) for gold objects). The recent excavation of early copper mines in Wales and Ireland has provided sufficient stimulation to re-analyse the older data in the light of new research⁷. This has demonstrated the probable use of copper ore sources from Ireland for Chalcolithic-Early Bronze Age metalwork in Scotland (Peter Bray pers. comm.) implying that copper mines in Scotland would probably be later in date. The estimated quantities of copper ore being mined in Wales and Ireland during the Chalcolithic-Early Bronze Age exploitation would certainly have been large enough to produce the number of copper and copper alloy objects known from Scotland (Timberlake 2009).

Recent research and re-assessments of gold analyses in Ireland with reference to Scottish gold objects have demonstrated the potential differences that exist in the compositions of chronologically distinct object types. This has led to the suggestion that gold ribbon torcs (see Eogan 1983) may primarily date to the Iron Age rather than the Middle Bronze Age as

previously supposed (Warner 2004). However, beyond the recent analysis of the Chalcolithic sun discs from the Knowes O' Trotty, Orkney indicating a probable Scottish provenance, there has been no comparable Bronze Age gold provenance project to that in Ireland (Warner *et al.* 2009). The use of lead isotope analysis to provenance copper and copper alloy objects has not been widely applied in Scotland in comparison to England and Wales (Rohl and Needham 1998). The isotopic analysis of a rare Early Bronze Age lead and cannel coal bead necklace found at West Water Reservoir, Peebleshire revealed a signature which is consistent with the southern upland sources (Hunter and Davis 1994, 2000; Hunter *et al.* 2006, 50). The highly probable movement of tin ore or tin metal from southwest England to Scotland, as evidenced not only by the tin-bronzes from the county but also the inlaid tin jet button from Rameldry, Fife (Baker *et al.* 2003) cannot be scientifically traced although a recent study demonstrates future potential (Haustein *et al.* 2010).

Figure 44: Four striking gold discs were found with a cremation in the principal mound in a barrow cemetery in Orkney. Demonstrating beautiful craftsmanship, it has been suggested

⁷ The data relating to Bronze Age copper and copper alloy objects analysed at Oxford are currently awaiting publication online.

that the gold discs represent the sun. Image © National Museums Scotland.

Geomorphology and geochemistry have great potential for indicating areas of early mining. Sediment analysis has already been used to identify medieval and later lead mining on Islay and at Leadhills and this technique could also be used to identify prehistoric extraction (Rowan *et al.* 1995). The geochemical monitoring of heavy metal pollution has also been used successfully at some of the prehistoric Welsh mines (Mighall 2003) and is currently being tested at Leadhills. Provenancing studies are another source of information, and the techniques used recently to demonstrate a correlation between placer gold deposits in the Mourne Mountains of Co Down and Irish Bronze Age gold artefacts could be applied to Scottish material.

Museum collections represent an underused source of information. National Museums Scotland and the Dumfries and Galloway Museums Service collections contain some possible stone mining tools and a review of other Scottish collections might be rewarding. This should be combined with a search of antiquarian and geological literature for accounts of the discovery of early mine workings and artefacts.

In the absence of coarse stone tools there can be a problem distinguishing between Bronze Age mines and other early or pre-industrial workings. The identification of Bronze Age

mines is an important aim but should the question of early Scottish mining be included as part of a broader chronological priority.

The broader research priorities for prehistoric and early mining in Britain have been outlined in a recent Historical Metallurgy Society research paper (Bayley, Crossley & Ponting 2008). The principal challenge facing the study of Bronze Age mining in Scotland is the recognition of the mines themselves. The apparent absence of coarse stone tools at Scottish mines suggests that other field techniques may be required to identify potential sites. The way forward would be a survey programme aimed at identifying those sites with potential evidence for pre-industrial mining (firesetting and firesetting debris, hand-picked workings, absence of gunpowder shot holes). This should be combined with detailed topographic survey to establish relationships between surface mining remains and dateable features in the immediate landscape, an approach currently being applied with some success to late prehistoric lead mining and settlement sites in the English North Pennines. The Leadhills area, for example, which combines multi period remains of lead and gold extraction with Bronze Age settlement, would be an ideal location for a trial survey examining the landscape setting of metal mining.

Copper mining at Tonderghie

What evidence is there for prospecting and mining for copper ores during the Bronze Age in Scotland? Some of the problems in identifying early metal mining sites are demonstrated by the site at Tonderghie, a small copper deposit near Whithorn, Dumfries and Galloway.

At Tonderghie a vein of barite with some copper mineralisation – mainly chalcopyrite and malachite – is exposed in coastal cliffs. This is one of a number of small copper deposits in south-west Scotland which were exploited during the post medieval period. Surviving surface remains, all assumed to be eighteenth or nineteenth century in date, include two in-filled mine shafts, a collapsed adit level and some areas of spoil. There is also an undated opencast working on the vein itself. Some of the mine workings overlay an area of rig cultivation.

Tonderghie is unique in having strong circumstantial evidence for earlier, possibly prehistoric, phases of mining. The Old Statistical Account of Whithorn parish compiled in 1794 refers to 'six pieces (of copper) in an earthen vessel' found on the Tonderghie estate and an accompanying illustration of one of these objects indicates that this was a hoard of EBA copper ingots. The same account also describes the discovery on the estate of a circular copper ingot which by its size and weight appears to be a late prehistoric or Roman bun ingot. Another bun ingot was found in 1880 at Carleton some 5km north west of Tonderghie. These ingots suggest the exploitation of a local ore source and Tonderghie, as the only copper vein in the immediate area, is the most likely site.

Recent fieldwork (Pickin and Hunter 2008) at Tonderghie has attempted to identify evidence for early exploitation. Over the last thirty years a number of Bronze Age mines have been recognised and recorded in Ireland, Wales and England. All these mines have produced a range of distinctive stone tools which were used in hard rock mining and ore processing; these tools are often found in association with mine spoil and fire-setting residues. Despite detailed searches on a number of occasions no stone tools have been found at Tonderghie nor have any stone tools from the site been identified in local museum collections. A detailed topographical survey by RCAHMS recorded the post-medieval mining features and the earlier, but probably still post medieval, field system. The survey also recorded some enigmatic earthworks, possibly related to ore extraction and processing, but their relationship to the field system and later mining features could not be established. Geophysical survey of the same area highlighted several features of archaeological significance including a feature close to the opencast interpreted as a circular ditched enclosure and the traces of another circular structure or hollowed feature, defined by a stone bank or wall, overlain by one of the post medieval mine shafts. Both the topographical and geophysical surveys suggest activity at the site predating the post medieval field system but further interpretation and dating can only be achieved through archaeological excavation.

The Tonderghie survey also included geochemical work by Dr T Mighall (2003), Aberdeen University. Elsewhere in the UK evidence for early mining has been reconstructed using geochemical proxies from peat bogs. For instance at Toddle Moss, near Leadhills, several phases of lead enrichment have been identified in the LBA, the tenth century AD and during later historical times. Lead isotopic signatures suggest that the lead is derived from local sources. A similar methodology was employed at Tonderghie. A 2.85 metre deep core was collected using a Russian corer for palaeoenvironmental analysis from a valley marsh that had grown in the infilled leg of a small lochan within 700 metres of the mine. A radiocarbon assay produced a calibrated age range of Cal BC 2834-2472 at 120 cm depth and Pb-210 dating has provided a chronology for the upper 40 cm of the core. Further geochemical analysis is planned to identify pollution phases and pollen analytical work to reconstruct vegetation changes associated with the mine.

The historic finds of EBA and late prehistoric ingots coupled with the results of the recent survey indicate that Tonderghie has the potential to be an early mine. Frustratingly, that evidence is still inconclusive and further work is required to establish the date and significance of the site.

Ores to Metal: Smelting, Re-melting and Recycling

There is currently no evidence for ore smelting dating to the Bronze Age in Scotland, let alone an actual workshop, reflecting a general paucity of evidence throughout northwest Europe (see Meurkens 2004). A copper droplet found at the Beaker settlement site of Northton, Isle of Harris together with the relatively extensive deposition of presumably used stone and clay moulds and mould fragments as in the landscape of the Migdale-Marnoch region and elsewhere during the Early Bronze Age (Cowie 1988; Needham 2004; Cowie and O'Connor 2009) represents the entire span of direct evidence for primary and secondary metal production. The location and organisation of these metallurgical activities in Scotland remains unknown as the findspots for moulds, as with metal objects, may well reflect intentional deposition rather than past production and consumption sites.

The absence of any ceramic vessel found in Scotland that is demonstrated through archaeometallurgical analysis to have been a crucible for smelting, re-melting or recycling means that any assessment has to rely upon compositional evidence from objects to explore recycling. This has been attempted for the Chalcolithic/Early Bronze Age in Britain and Ireland and has demonstrated that the first millennium (c. 2400/2500BC-1400/1500BC) of copper and copper alloy metal in Scotland was primarily re-melted from objects produced in Ireland (Peter Bray pers. comm). The Middle-Late Bronze Age compositional data has yet to be analysed. The contemporary evidence for high concentrations of moulds at settlement sites such as Cladh Hallan, South Uist and Jarlshof, Shetland during the Late Bronze Age (Hamilton 1956; Parker Pearson *et al.* 2004; Matthew Juddery pers. comm.) *potentially* implies that at least re-melting and recycling could have been carried out in the near vicinity.

Metal to Object: Alloying, Casting and Working

The earliest metal objects found in Scotland are copper and gold from c. 2400/2500 BC (Coles 1969; O'Connor 2004). The evidence for arsenical copper, whether as a deliberate alloy or due to the exploitation of arsenical copper ores, had been identified in halberds by Northover (1989) and may simply be the result of smelting sulphidic ores and casting the halberds in closed moulds (Bray pers. comm.). Following the adoption of tin-bronze c. 2100/2200 BC, very few copper and arsenical copper objects are known. The early use of high tin-bronze to create a silvery coloured softer metal is clearly demonstrated in the Early Bronze Age Migdale-Marnoch regional metalworking tradition (Needham 2004). The early exploitation of lead is attested in the lead and cannel coal bead necklace found in an Early Bronze Age cist cemetery at West Water Reservoir, Peeblesshire (Hunter and Davis 1994, 2000). The alloying of copper, tin and lead to create a lead-bronze alloy which is widely evidenced in Wales and southern England during the Middle-Late Bronze Age (e.g. Northover 1980, 66-8) does not appear to have been as widely practised in Scotland although the St Andrews hoard, Fife revealed a greater complexity of alloying practices than had been anticipated (Cowie *et al.* 1998).

Figure 46 ©NMS Late Bronze Age hoard recovered in 1990 from Priestden Place, St Andrews, Fife. This is the largest and most representative hoard of the Ewart Park

assemblage from Scotland. In addition to bronze objects, amber beads and shale bracelets, organic remains of wood, textile, leather, fibre, boars' tusks and horn or antler also survived.

The metallographic analysis of Bronze Age metal objects in Scotland is limited to a small number of objects and object types with the consequence that broader technological patterns have to be inferred. The casting, annealing and cold-working of copper and tin-bronze flat axes (Bray pers comm.), the closed mould casting and rivets in halberds and certain daggers (Gerloff 1975, Schuhmacher 2002) together with the delicate sheet-working of gold lunula and basket ornaments (Taylor 1980; O'Connor 2004) and evidence for embossed and incised decoration in gold (Needham 2000) and bronze (Coles 1969) indicates that the Chalcolithic/Early Bronze Age metal objects in Scotland were manufactured by craftspeople, potentially living in Scotland, using a relatively wide range of manufacturing techniques.

The increasing sophistication and widespread practicing of bronze casting and metalworking can be seen in the Middle Bronze Age with the expanded range and quantity of bronze objects (Coles 1964); the precision and length of the rapier blades (Burgess and Gerloff 1981); the adoption of socket technology in spears (Davis 2006) and axes (Schmidt and Burgess 1981); and finally in sheet metalworking of large objects with cast attachments such as shields, cauldrons and buckets (Gerloff 2010; Uckelmann in prep). The twisting and flange twisting of gold bars into torcs (Eogan 1967) as well as similar twisting of gold ribbons (Eogan 1983) represents a distinctly new technological approach to the metal (Roberts 2007). The Late Bronze Age represents a continuation and development of the earlier technologies but with a substantial expansion in the range of bronze and gold objects being produced and circulated (Coles 1960a; Eogan 1994). Further developments in bronze-casting and working can be seen in the swords (Coloqhoun and Burgess 1988) and delicate

gold wire-working in the striped penannular rings and lock-rings (Eogan 1994).

The absence of workshops means that the evidence beyond examining the objects derives from a small selection of bronze tools such as anvils (e.g. Ehrenberg 1980). The identification of individual metalworkers is restricted to drawing inferences from rare, distinct and technologically complex objects such as shields (Uckelmann in press; in prep and cauldrons (Gerloff 2010). This is exemplified by the discovery of two virtually identical shields - one from Coveney, Cambridgeshire and the other from Auchmaliddie, Aberdeenshire - which provide potential evidence for an individual craftsperson. The idea of an individual metal-smith has been proposed for Early Bronze Age gold in Wessex (e.g. Taylor 2005) and could also be relevant to objects from Scotland such as daggers.

Object to Artefact: Use, Circulation and Deposition

The use-wear on metal objects in Scotland during the Bronze Age has yet to be systematically analysed beyond specific object types and collections such as bronze flat axes (Moyler 1998), swords (Bridgford 2000; swords and spears Anderson 2011, shields (Uckelmann in press; in prep.) and socketed axes (Roberts and Ottaway 2004). Each case study has revealed far greater complexity in the past uses of the object than had been anticipated. This is exemplified by the potential use of shields as defensive weapons rather than simply ceremonial ornaments (Uckelmann 2011; 2012) and the deliberate destruction of swords before deposition in rivers (Bridgford 2000). Use-wear has been used, often in conjunction with experimental replications, in the reconstruction of combat techniques during the Bronze Age (see papers in Uckelmann and Mödinger 2011).

The circulation of objects, whether through an individual or community movement, exchange or recycling is difficult to reconstruct from the available evidence. Inferences tend to be based either on compositional or typological

comparisons. Distribution maps reveal concentrations of a distinctive metallurgical trait or object type that, at least partially, reflects metal circulation (e.g. Coles 1960a; 1964; 1969). For instance, the identification of regional metalworking traditions such as the Migdale Marnoch in northeast Scotland (Cowie 1988; Needham 2004) demonstrates a spatially and temporally restricted pattern of metalworking techniques and objects. In contrast, the St Andrews hoard revealed several objects which are not commonly found in Scotland such as a bugle shaped object, a ribbed-tanged knife and a peaked slide (Cowie *et al.* 1991; Cowie *et al.* 1998) potentially indicating the movement of metal objects from southeast England or northern France. However, as all metal objects could have been recycled as ingots, and the surviving objects were those deliberately placed and then subsequently recovered by chance several thousand years later, our perspective on metal circulation in the Bronze Age is seriously compromised.

The deposition of metal objects in land, riverine and maritime contexts has attracted considerable research whether at an individual site level as at Dail na Caraidh (Barrett and Gourlay 1999) and St Andrews

(Cowie *et al.* 1991; Cowie *et al.* 1998); a regional perspective as at Migdale Marnoch (e.g. Needham 2004); or orientated towards specific object types such as swords and shields (e.g. Bridgford 2000; Uckelmann in press; in prep.). The geography of object deposition appears to reveal consistent patterns such as the placing of individual swords in rivers and shields in bogs (*ibid*) and the placing of Late Bronze Age hoards in association with higher ground as around the Eildon Hills (O'Connor and Cowie 1985). The potential for replicating the pioneering research by Yates and Bradley (2010a; 2010b) in southeast and eastern England in tracing the exact findspots of old and new hoards and then locating them in their landscape context is evident. The study of the placing of metal objects in graves as at Rameldry Farm, Fife (Baker *et al.* 2003) during the Chalcolithic/Early Bronze Age has benefitted substantially from the recent flurry of large projects such as the Beaker People Project, Beakers and Bodies and the National Museums Scotland dating programme which are re-analysing and re-dating many funerary sites.

Figure 47: Visualisation of the Copper working process and taphonomy (Ottaway 2001, Fig 1)

4.5.2 The Societal context of metallurgy; Writing Life Histories for Scottish Bronze Age copper-alloy Artefacts: Biography, Prosopography and weaving data

After a long theoretical gestation the concept of object biographies has become increasingly visible within the archaeology of Later Prehistory. Kopytoff's (1986) paper on the cultural biography of things from the edited volume *The Social Life of Things* can be seen as the beginning of the incorporation of the concept of artefact biography into archaeology. Over ten years later the call was taken up in other influential collections particularly Marshall and Gosden's (1999) edition of *World Archaeology* 'The Cultural Biography of Objects'. A recent paper by Joy (2009) explicitly tries to renew focus on the concept, though there are signs that he need not worry – biography has begun to enter the lexicon of archaeological material culture studies. However at its heart it is an idea that derives from anthropological fieldwork.

The copper-alloy objects of the Scottish Early Bronze Age (EBA) are an ideal case study for exploring the concept and assessing its usefulness for future researchers in this period of prehistory. Metalwork has always held an iconic, indeed eponymous status within Bronze Age studies, being central to understanding chronological and social change. The number of analytical, scientific and conceptual approaches that have been applied to bronze probably exceeds those for any other artefact category. This section will argue that this is crucial to the potential of biography and points towards its practical application using the concept of prosopography.

Biography as a framework is intuitively attractive for studying archaeological material culture. It focuses on a generational 'human' time scale for understanding how things and people interact. It unites the concepts of agency of things with archaeological ideas of geography, place and technology. Put briefly, biography encourages the study of fine-scale

interactions of people and things. To identify how objects were being made and used; but also how *people* in the Bronze Age were being 'made' by the objects that they were making and using (Gosden 2005).

Being a weaver together of theory does not, however, make object biography straightforward to *use* in Bronze Age studies. The datasets available to archaeologists are incomplete, dispersed and imprecise when compared to the anthropological experience detailed in Kopytoff (1986) or Peers (1999). However, there is no need to be too pessimistic as many of the techniques available to the study of early metallurgy neatly mesh with object life events. Chemical composition and lead isotopes can be used to infer the origin of the ore used to produce the metal (Needham 2002; Rohl and Needham 1998), while recent work on chemical signatures of melting and casting, the distribution of moulds, and regional typologies can come together to pinpoint the birthplace of individual objects in their final form (Bray and Pollard in press). Metallography uses polished cross-sections of samples from objects under reflected light microscopy to investigate smithing processes as well as use-life (Scott 1991). Surface wear analysis can also show how copper-alloy objects were used in life and also, where applicable, how they were decorated (Wall 1987; Moyler 2008). Lastly the traditional archaeological strengths of excavation and burial archaeology can show how the object ended its social life and was removed from interaction. Many of the attributes of the lives of things can therefore be accessed using traditional and venerable archaeological techniques. Clearly, new theories can help breathe life into old datasets.

The practical limits of time, money, conservation concerns and quality of data constrain how widely object biographies can be written. Though elements of life history can be seen in our material science and archaeological datasets the chronological resolution within the Scottish Bronze Age is

currently in terms of centuries (Needham *et al.* 1997; Needham 2004). We can infer internal object sequences of action, but overall these sequences will float within broad periods of absolute time. Few objects have had multiple analytical techniques applied to them. Only the most important, rare or iconic can justify the expense and focus of broad based investigation. Therefore if a score is assigned to each Early Bronze Age copper alloy artefact from Scotland, (with a point gained for each technique applied to it, 1 for metallography, 1 for modern excavation, 1 for chemical composition and so on), only a few recently excavated daggers score highly (Bray 2009). Key examples would be the work on the Rameldry and Seafeld West daggers (Baker *et al.* 2003; Cressey and Sheridan 2003). The majority of artefacts, even after over one hundred years of scientific attention, still score zero or one. Currently, no Scottish EBA metalwork has been sampled for lead isotope analysis, while the known chemical compositions were mostly derived from the Studies on the Beginnings of Metallurgy Project (SAM 1 and 2 project, Junghans *et al.* 1960, 1968) which were produced using the relatively imprecise, (and now outdated) analytical technique of Optical Emission Spectroscopy.

Overall, the vast majority of material classes have actually received less focused work than copper-alloy, which again argues against a widespread application of object biography. Where there are large available datasets, such as for metallurgy, representing a lot of known 'life-events', these data are widely spread across the assemblage. Rather than biography being a common, quotidian tool for material culture studies, it should be seen it as a feasible ideal that, in the near future, will only be applied to objects of national significance (for example see the study on the Gundestrup Cauldron, a focal item in the collections of the National Museum of Denmark in Copenhagen, (Nielsen *et al.* 2005).

Data on artefact life events can be brought together under a slightly different framework

that emphasises the analysis of fragmentary collections of data. Prosopography was developed in Ancient History to solve precisely the problem outlined above. Obviously people had life histories; however the written texts that survived are often fragmented and incomplete. Therefore prosopography collects all possible sources in parallel and draws biographical inferences on the group or assemblage level (Keats-Rohan 2007). When possible more detailed life histories are written, but overall all biographical datapoints or 'events' are used to their full potential to illuminate groups of people with a common origin, profession, age or fate. This is clearly the way archaeologists

have been working for centuries, weaving together assemblages to infer relative chronologies and social systems. Building on the initial spark of object biography created by anthropology of current objects, prosopography may offer archaeologists a useful tool. The University of Oxford is exploring, through a project yet in its early stages, ways that prosopography can be applied to archaeological datasets (Bray *et al.* forthcoming). Rather than individual stories about artefacts, this will be a model of data collection and interpretation to act as a bridge between archaeological information and material culture theory.

Experimental Archaeology: Bronze Age Weaponry

Figure 48: Replica weapons seen post-experiment and evidencing damage. Examination of the edges of swords in Britain and Ireland suggest they were often used in combat. © Kate Anderson

During the summer of 2009 a series of experiments looking at the damage that combat behaviours left on replicas of Late Bronze Age weapons was undertaken (Anderson, in press), with a view to comparing the results with the LBA Scottish weapons panoply and identifying common combat behaviours in the LBA. One sword, thirty-three spearheads, one metal shield and one leather shield were used to make a range of strikes, against each other and the carcass of a pig, under tightly controlled and documented conditions.

The results from these experiments were informative in terms of the original aims, as well as providing a range of unanticipated information which was to prove relevant. It was not possible to match forms of damage to combat behaviours, as subsequent metallurgical analysis suggests that the latter is more dependent on the alloy involved. However, the frequency with which the

experimental weapon edges became, sometimes heavily, damaged and the number of edge damaged prehistoric weapons which have only a small number of damages suggest that combat in the LBA possibly consisted of very short engagements – pitched battles lasting for hours seem very unlikely. Those involved appear to have been regularly using spearheads in the same way as a sword – that is, on a short shaft in a slashing motion. The primary modes of use of the LBA Scottish weapons panoply suggest that fighting as a unit, within a shield wall for example, would have been ineffectual; fighters would have fought individually within a *melée*. Finally, the level of skill required to wield the weapons effectively, and the ability to retain that skill under pressure, were clearly crucial as it became apparent that some forms of use were not only less effective than others, but could positively damage the weapon or shield of the user. These are simply the initial, most basic interpretations of a dataset which proved immensely fruitful.

The process of conducting the experiments was instructive in itself; although there are a number of clearly defined guidelines on good academic practice (Callahan 1999; Coles 1979; Mathieu & Meyer 2002; Rasmussen 2007), the unavoidable practical aspects of running a project are frequently entirely ignored. In this case, issues relating to balancing project outcomes with the available funding, ensuring adequate health and safety practices and sourcing the appropriate components, necessitated the constant meshing of practical organisation with academic theory to the detriment of neither – without which much of the project benefits might have been lost. There is considerable scope, not just within Scotland but taking a leadership role across Britain and Europe as well, to develop both more formalised instruction on how to design projects, as well as specialised support and information networks (particularly relating to the sourcing of materials, labour and products). In addition, there is a need for greater strategic direction across Europe as a whole so that experimental researchers can develop appropriately targeted projects and collaborate together on more ambitious programmes of work.

4.6 Research Recommendations

- Further study of the social context of craft production, including how different materials relate (and within a landscape context), and exploring biographical approaches.
- Development of innovative methods of prospecting, sourcing and compositional analysis, and combination of approaches including: experimental archaeology; the environmental context; metal detecting; aerial photographs.
- Further study of the Late Bronze Age – Early Iron Age transition through material culture.
- Further work on how best to design and harness programmes of experimental archaeology.
- Nuanced regional studies to address whether there are broadly Scotland-wide phenomena, or a series of overlapping regional Bronze Ages.
- Improve chronological resolution for Middle Bronze Age and Late Bronze Age ceramics.
- Development of new techniques (including nano-techniques) in order to obtain enriched data-sets to provide the material to answer a range of questions regarding Bronze Age society.
- Development of new approaches and new ways of using existing data.

5. Identity, Society, Belief Systems

5.1 Introduction

The following sections will consider a range of information regarding the character of social organisation and the expression of identity in the Scottish Bronze Age, with a particular focus on the evidence provided by mortuary rites, ceremonial monuments and depositional practices. Although grave goods played an important role in the construction of age, gender and possibly status distinctions (e.g. Sheridan and Shortland 2003), most burials – especially during the later part of the period – were unaccompanied; in these cases, however, detailed consideration of bodily treatment, depositional context and the architecture of funerary monuments provides insights into changing concepts of self and community, as well as ideas about ancestry, death and the afterlife (e.g. Downes 1999). As will be seen below, mortuary architecture is highly varied, and in some regions forms just one element of more extensive monument complexes that include other types of monument such as henges, stone rows and timber circles: some of the latter were built in the Bronze Age while others date to the Neolithic, indicating that particular places retained their significance over very long periods of time.

The spatial relationships between such sites doubtless acted as one way of giving material form to social relations. Beyond this, however, the alignment of sites such as recumbent stone circles on prominent features of the landscape, notably conspicuous mountains (e.g. MacGregor 2002, 153-155), serve as a reminder that these monument complexes must also be calculatedly set within their landscape contexts. Natural features such as mountains, rivers and bogs were part of Bronze Age cosmographies: the importance of these places was marked out by the deposition of metal objects (e.g. Cowie 2004) and the creation of rock art (e.g. Bradley 1997).

Bronze Age monuments also frequently incorporated lunar and solar alignments (e.g. Burl 2000) so that both they and the intensely socialised landscapes in which they were set could be referenced to wider schemes according to which people's place in the universe could be defined. However, it would be a mistake to make too sharp a distinction between the 'sacred landscapes' of monument complexes or 'liminal' places such as bogs and the everyday world of domestic practice (Bradley 2005a): there is also good evidence that ritual activities of various sorts took place in Bronze Age roundhouses.

5.2 Identity

The practice of individual interment has traditionally been hailed as an innovation associated with the first appearance of metal and other novelties around the 25th century BC, and taken to indicate a new emphasis on the individual, as opposed to communal, identity. Although the contrast between this and previous Neolithic practices is not as stark as had previously been portrayed – since individual interment of cremated (and, very rarely, unburnt) remains is known from the Middle and Late Neolithic in Scotland, as elsewhere in Britain, nevertheless funerary practices seem to have been an arena for the sometimes ostentatious display of identity during the Chalcolithic and Bronze Age. Communal identity was also celebrated in death, however, as most pit and cist graves have been found in cemetery arrangements. Notable exceptions are the Chalcolithic/Early Bronze Age individuals whose remains have been found at the centre of some recumbent stone circles, Clava cairns and small henges (such as Broomend of Crichton) in north-east Scotland: it seems that these individuals were memorialised by the erection of these monuments, as research by Richard Bradley has revealed, and they may indicate a kind of Big Man-type society in this part of Scotland towards the end of the third millennium. Similarly, the individuals buried under the large cairns in Kilmartin Glen (c 22nd century

BC) had been accorded special status as important individuals.

The aspects of identity which were underlined in Chalcolithic and Early Bronze Age funerary practices are gender (with males and females being laid on different sides and facing different ways in most Beaker graves, as Alexandra Shepherd's research has demonstrated) and age and status, with the most richly-furnished graves generally being those of older individuals. The exceptions are a small number of Early Bronze Age child graves with special grave goods, from Doune (where one child was buried with a miniature battle axehead, and another with a miniature macehead; (McLaren 2004) and West Water Reservoir (where a young child was buried wearing a cannel coal and lead necklace). Richly-furnished female graves do not appear until bronze started to be used, and from this time (i.e. 22nd century, until roughly the 20th/19th century) there is a series of ostentatious funerary monuments, for both men and women; this is likely to relate to the opportunities for acquiring wealth and power from the circulation of bronze and its raw materials. These rich graves include a series of male interments featuring daggers while females were accompanied by Whitby jet necklaces; some are under imposing cairns, while some are located inside pre-existing sacred monuments. The Beaker and Food Vessel-associated cists at Cairnpapple combine the two elements, and also probably incorporate stones from a dismantled stone circle that had stood there previously (but see Mercer 1981b).

The increasing popularity of cremation as a funerary rite, especially from the 20th century BC, may be linked to beliefs about releasing a life force from mortal remains, and/or joining individual identity with that of the ancestors and gods: it is undoubtedly linked to wider cosmological beliefs (see below). It remained the dominant practice until after the introduction of iron, with the remains usually being deposited in cemeteries, either in urns

or organic containers, and often with the remains of more than one individual being interred together. The re-use of Early Bronze Age monuments for such interments within the period 1400–800 BC is well attested. The use of kerb cairns – a specific monument type, memorably likened to a Charlotte Russe dessert – for the interment of cremated remains has been dated to between 1400 and 1000 BC, with some sites being located near standing stones or stone alignments (as at Ballymeanoch, Argyll & Bute).

Clues as to how individual identity was expressed during life are provided by the jewellery, dress accessories and other objects buried with, and on, the dead, as well as by other material (e.g. bronze weaponry). It appears that portrayal of men as archers (be it as hunters, warriors or – more likely – both) was an important concern during the Chalcolithic and Early Bronze Age, and one that can be traced directly to Continental Beaker ideals of male martiality. Increasingly elaborate archery equipment (e.g. wristguards), and also non-archery weapons (i.e. stone maceheads and battle axeheads, but also arguably copper and bronze axeheads) shows that martiality was an arena for the expression of status. That this continued to be a preoccupation throughout the Bronze Age is suggested by the metal weaponry – axeheads, stabbing and slashing weapons (daggers, then dirks, then rapiers, then swords, together with ostentatious Late Bronze Age shields), halberds and spears. With axeheads and spearheads, competitive conspicuous consumption is suggested by the existence of exaggerated or complicated examples (e.g. decorated axeheads, tinned axeheads and oversized axeheads and spearheads). It seems likely that ritualised, heroic combat between individuals took place at different points during the period and was a key way to underline prowess and status; also important, during the Late Bronze Age, was possession of a vehicle, presumably pony-driven, as suggested by finds of harness adornments. As for male costume, the Chalcolithic and Early Bronze Age V-

perforated buttons of jet and cannel coal indicate the existence of jackets (usually with a set of six buttons), and also of heavier outer garments (?cloaks), together with occasional hints of possible leggings (fastened by buttons). Buttons also seem to have been used to fasten pouches containing fire-making equipment. Pins are rare during the Early Bronze Age, but ostentatious sunflower-headed pins feature during the Later Bronze Age. Gold and bronze hair ornaments are known from the Early Bronze Age, and a hoard from Culduthel included jewellery and dress accessories suggesting that their owner was aware of fashions in Bavaria.

Figure 49: Beaker, archery equipment, strike-a-light and amber bead found in a cist burial at Culduthel, Inverness, Inverness-shire. The archery equipment consists of a stone wrist guard with copper rivets with gold caps, a bone belt-ring and eight barbed and tanged flint arrowheads. ©NMS

As for female identity, jet jewellery (again including buttons, but more rarely than with men) was a key indicator of status from the Early Bronze Age, with elaborate spacer plate necklaces made in Whitby constituting skeuomorphs of Irish gold lunulae. Sometimes these necklaces were worn with bracelets, as a parure; sometimes they were kept for generations before being buried. Fine metal bangles, some with embossed designs in the shape of fusiform beads, were also worn during the Early Bronze Age. Faience was used

during the first half of the second millennium; like jet and amber, this was probably used as amuletic jewellery – supernatural power dressing – as much as for indicating wealth and status. The fashion for using faience – and the know-how to make it – may well have been acquired from southern England as from the 20th century, inland and coastal Wessex seems to have supplanted northern Britain and Ireland as the epicentre of fashion. An exceptionally clear example of this is offered by the objects found with cremated remains in a cist at the Knowes of Trotty, Orkney, where parts of an old amber spacer plate necklace, plus amber ornaments, were found with Scottish-made foil covers for conical ornaments; the amber may well have come through Wessex, and the gold emulates the fine sheet goldwork of Wessex graves. The amber and gold ornaments may have adorned a special, ‘regal’-like garment, analogous to the Mold Cape in north Wales. Although some Middle and Late Bronze Age jewellery may have been worn by women, it is much harder to identify high-status females after around 1700 BC, since expressions of power and status during the Middle and Later Bronze Age seem to be dominated by martial and feasting equipment and by evidence for votive deposition, all of which have traditionally been assumed to be associated with males.

Figure 50: Necklace from burial at Killy Kieran, Argyll. Made from Whitby jet and cannel coal, the necklace was imported from Yorkshire between 2050 and 1800 BC. The original number of beads

was probably 114, with 6 space plates and a fastener. Small cannel coal found in the burial may be the remains of a matching bracelet, © NMS.

From the foregoing it is clear that society during the Bronze Age was socially differentiated, from the beginning of the period until its end, although the ways of expressing this varied over time and space. The fact that women of high status were signalled from around the 22nd century raises the question of whether they acquired this status at that time, as a result of generally increased levels of wealth; this seems likely. The aforementioned rich child graves suggest that status was probably ascribed, rather than (or as well as) achieved. The underpinnings of this social differentiation are likely to have involved control over the flow of metals, at least to some extent; this is especially the case for Kilmartin Glen, where the elite may have controlled the importation of Irish copper and its subsequent movement north-eastwards up the Great Glen. Other sources of wealth and power would have been agriculture-based (as reflected in the density of rich Early Bronze Age graves in the fertile lowlands of eastern and south-east Scotland), while during the early first millennium (and possibly the late second), the participation of the Scottish elite in an international network of competitive conspicuous consumption – the so-called Atlantic Bronze Age – is attested by hoards of metalwork, weapons and feasting equipment. Is this inflationary system, the possession, accumulation and conspicuous consumption of bronze operated as the motor driving the behaviour of elites all along the Atlantic façade. When this system collapsed around 800 BC – possibly through being over-stretched – the opportunity arose for the traditional power structures to be replaced.

Other evidence relating to the nature of society is relatively sparse (although see below regarding belief systems and their expression), although the ‘hillfort’ sites of the Late Bronze Age in southern Scotland are likely to have been expressions of elite power,

and not just defended ?settlements. There is no evidence to suggest systems of power that extended over very large territories at any point during the Chalcolithic or Bronze Age – in other words, there is nothing to suggest the kind of tribal system reflected in the major hillforts of Iron Age southern England.

Major research questions that remain to be addressed concerning identity and society include:

- Can any more be said about the nature of social organisation, and any variation over space and time? In particular, can particular systems of descent and inheritance be identified?
- How does the treatment of the body at death and grave goods relate to status in life? What can the treatment of the dead tell us about identity?
- Is there any clear evidence for expressions of status differentiation among Middle and Late Bronze Age women?
- How did the distribution of the elite relate to centres of metalworking? (It appears that, with the exception of the individuals monumentalised in the Clava cairns, recumbent stone circles and henges, the Migdale-Marnoch metalworking area is relatively poor in high-status graves.)
- To what extent was power and wealth based on the control of metal circulation? How was the belief system integrated within systems of power?
- How can concepts of individuality and how they change over time and self, best be explored?

Language

Archaeological evidence alone cannot tell what language was spoken in Scotland during the Bronze Age. Some archaeologists have suggested that Celtic language developed in Britain before the Bronze Age, while an origin for Celtic in Western Europe has recently

been proposed in contrast to the traditional view that Celtic spread to Britain from central Europe in the mid-first millennium BC. On the traditional basis, only a few existing Scottish place-names interpreted as pre-Celtic and non-Indo-European would have been current during the Bronze Age.

5.3 Society, structure, and organisation

In the last 50 years, each decade has seen a dramatic increase in the quantity and quality of prehistoric archaeological and environmental data in Scotland. Whether through the application of new scientific methods, the impact of developer-funded archaeology, the significant expansion in the archaeological profession or the rise of theoretical archaeology, there has definitely been no better time to propose interpretations of Bronze Age societies. The flood of publications presenting new sites, dates and analyses presented in (post-) modern academic language can easily give the impression that older interpretations of Bronze Age society are now largely irrelevant. It is therefore essential to re-examine the intellectual historiography of Bronze Age societies in Scotland to see whether this is the case of whether continuities remain.

In reading the literature from the 19th century beginnings to the present day, it is striking that there have always been scholars such as Robert Munro (1899), John Abercromby (1912) and V. Gordon Childe (1944) who seem naturally adventurous in their interpretation of Bronze Age social and political organisation. In contrast, there have always been scholars such as Daniel Wilson (1851), Joseph Anderson (1886), J. Graham Callander (1923), Stuart Piggott (1958) and John Coles (1959/60, 1963/64 and 1968/9) who seem naturally far more cautious. With few exceptions (e.g. Clarke *et al.* 1985; Sheridan 2008), more recent scholars have demonstrated relative caution when given the opportunity to provide overarching societal

interpretations for Bronze Age Scotland (e.g. Ashmore 1996; Cowie and Shepherd 1997; Bradley 2007). They seem far more at ease when addressing the societal implications of specific phenomena such as metal (e.g. Cowie 1988; Needham 2004), monumentality (e.g. Bradley 2005b; 2011), funerary rituals (e.g. Needham's 2011 Rhind lectures) and associated objects such as pottery (e.g. Sheridan 2008) and jet or faience ornamentation (e.g. Sheridan and Davis 2002; Sheridan and Shortland 2004; Shepherd 2011). These archaeological foundations for the interpretation of the Bronze Age societies would be familiar to 19th century scholars. Far less familiar would be the increasing interpretative role of roundhouse settlements (e.g. Pope in press) and environmental data (e.g. Tipping 2010) whose discovery and analysis only developed fully in the last 30-40 years.

There are recurring intellectual themes that emerge from 150 years of Bronze Age societies in Scotland being explored. The idea that continental European individuals or small groups from continental Europe brought new ideas, practices, technologies and objects to Scotland is partially re-invented by each generation of Bronze Age scholars. This has been played out in scholarship surrounding Beaker burials - whether as foreign groups causing social upheaval (e.g. Abercromby 1912, I, 98-101 and II, 80-92; Childe 1946, 42) or as more peaceful technologically sophisticated immigrants (e.g. Piggott 1958, 49-64; Clark 1976, 276-280). It is the latter which resonates in current debates (see Brodie 1994; Needham 2005; vander Linden 2006; Sheridan 2008), especially in the light of isotope analysis seeking to map the movement of individuals (see publications from the *Beaker People Project* and *Beakers and Bodies* projects).

If it is the continental pioneers who introduced Bronze Age novelties to Scotland, it is the native elites who derive or reflect their status by controlling them. In many interpretations of Bronze Age society until the

last two decades there is a small group of men wielding power at the top. These are perceived as operating in hierarchies whereby their roles have variously been characterised as chiefs, priests, leaders or warrior-kings. They are traditionally identified in Scotland by the presence of an ostentatious burial or of rare, exotic and technologically sophisticated material culture. This is an intellectual tradition that can be identified across European Bronze Age studies (see Bruck and Fontijn forthcoming) and in Scotland probably derives ultimately from written Roman accounts of the inhabitants of Britain. The more recent desire to emphasise the communal over the individual in societal interpretations has led to ostentatious burials now being re-interpreted as the spiritual elevation of the group rather than an individual (e.g. Needham 2011, Lecture 5) which finds echoes in the otherwise intellectual champion of Bronze Age chiefs, V. Gordon Childe in his Rhind lectures over 60 years earlier (Childe 1944, 49-50). Frequently cited activities for elites tend to revolve around trade and exchange, hunting (Case 2004; Mercer 2006) and warfare with both bringing economic or socio-political gain. By definition, elites are a minority who control, or are at least politically, socially or economically superior to the majority of the population.

The challenge of identifying the non-elite groupings within this population from material culture alone has meant that terms such as tribes, communities, groups, clans and extended families have been, and continue to be, used virtually inter-changeably and with little definition. Groupings might be divided into indigenous people or new immigrants but beyond this there is still no agreed unit for analysing Bronze Age social organisation. This is despite the genuine desire to engage with this unknown majority of the population and the increasingly high resolution being achieved in excavation and dating. The analysis of settlement evidence – whether addressing phases of construction or reconstruction, the organisation of space or

ritual activities – has stimulated discussions of the social and ritual life of households (e.g. Parker-Pearson *et al.* 2004, 64-82; Pope in press). Similarly, the analysis of funerary remains has enabled the potential societal roles of social groups traditionally overlooked, such as women or children, to be re-evaluated (e.g. McLaren 2004; forthcoming).

Any discussion of the inter-relationships of proposed societal groupings in Bronze Age Scotland has tended to concentrate on: craft and trade, generally identified through material culture scholarship; ritual gatherings, usually interpreted through long-term engagement with monumental and funerary landscapes and cosmological preoccupations therein; and on warfare, as signified by the discovery and/or apparent use of bronze weaponry. Interpretations of trade or warfare are typically structured by geographical oppositions such as island: mainland or highland: lowland, usually with the aspiration of identifying core and peripheral areas of activity and interaction. The recent emphasis on landscape and environmental research has ensured that agriculture, without doubt the fundamental core of Bronze Age social life in Scotland and beyond, now plays an appropriately key role in contemporary socioeconomic debates.

Warfare in the Scottish Bronze Age

It is a necessary and an appropriate adjustment that the study of warfare has regained a proper position in debates relating to Western Europe in the Bronze Age (see Keeley 1996; Schulting and Wysocki 2005). It is not so much that a weight of new evidence has brought this about, as an appreciation of the volume of old evidence linked to new and stimulating discoveries. The intellectual climate within which this debate has taken place has also changed very markedly since the 1980's with shifting political and philosophical emphases that have prompted the readmission of the consideration of warfare to the study of prehistoric human society (Carman and Harding 1999).

The difficulties have, however, not only been those of perception and integration. Real problems exist, also, in the archaeological recognition and interpretation of warlike activity. Violence is, of course, universal, and is prevalent among all forms of life as well as among humans. ‘Conflict’, the OED suggests, is a collective expression ‘an encounter with arms’, ‘a prolonged struggle’, notions which suggest a restriction to human agency – although collective violence can occur among primates and other mammals. Violence, and consequent traumatic injury, can also, of course, occur in any inter-personal context. It can be part of ‘playing’ or ‘ceremonial’ and an accidental outcome of almost any activity. Conflict, as defined, can take a range of forms ranging from personal and group feud, raiding of an endemic but quite irregular character, through ambush to formal ‘duelling’. It can also be expressed by an infinite number of non-lethal demonstrations such as shouting, singing or sumptuary means.

Warfare has more formal connotations and is, to paraphrase Clausewitz, ‘the pursuit of policy by other means’. It requires societies that are sufficiently cohesive and hierarchical for policy to emerge, to be formulated and then directed and sufficiently organised to deploy selected numbers of men and women (usually, it must be said, men) under direct leadership to exert the will of the society over that of another, (see Mercer 1999). Mercer chose to emphasise the rôle of the three *casūs bellorum* – ‘*commercium*’ (monopoly of and access to goods), ‘*territorium*’ (command of land and routes of access to it), and ‘*conubium*’ (dynastic succession and inter-marriages). He indicated the evident existence of the long-distance transfer of goods, the marking of territorial limits and boundaries, and the existence of dynastic and hierarchical elites within Neolithic and Bronze Age Southern England at least. All the stimuli for warfare would, therefore, appear to be present in the Early Neolithic and are certainly present throughout Britain in the Bronze Age.

An oversailing problem resides in the fact that, despite the enormous impact that it may have on societies, warfare is often extremely difficult to demonstrate in the archaeological record. The principal evidential sources in the prehistoric context are

- **Skeletal evidence of trauma** or circum- or inter-skeletal presence of armatures found in burials;
- **Defence construction** – and, where available, traces of the violent destruction of defences;
- **Concentrations of weaponry** and other equipment either as the remnant debris at a battle site or as victory-celebratory depositions;
- **Depictions** of war-like activities;
- The **occurrence of weapons** of locally distinctive type in distant locations, suggestive of the movement of warriors or ‘diplomatic’ gifts.

While any one of these criteria may be sufficient to allow the inference of warfare in historical circumstances where literary reference to warfare is available – this may well not be the case in any prehistoric context, where an intersection of some or all of the above strands of evidence will be necessary before the inference of the existence of warfare can be drawn. To this effect the five evidential streams will be reviewed in the Scottish context.

Skeletal evidence of trauma: This approach has been famously advanced recently by Rick Schulting and Michael Wysocki (2005) in an examination of some 350 Neolithic crania, largely from Long Barrows (very largely from S England and S Wales) with 8.9% (31) showing evidence of substantial cranial trauma. Of these latter some seven exhibited cranial traces of injuries that would have been fatal – the remainder (c.24) had injuries that ultimately healed although they may not have left their recipient unimpaired. Only one Scottish site was included in the study – Tulloch of Assery A & B, Caithness (Corcoran 1967) where cairn A produced evidence of cranial damage (pre or post mortem

uncertain) and where a vertebra from cairn B had been pierced by a leaf arrowhead. This fatality rate (?2 among the total MNI from the three cairns of 12+) is comparable with Schulting and Wysocki's figures, but, further north, in the large assemblages at Isbister, Judson Chesterman's work on the assemblage that he estimated to be between 122/186 adults and 56/62 'teenagers' (109 crania or parts thereof) he observed no cranial trauma and very little evidence of injury of any kind – a few rib and vertebral fractures being observed. The material was very fragmentary but Chesterman was looking for, and did observe, some material relevant to these issues. Similarly at Quanterness (Renfrew 1979; 157 MNI with 15 cranial fragments from Chamber F) in Chesterman's summary table 'Synopsis of Pathology' only crush injuries are observed. The same phenomenon is repeated in Mary Harman's examination of the bone from Holm of Papa Westray (Ritchie 2009) where there was a MNI of 12 displaying, however, relatively few cranial fragments.

Very few such massive assemblages are likely to accrue in modern times, certainly from the Bronze Age, and the general, although not universal, poverty of survival of bone in the base-deficient soils of the country will further add to the difficulties of trying to extend this type of study in the Bronze Age context. This merely emphasises the necessity and possible rewards of subjecting all retrieved human skeletal material of the period to such interrogation.

It must however be borne in mind that the upshot of such evidence, in isolation, can only be that an individual was hit on the head (possibly not even by human agency) or shot by arrow (accidentally or by execution). This fact alone cannot allow warfare to be inferred. Only by 'intersection' with other data can that inference be made.

Defence Construction: Scotland has no lack of this component. Yet an immediate consideration must be that defensive construction was (and is) very generally

psychologically based – to impress, to deter, to reassure, to consolidate, to distract. Nevertheless its power to do any or all of these things only resides in the existence of warfare within the knowledge of those whose psychology is being played upon. To demonstrate local warfare, therefore, the paramount need is to observe that defences are attacked. How to observe such phenomena as escalate or slighting in a stone environment (how forced stone differs in appearance from tumbled, how burning affects stone (different rocks?) are appropriate subjects for experimental approaches. It is important to remember that the ditch created by the excavation of material for a rampart can only represent a *terminus ante quem* and may indeed eradicate earlier stages of defence, whereas the content of the rampart may include earlier defensive circuits, or fragments of them and will certainly seal a *terminus post quem* horizon. As well as digging ditches – excavators might double the width in digging upstanding ramparts (thereby almost certainly leading to greater structural understanding) and analyse their content.

Scotland also has produced a range of hilltop fortified enclosures that have at a late stage in their use been fired in a manner that has brought about the vitrification of timber-laced walls. These sites, a number of which have produced radiocarbon and TL dates in the middle of the 1st millennium cal.BC, (and a number of which are much later) require greater understanding in their possible relation to Bronze Age as well as Iron Age Societies. High altitude enclosures such as those at Hownam Law, Eildon Hill (with its radiocarbon dated house platforms of LBA date) (Rideout *et al.*, 1992), Traprain Law (Armit *et al.* 1999, 2000) which also displays substantial LBA occupation may well all relate to this period. The Tap o'North has, of course, yielded Thermoluminescence dates associated with vitrification that fall in the late third millennium cal BC and Ben Griam Beg (Mercer 1991) is another of these very high altitude forts (620m OD) that Halliday has argued to

be difficult to imagine occupied in the latter half of the 1st millennium cal BC. and more likely to pertain to the 2nd.

In sum one must be alert to the likelihood of Bronze Age hilltop and enclosed fortification/defence and seek to demonstrate its function.

Concentration of weaponry: After the initial presence of warfare in the British Neolithic Mercer (2009) has argued that there is no evidence to indicate the presence of warfare either in terms of weapon design, enclosure design or indeed in traces of on-site destruction. The burning of the timber palisade at Mount Pleasant, Dorset (Wainwright 1979) could have been accidental, or a ceremonial event. The death of a young man by arrowshot at Stonehenge could be the result of ritual or judicial killing. There is no sign of the ‘intersection’ of evidence referred to above that allows the inference of warfare. The ‘weaponry’ of the Early Bronze Age is wholly inadequate – other than the archery equipment that appears to be a very high status weapon – little suited to warfare where the bow is usually deployed *en masse* and the battle axes, again often with the appearance of high status, that could be lethally used but not with ease. It is suggested that developed and hierarchical hunting cults may be represented by these accoutrements and it was in the bands of spearmen (the spear appeared in Scotland during the final phase of the EBA) drawn together to defend the high status hunter from retaliatory attack by cornered boar, stags and aurochs, that the origin of the war band controlled by a local chieftain may have lain. By the opening of the MBA the metal inventory is displaying highly competent weapon combinations of rapiers, dirks and spears, and evidence of multiple killing with spears is available from Tormorton, Glos.

By 1200 calBC an even more developed weapon combination of sword and spear was introduced and remained in a constant state

of development until, and indeed long after, the demise of bronze as an edge-producing metal.

All these issues are replicated in Scotland but are writ relatively small. The number of bronzes recovered here is relatively small. Furthermore large hoards are relatively rare and the river concentrations known from the Thames and to a lesser extent the Fen edge of Cambridgeshire and the River Shannon in Ireland are currently unknown in Scotland – even in such well-dredged rivers as the Clyde and the Tay. Such ‘wet-place’ finds have been interpreted as offerings of weapons captured in battle, or by some scholars as marking the actual site of conflict being at river crossings, with weapons being lost in the course of the *melée*.

Depiction of war-like activities: That rivers were the scene of warlike activity is to be imagined from the ship model recovered from Roos Carr (Yorks E.R.) which showed four male figures with shields and probably originally with spears or swords standing upright in a canoe with an animal figurehead. The Balachulish figure, clearly part of a larger assemblage may well be a similar depiction at a rather larger scale and of a similar LBA date.

This evidence can only be compared with the substantially intact bog burial of a sewn plank canoe with the entire armament of a war band found at Hjortspring in SW Denmark (Randsborg 1995) and dated to c.400 calBC.

With such finds of weapons, single or multiple, or other water-logged material associated with human remains, it is absolutely vital that, where possible, excavation is undertaken as quickly as possible (to prevent unnecessary damage or decay through exposure) to expose as wide an area as possible around the find (be it only a single weapon) to determine the nature of the deposition and the likely circumstance or its origination. Such activity may lead on to the exciting potential of the work conducted in Mecklenburg-Vorpommern, Germany,

(Jantzen *et al.* 2011) where the combination of accumulated distributions, investigative excavations at casual find sites and the thorough examination of human bone finds over an entire valley length has produced the 'intersection' that permits the inference of warfare. This approach can be compared to the enquiry jointly concluded by Maj. Tony Clunn of BAOR, a metal detector enthusiast, in active cooperation with Dr Wolfgang Schlüter of the Hannover Denkmalpflege whereby a combination of scientific metal-detector work, field survey, examination of museum collections, and, in this instance, relating to a Roman defeat of AD 9 – the limited account of classical sources saw the retrieval of an essentially prehistoric battlefield site – the scene of the Varus disaster near the Teutoberg, the site which can now be called the battle of the Kalkreise (an English account exists in Wells 2003; Schlüter and Weigels 1999).

A centre of excellence⁸ exists here in Scotland in the tracing of early battlefield archaeology that could be central to this area of enquiry.

The occurrence of weapons of local type in distant locations: The dispersal of young men whether as 'soldiers of fortune', as hostages, as guests/adoptees or in whatever guise, or of diplomatic gift giving to external power centres may well be registered in the archaeological record by the appearance of weaponry of slightly exotic type at some distance from source. This is easy to observe in the appearance of blatantly British spearhead and sword types in the Paris Basin and further afield – presumably the product of traffic of this type. More intricate evaluation of weapons with this specific objective in view might lead to an altogether more complex network of communication based upon micro-matching of weapons.

Experimentation, testing and establishing the mechanical properties of replica bronze

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<http://www.gla.ac.uk/departments/battlefieldarchaeology/>

weapons will continue to yield valuable insights to those interested in their practical use and likely rôle. Prof John Coles began this process half a century ago in examining the efficacy of Bronze shields (Coles 1960b), but more recently Susan Bridgford examining the edge damage patterning on LBA swords (1997) has produced some thoughtful comments relating to possibly institutionalized fighting/duelling techniques in use at the time and very recently Kate Anderson's work showing the ubiquitous and varied employment of the spear in action at the period (2011). This series of experiments perhaps supports the view (Mercer 2006) that, as the hoards suggest, the spear was the principal weapon, finely graded through a whole series of types to reflect rank with those at the grandest end of the scale seeking high fashion in the intricate processes of typological change. Swords were the minority weapon of the leadership group equally subject to fashion-change and possibly principally reserved for 'reserved combat' (between 'champions' and 'trophy detachment'.

Much work remains to be accomplished to understand the rôle and nature of warfare in Britain at the time of the Book of David and the trials of Agamemnon.

5.4 Belief systems and ceremony in Bronze Age Scotland

The Scottish Bronze Age was a period of dramatic social and economic change, characterised by the emergence of social stratification and an increase in inter-regional interaction, accompanied sometimes by violent conflict. Against this backdrop, Bronze Age ritual and religion can be seen to have played a significant role in the construction, definition and maintenance of social relationships. Although common themes emerge, there is considerable diversity in the availability and quality of evidence for ritual practice across Scotland. In addition, the character of the evidence in regions such as

Aberdeenshire, Orkney or Argyll and Bute is very different: Clava cairns are found only in northeast Scotland (Bradley 2000), for example, while kerb cairns, common in Argyll and Aberdeenshire, are not found in the Borders (Ritchie and McLaren 1972). In general, religious iconography is lacking, but evidence from continental Europe can provide useful insights into elements of the belief systems of this period.

5.4.1 Natural places

Bronze Age communities did not draw a sharp distinction between ritual and secular activities as is done today (Brück 1999a). As will be seen below, ritual activities took place on settlement sites. Religious beliefs informed daily practice because they provided the fundamental conceptual framework for understanding how the world works. That said, however, there is strong evidence to suggest that special places on the edges of the inhabited landscape were reserved for particular forms of ceremonial practice (Fontijn 2002).

Figure 51: (top) View of Arthur's Seat and Duddingston Loch (©RCAHMS) and (bottom) bronzes from Duddingston Loch (©NMS). This find consists mainly of weapons that had been broken or burnt before deposition in the water and also the ring handle from a bronze bucket.

The deposition of metalwork and other finds at significant places within the natural landscape is one of the key ritual practices of the Scottish Bronze Age. Wet places, in particular, were singled out for attention. Bronze objects, often comprising high status items and artefacts of probable ritual significance were thrown into rivers, lakes and bogs. Examples include the Early Bronze Age halberd deposited in a bog at Whiteleys, Wigtownshire (Hunter 1868), and a number of Late Bronze Age swords from the River Tay (Coles 1960a, 85); this was clearly a practice with a long history.

Figure 52: Late Bronze Age shield from Yetholm, Roxburghshire ©NMS Shields like this are among the finest objects from Bronze Age Scotland; they were hammered out of a single piece of bronze. While probably intended mainly for display, they would have been strong enough for use in combat.

At Yetholm in southern Scotland, three Late Bronze Age shields were also found in a bog (Coles 1960a, 132). Such finds are likely to represent votive offerings to gods or ancestors: in many cases, they would not have been recoverable, so it is difficult to explain their deposition in functional terms (e.g. Bradley 1990). Bronze weaponry was the main category of artefact deposited in such contexts and this fact has been interpreted in a variety of ways: for example, some have suggested that this was a means of ritually decommissioning the weapons of vanquished enemies while others suggest that these objects were deposited in the context of particular lifecycle rites. It has been argued that only those who held positions of particular social and economic standing could have afforded to relinquish such objects; such acts of ‘conspicuous consumption’ would have enhanced their reputations as wealthy and powerful individuals in the eyes of their neighbours (ibid.). However, although the deposition of high status objects such as the three shields from Yetholm can be interpreted in such terms, the deposition of one or two flat axes may have had a quite different significance: the desire to express personal status may not have always been paramount

and depositional practice may relate to other concerns, for example the life-histories of the objects or the people associated with them.

Other eye-catching features of the natural landscape, for example rock outcrops, mountain tops, mountain passes and caves, were also a focus of votive deposition. For instance, a hoard of three Early Bronze Age flat axes was found below the summit of Arthur’s Seat on Dunsapie Crag, Edinburgh (Cowie 2004), while two further artefacts of the same type were found in the Pass of Ballater, Aberdeenshire (Ralston 1984, 77-78). In the Sculptor’s Cave at Covesea, Moray, a large quantity of bronze objects and human remains were retrieved (see Case Study below). The stairwell and paved entranceway at High Pasture Cave on the Isle of Skye probably date to the Iron Age, but there is evidence for activity at this site during the Late Bronze Age including – possibly – feasting and metalworking⁹. On Orkney, souterrains – underground dry-stone walled chambers accessed via a long, narrow passage – may have provided a localised and man-made equivalent of sacred caves in other areas. The souterrain at Ness Breck, Orkney, dates to the Later Bronze Age (Carruthers and Lee forthcoming).

Figure 53: The three decorated axes from Dunsapie Crag, Edinburgh (after Cowie 2004, fig. 20.5) Axes like this were exported to Scandinavia and central Europe.

⁹ see <http://www.high-pasture-cave.org/>

Ballachulish

At Ballachulish, in western Scotland, an anthropomorphic figure was found in a bog in 1880 by workmen building a wall (Christison 1881; Coles 1990). The figure, carved from a single piece of alder and with quartzite eyes, is female and stands almost 5 feet high. It has been dated to 730-520 BC, a period spanning the Late Bronze Age-Early Iron Age transition. The pubic area is deeply carved and the figure appears to hold a phallic object over its abdomen; it may therefore have been a representation (or embodiment) of a fertility deity. The use of quartzite pebbles to create the eyes is interesting; as we will see below, this material was considered to have magical qualities in prehistory.

The figure was found lying on its face in the bog. Above it were the remains of wickerwork panels, suggesting it may originally have stood in a shelter of some sort, overlooking the dangerous stretch of water where Lough Leven meets the sea. Here, a deity guarded a liminal zone, and parallels may have been drawn between the perils of travel and encounters with the other world.

The details of the carving are clearest on an old photograph taken at the time of discovery. Her pebble eyes stare out and her mouth is slightly open. The legs end in a solid block of wood, with a rectangular hollow carved into its front. The height of the figure, when found, was around 145 centimetres (just under 5 feet). Today, it looks very different from when it was found. The figure had survived thanks to the peat which had grown over the site but back in the 1880s there were no scientific techniques to preserve waterlogged wood. As it dried out, the figure warped and cracked, and a large piece broke off. © National Museums Scotland.

Figure 54: The Ballachulish figure. (left) as discovered in 1880 and (right) as it currently is. ©NMS

Sculptor's cave, Covesea

Figure 55: Sculptor's Cave, Covesea. (left) showing the site at the base of the cliff, image courtesy I Shepherd. (right) showing the site under excavation

The Sculptor's Cave, Covesea, is located near the base of impressive cliffs where the Moray Firth meets the sea. The cave interior, some 13.5 x 20m in area and up to 5.5m high, is reached via twin passages, over 11m long, from a large entrance canopy. The site – inaccessible at high tide – produced a range of objects of Late Bronze Age date including several bronze armrings, ring money, a swan's neck pin, pottery and worked bone, along with a very large quantity of human remains, predominantly those of children (Benton 1931; Shepherd 2007). The presence of skull and mandible fragments in the entrance passages suggests the display of heads at the entrance to the cave. There is evidence to suggest that one juvenile frontal bone was deliberately defleshed, hinting at practices which involved the curation of human remains (Armit *et al.* 2011).

Figure 56: Hair rings from Sculptors Cave, Covesea ©NMS . 'Hair rings' from Sculptors Cave ... The true function of these objects is not yet understood. They occur in precious metal, as well as in base metal covered with gold sheet. In northern France and the Low Countries they are often found with burials and with human remains in a cave at Han-sur-Lesse in Belgium.

The very nature of this site – a cave that was often difficult and dangerous to access – is likely to have made this a highly appropriate location for the undertaking of ritual practices. A dark and frightening place situated between land and sea, the upper world and the underworld, this was a liminal location in which rites of passage – transforming children to adults or the living to the dead – may have taken place. It may also have provided an access point to the gods or spirits of the underworld. Interestingly, a concern with the human head re-emerged at the site in the Roman Iron

Age, more than a millennium later, when a number of individuals were decapitated, again most likely in the context of ritual activities in the cave (ibid.).

Rock Art

It is possible that open air rock art continued to be created during this period, although it is now thought that this practice predominantly dates to Late Neolithic or earlier (e.g. Waddington 1998). The most common motifs are geometric – notably cup marks and cup-and-ring motifs. These were pecked onto outcrops and boulders.

As elsewhere along the Atlantic facade, there are concentrations of rock art in particular landscapes, for example on the southern flanks of Ben Lawers overlooking Loch Tay. Bradley has suggested that rock art was created to define the edges of territories, and to mark particular resources (such as ponds or lakes) or routeways through the landscape, especially in the uplands where communities may have shared access to summer grazing (e.g. Bradley 1997). However, he argues that it may also have drawn attention to cosmologically-significant places, including not only important features of the natural landscape – as in the case of Ben Lawers – but also monuments: further south, he suggests that rock art marks out routeways approaching the Milfield Basin in Northumberland, where there is a major concentration of Late Neolithic monuments.

Recent excavation at rock art sites by both Bradley and Andy Jones has attempted to understand the kinds of activities that were carried out at these locations: at Ben Lawers, for example, a cobbled surface and scatters of worked quartz were found at the foot of rock art panels (Bradley *et al.* 2010). In Scotland, there is evidence for the ongoing creation and/or re-use of rock art during the Bronze Age.

Figure 57: Ormaig rock art, Argyll ©RCAHMS

The standing stones at Nether Largie in the Kilmartin Glen with their cup-and-ring marks may date to the Later Bronze Age. Particularly unusual in a British context are the depictions of Early Bronze Age axes from one of the cists under the cairn at Ri Cruin in the same area (Jones 2001). In contrast, the curvilinear motifs on one of the slabs from the cist at Balblair, near Inverness, recall aspects of the art from Middle Neolithic passage tombs and it has therefore been suggested that in this case, the artwork was re-used from a much older monument (Dutton and Clapperton 2005).

Together, the creation of rock art and the deposition of metalwork and other objects suggest that Bronze Age people viewed prominent features of the natural landscape as sacred places (cf. Wyss 1996; Bradley 2000a; Cowie 2004); as will be seen below, the orientation of Bronze Age monuments towards mountains also supports this suggestion. Caves, bogs, mountains, lakes and other features provided a conduit between heaven, earth and the underworld so that gods, spirits and ancestors could be addressed and propitiated. As such, these places were considered to possess liminal or otherworldly characteristics that provided a context in which ideas of danger, difference

and distance could be addressed and mediated.

Distinctions between self and other and between the familiar and the foreign were central to the activities that were carried out at these sites. Features such as rivers and bogs form natural geographical boundaries and, as such, provide a perfect example of the interplay between political power and religious beliefs. Those who deposited metalwork into the water enhanced their own

status in the eyes of their community by propitiating the gods; at the same time, we might interpret such acts as political posturing at what may have been boundaries between neighbouring groups.

Figure 58: The decorated cist slabs from Balblair, with suggested position of the corpse (this did not survive) (after Dutton and Clapperton 2005, fig. 2).

However, the Bronze Age concern with 'natural places' should not be taken to indicate that culture and nature were strictly differentiated. Instead, it may suggest that elements of the 'natural' landscape were socialised - powerful places that were highly meaningful and that may have been

considered animate entities in their own right (cf. Pálsson 1996). This has important implications for the Bronze Age economy: contrary to traditional archaeological narratives which posit intensification of production over the course of prehistory, landscape was not simply an object of economic exploitation. Doubtless, the social

and religious significance ascribed to it informed 'economic' activities such as agriculture and mining.

Key research questions include:

- Can regional traditions in the deposition of metalwork be identified? For example, although Early Bronze Age daggers are found in graves in the south-east of Scotland, in Orkney they were deposited in bogs. How did these regional traditions change over time?
- Were different kinds of depositional practice carried out in different kinds of waters (e.g. lakes, bogs, fast-flowing vs slow-moving rivers, etc.)?
- How have taphonomic factors affected our current distribution maps of metal objects? For example, only the Rivers Tay and Clyde have been dredged but other Scottish rivers are also likely to have foci of deposition in the past. Targeted metal-detection at locations that may have seen depositional activities in the Bronze Age (for example around fords) might prove useful.
- How have recent activities/histories of research affected our distribution maps? For example, are metal-detectorists more active in some regions than others?
- What is the spatial relationship between locations where metal objects were deposited and other contemporary sites, such as cairns or settlements? Were rivers and bogs really 'marginal' elements of the Bronze Age landscape? Although Trevor Cowie and Brendan O'Connor have discussed the landscape contexts of certain bronze finds (e.g. O'Connor and Cowie 1985), our understanding of the relationship between hoards and other classes of site needs to be improved. Integrating information on metal findspots with historic environment

records will place depositional practices more firmly in their landscape setting. For Scotland, existing databases (e.g. John Coles's card index at NMS; data held by RCAHMS on CANMORE; and Peter Bray's database of metallurgical information) could be brought together to enable clearer understanding of the landscape context of different traditions and types of metal object.

- Palaeoenvironmental analysis and targetted excavation at significant hoard sites may further illuminate the landscape context of metal deposition.
- How did the significance of particular natural places change over time? How persistent were such traditions?
- What is the date range for both the production and use/re-use of Scottish rock art?
- How does the corpus of rock art found in Early Bronze Age burials relate in stylistic terms to open-air rock art and to megalithic art? Why might rock art and/or megalithic art have been re-used in such contexts?

5.4.2 Cosmology and Bronze Age monuments

The belief in an existence of an afterlife is amply attested by Chalcolithic and Early Bronze Age funerary practices (see section 5.5), and is also arguably implicit in the practice of cremation. Other information about the nature of belief systems is provided by ceremonial monuments, a wide variety of which were constructed in Bronze Age Scotland. These range from cairns built for the disposal of the dead to stone rows, stone circles and various different types of 'hengiform' monument. In many cases, these occurred in monument complexes that are likely to have spanned the third and second millennia BC. The dense concentration of monuments in Kilmartin Glen, for example, includes a linear cairn cemetery, henge, stone

circles, stone rows and standing stones, creating an extensive and impressive sacred landscape (e.g. Scott 1991; Cook *et al.* 2010). At Broomend of Crichton, there were originally two stone circles, one of which incorporated a cairn while the other was enclosed by a henge; these were linked by a double stone row that ended at an early Bronze Age cist cemetery (Bradley 2011).

Figure 59: Kilmartin Valley, showing the remains of standing stones and cairns. ©RCAHMS

Despite the uncertainty with dating some monuments, the evolution of certain landscapes in Scotland is now better understood, although the history and significance of others remain a topic of considerable debate. The chronology of many of these classes of monument is beginning to be clarified by new fieldwork and by targeted radiocarbon dating. The dating of Clava cairns, for example, has long been a matter of conjecture. Found only in north-east Scotland, these monuments comprise a central corbelled chamber entered via a long passage oriented southwest and covered with a cairn (e.g. Henshall 1963). At many sites, the cairn is revetted by kerbstones and surrounded by a stone circle. The kerbstones and stone circles are often carefully graded in height, with the

tallest stones to the south-west. The similarity of Clava cairns to passage tombs has meant that they have often been thought to date to the Neolithic, but work by Richard Bradley has now shown that they were constructed in the late third millennium BC (Bradley 2000b).

Stone circles take different forms in different areas and a number of distinctive regional traditions can be identified. Perhaps the best known of these are the recumbent stone circles of Aberdeenshire (e.g. Burl 1973; Welfare *in press*). These are distinguished by the presence of a large slab laid on its side on the southwest side of the circle and usually flanked by two particularly tall stones. Similar to Clava cairns, the stones were often graded in height, with the smallest stones situated directly opposite the recumbent, and these monuments too were constructed in the late third millennium (Bradley 2005b). Research suggests that they may have played a role in funerary practices. The primary feature at Tomnaverie, for example, was a cremation pyre which was subsequently enclosed by a ring cairn and finally surrounded by the stone circle (*ibid.*); however, others have argued that they were not solely designed as mortuary monuments and that the treatment of the dead was only one element in the range of ritual practices carried out at these sites. In other regions, stone circles can be ascribed rather different date ranges. Some are likely to have been constructed during the early second millennium (although others had already been built around 3000 BC), while the small, slightly oval stone ‘circles’ of Tayside – such as that at Croft Moraig (Bradley and Sheridan 2005) – were probably erected as late as the early first millennium. Likewise, some timber circles, such as that at Broomend of Crichton in Aberdeenshire (Bradley 2011), were built during the first half of the second millennium, but they have precursors constructed around 3000 BC.

Figure 60: Plan of the excavated features at the henge and timber circle at Broomend of Crichtie (Bradley 2011, 35; Illus 1.35)

‘Henges’ and ‘hengiforms’ –terms that are, perhaps, in need of replacing – seem to have a very wide date span, with some (e.g. Stones of Stenness on Orkney: Ritchie 1976; Ashmore 2000; Ashmore 2001a) being built during the Late Neolithic, others (e.g. Broomend of Crichtie: Bradley 2011) around 2000 BC and some (Pullyhour: *ibid.*) during the first half of the second millennium. Recent research on

these and similar sites by Richard Bradley (*ibid.*) is improving our understanding of their dating. In several cases, as at Broomend of Crichtie, they seem to have been built to define a sacred precinct around a pre-existing monument (in this case a stone circle). At this site, a number of Early Bronze Age cremation burials were deposited at the foot of the stones in the earlier stone circle and a deep grave was dug in the centre of the henge;

these acts appear to have taken place around the same time that the henge itself was built (ibid.) and serve to remind that monuments such as henges were usually only one component of more extensive sacred landscapes. This work highlights the point that perhaps the most interesting result of recent research and excavation on these various classes of monument is that some traditions of monument construction (hengés and stone circles, for example) appear to have been very long-lived. This calls into question any simplistic division we might be tempted to make between ‘group-oriented’ Neolithic societies and ‘individualistic’ Bronze Age societies.

Stone rows also were also built in the Bronze Age. The pre-existing Neolithic stone circle at Calanais may well have had its avenues added during the late third or second millennium BC, and other avenues of stone and timber were erected during the Early Bronze Age, with the stone example at Broomend of Crichton linking a Beaker cist cemetery with the henge and a recumbent stone circle (Bradley 2011). Cremated bone sealed in the socket of one of the Ballymeanoch alignments in mid-Argyll has been dated to c 1200 BC (Sheridan 2005), while charcoal from a stone hole in the short stone row at Ardnacross, northern Mull, has produced a similar date (Martlew & Ruggles 1996). The more complex arrangement of standing stones at Nether Largie is also likely to date to this period. Both here and at Ballymeanoch, stretches of cup/cup and ring-marked outcrops were prised off and used in these monuments, arguably enhancing their ability to ‘catch’ divine power. The ‘four poster’ stone monuments which are mostly found in and around Tayside were in existence by 1600 BC, if not a few centuries before (Burl 1988). Single standing stones are far more difficult to date, but to judge from the interments of urned cremated remains found at the foot of at least one must have been in place by c. 1800 BC.

Figure 61: Cup and ring marked standing stone at Nether Largie, Kilmartin valley ©RCAHMS

Astronomical alignments are important features of many of these classes of monuments (e.g. Burl 2000). From at least the late third to the late second millennium, there was an interest in marking key points in time by orientating monuments with respect to positions of the moon, sun and possibly other celestial bodies: this hints at the importance of solar and lunar cycles to Bronze Age cosmology. For example, recumbent stone circles are oriented so that the moon at its major standstill rises or sets over a significant point on the horizon framed by the recumbent stone and its flankers (Ruggles & Burl 1985). Cupmarks mark the recumbent and sometimes the flanking stones – and hence the position of the rising or setting moon – at sites such as Sunhoney (MacGregor 2002, 151). The presence of smashed quartz at many of these monuments suggests that this white, numinous material may have been associated with the moon (Bradley 2005b): quartz emits a greenish spark – triboluminescence – and a cordite-like smell when struck. The short stone rows of northern Mull were also oriented towards the southernmost rising and setting points of the moon at major standstill (Martlew & Ruggles 1996). At Glengorm, for example, the moon rises over Ben More, the highest mountain on Mull, at this point in the lunar cycle (ibid.); mountains such as this may have been seen as

sacred places. Monuments also incorporated solar alignments. At Balnuaran of Clava, for instance, two clava cairns were aligned on the midwinter sunset (Bradley 2000b), a significant point in the calendar of any farming community, while at Croft Moraig in Perthshire, the entrance to the stone circle in its earliest phases frames the sunrise at the equinoxes (Bradley and Sheridan 2005).

Similar concerns are given architectural form in the choice and placement of particular types of stone within these monuments. At Balnuaran of Clava, red stones that absorb the light were most prevalent around the southwest of the cairns while grey and white stones that reflect the light were concentrated on the northeast (Bradley 2000b). In this way, a contrastive symbolism of life and death, light and darkness, became embedded into the monuments themselves, underlining the likely symbolism of their

astronomical alignment. At recumbent stone circles, on the other hand, white/grey stones such as quartz may have symbolised the moon while red stones may have referenced fire (Bradley 2005b): there is archaeological evidence for major acts of burning at these sites, probably carried out as an element of funerary and/or purification rites. At Sunhoney, for example, all of the stones were of pink granite with the exception of the recumbent which is grey (MacGregor 2002, 149), while pieces of quartz were deposited on the old ground surface opposite the recumbent stone at Cothiemuir Wood (Bradley 2005b). At these sites – as at Clava cairns – a broad interest in concepts of fertility and regeneration (as symbolised by the cyclical movements of heavenly bodies) may be discerned that makes perfect sense in a mortuary context.

Figure 62: Plan of the stone colours at the recumbent stone circle at Tomnaverie (from Bradley 2005b, 30)

It is, of course, difficult to reconstruct the content of the belief systems that underpinned the ceremonies carried out at Bronze Age monuments in any more detail: iconography dating to the Bronze Age is virtually absent in Scotland (the axes carved onto cist slabs at Ri Cruin and Nether Largie in the Kilmartin Valley are exceptions). However, comparisons with Continental material may prove instructive. Studies of Bronze Age iconography, particularly in northern Germany and Scandinavia, have identified a number of possible religious symbols including ships, waterbirds, chariots, horses, the sun and the wheel (e.g. Gelling and Davidson 1969; Kaul 2004). These were produced in a variety of media, of which Scandinavian rock art is perhaps the best known (e.g. Kristiansen 2010). This body of images, along with bronze ceremonial items such as the Trundholm chariot (Glob 1973, 99-103) and the Nebra disc (see Insert below), have facilitated the reconstruction of elements of Bronze Age cosmology. This seems to have been concerned with the movement of the sun, moon and other celestial bodies, the passing of the seasons and the cyclical regeneration of life. Bronze Age societies are thought to have regarded the sun as a deity that travelled by day in a chariot through the heavens and by night in a ship across the watery underworld (Kaul 2004). As such, boats and chariots were linked with cycles of death and rebirth and appear to have been considered a suitable means of transporting the dead to the afterlife.

Figure 63: Ri Cruin end slab ©RCAHMS

The astronomical orientations discussed briefly above hint that similar concerns may have informed Scottish belief systems during this period. Likewise, the large number of votive deposits in wet contexts in Scotland suggests that water was a significant component of Bronze Age cosmographies in this region. The cup-and-ring motifs that dominate Scottish rock art have sometimes been interpreted as sun symbols (e.g. Beckensall 2009, 62), while quartz pebbles (which some have linked with the sun and others the moon: e.g. Darvill 2002; Bradley 2005b) are frequently included with Early Bronze Age burials: the grave goods that accompanied a double cremation at Beech Hill House, Perthshire, included a bone pommel, bone toggle and a quartz pebble (Stevenson 1995). The gold discs that accompanied the cremation burial at the Knowes of Trotty, Orkney (Sheridan *et al.* 2003), may make reference to the sun, and it is not hard to imagine how conceptual links may have been drawn between the sun, fire and the magical activity of metalworking (e.g. Budd and Taylor 1995); as such, either making or owning items of this sort may have been a source of social power (Sheridan & Shortland 2003). One of the inhumation burials at Barns Farm, Fife, had been deposited in a possible curricule or

small, skin-covered boat (Watkins 1983), while elsewhere, for example at Forteviot on the River Earn (e.g. St Joseph 1976; 1978), concentrations of barrows in river valleys created a link between the dead and travel by water. Together, these examples suggest that although the belief systems of Bronze Age Scotland were doubtless regionally specific, significant elements were shared with other parts of northwest Europe, underlining the strength and importance of inter-regional interaction during the period.

Whatever the case, the rituals carried out at Scottish Bronze Age monuments would have facilitated the creation, reproduction and transformation of social identities. Those who played a key role in the rituals carried out at these sites, or who had preferential access to ancestors buried there, are likely to have been people of particular social standing: it was they, after all, who ensured the cyclical regeneration of the natural world. Indeed, the architecture of monuments such as stone circles or henges may have ensured that some members of the community were admitted while others were excluded. The construction of special-purpose monuments that may have been accessible only to certain people suggests that, on occasion, architecture was used as a technology of social differentiation.

Finally, it is important to note that earlier monuments were frequently re-used many centuries after they were originally constructed. Cremation burials dating to the Middle and Late Bronze Age were inserted at both recumbent stone circles and Clava cairns, for example at Tomnaverie (Bradley 2000b). At some of these sites, metalworking – itself perhaps seen as a magical, transformative activity – seems to have taken place during the Late Bronze Age. It may be that locations long associated with the ancestors and with ritual practices involving fire were considered especially suitable for the production of bronze objects: part of a sword mould was found at Loanhead of Daviot, for example (Kilbride-Jones 1936, 290). Chambered tombs of Neolithic date

were also re-used as places of burial and for other depositional practices during the Bronze Age: at Isbister on South Ronaldsay, for example, the remains of a number of white-tailed sea eagles were deposited in the tomb during the Early Bronze Age, around a millennium after the tomb itself was built (Sheridan 2005). Such practices suggest that communities drew on the potent symbolism of ancestral places in the construction of social identity; doubtless, however, the significance of these places and the beliefs that underpinned the activities carried out at them changed over time.

Figure 64: Temple Wood, Kilmartin valley
©RCAHMS

The compact distributions of such distinctive monuments as recumbent stone circles and Clava passage graves, leave little doubt that various aspects of Bronze Age life and practice were expressed differently from place to place. This is particularly so of funerary and ceremonial monuments. Thus some of the ideas that seem to be inherent in recumbent stone circles in the North-east, which dramatically emphasise the south-western arc of the monument and extensively draw on the symbolism of quartz (see Welfare 2011), are not only inherent within the Clava-type cairns around the inner Moray Firth, but are found across much wider areas of Scotland. The grading of the kerbstones towards the south-west, for example, is not only a notable feature of many large cairns with well-preserved kerbs, but equally a feature of the classic small kerb cairns, with their disproportionately large kerbstones and extensive use of quartz (Ritchie and Maclaren

1972); these latter are mainly found in Argyll and Perthshire, but the distribution is by no means exclusive. Indeed, any regional patterns to be observed in the character of the kerbs of cairns is much more diffuse and difficult to discern, though the apparent absence of such features from the south-east of Scotland might be construed as some form of regional expression in its own right. Even here, however, the faint echo of the same beliefs is perhaps detectable in the Harehope Cairn, where with the primary cairn was enlarged eccentrically with a much thicker band of new cairn material on the south-west (Jobey 1981). The significance of these regional distributions, however, are not understood, and it would be naïve to define a region on the distribution of one particular type of monument or artefact. The brash architecture of a recumbent stone circles becomes self-appointing as a regional expression, and ignores the a host of other circles in the North-east that present shades of the same design, but without the addition of the massive recumbent block. The presence of an internal cairn, for example, is also attested in other circles, as is the grading of ringstones, though in some cases the evidence suggests no more than an open ring of ungraded orthostats. In this sense, the North-east forms part of a much larger region stretching southwards into Perthshire, an area equally notable for its concentration of small megalithic rings and settings. Many of these are also graded towards the south-west, including the complex circle at Croft Moraig, while others, such as Moncrieffe House, reveal other patterns. This area and neighbouring Angus are also notable for their four-poster stone settings, in which the corner stones are also typically graded in height.

The Nebra sky-disc

A number of spectacular finds elsewhere in Europe have provided extraordinary insights into the character of Bronze Age cosmologies. Chief among these is the Nebra sky-disc (see papers in Meller 2004), found by metal-detectorists in 1999 on the Mittelberg, a hilltop just southwest of Halle in Germany. This bronze disc, some 31cm in diameter and weighing over 2kg, is decorated with sheet-gold depictions of a crescent moon, stars and the sun or full moon. It was deposited around 1600 BC in a hoard alongside a selection of other high-status objects, including two swords with gold hilt-bands, two axes, a chisel and several spiral armlets. The inlaid gold sheeting on the disc is of three different compositions, suggesting that the object as we see it today is the result of several phases of reworking and addition. The sky-disc provides evidence for an interest in the movement of celestial bodies. A cluster of seven stars depicts the Pleiades whose disappearance in March and reappearance in October mark the beginning and end of the agricultural cycle. Two gold arcs, attached to either the edge of the disc, mark the positions of the rising and setting of the sun at the solstices as observed from the Mittelberg. At the bottom of the disc, a ship – the celestial vessel in which the sun is thought to have travelled on its diurnal cycle in Bronze Age mythology – is also depicted in sheet gold.

Figure 65: The Nebra disc © LDA Sachsen-Anhalt (Foto: Juraj Lipták). Further information on the Nebra Disc can be found here: http://www.lda-lsa.de/en/nebra_sky_disc/.

It is possible that the tin for the bronze disc and the gold for the ornamental inlay came from Britain and Ireland. The cosmological knowledge represented on the disc was probably not confined to central Europe.

Key research questions include:

- Perhaps the most interesting result of recent research and excavation on these various classes of monument is that some traditions of monument construction (stone circles, for

example) appear to have been very long-lived. Were there changes over time in the architecture, use and significance of classes of monument such as henges and stone circles?

- Monument complexes in certain regions have been well studied but

there are considerable gaps in our knowledge of the chronology and development of others. Work such as that currently being undertaken by the Strathearn Environs and Royal Forteviot project (SERF¹⁰) has much to offer here.

- When were single standing stones erected? Are they, like stone and timber circles and henges, a kind of monument that was erected at different times from the Neolithic onwards?
- Although dates have been obtained for stone rows in some regions, these remain poorly dated elsewhere, for example in Caithness and Sutherland where these are found in spatial association with Bronze Age monuments. Likewise, there may be regional differences in the chronology of other monument types and these require further study.
- When exactly, and why, were ‘four posters’ built?
- Although it is widely accepted that Orkney’s souterrains date primarily to the Iron Age, new dates call for a review of these monuments.
- The chronology of some classes of chambered tomb remains poorly understood. For example, it is often assumed that Bargrennan tombs in southwest Scotland are Neolithic, but the only dateable evidence from recent excavations at two of these sites comprises a series of Early Bronze Age cremation burials deposited around the edge of the monuments (Cummings and Fowler 2007). Clava cairns and Irish wedge tombs are now known to date to the Early Bronze Age and it is possible that other types of megalithic tomb may also have been constructed in

this period. Shetland’s chambered tombs also remain poorly dated.

- How many of the monuments of the Chalcolithic and Bronze Age were designed with specific astronomical orientations?
- What does the regionally-specific character of Scottish Bronze Age monuments say about the construction of social identity during this period?
- To what extent were belief systems regionalised? Conversely, can sharing of beliefs be detected far beyond Scotland during this time and, if so, in what respects?
- The nature of religious beliefs and practices in parts of Scotland (e.g. Shetland) is very poorly understood. How can these be characterised?
- Was the re-use of older monuments particularly prevalent during certain periods of the Bronze Age and, if so, what does this mean?
- Although the sources of stone used to build certain classes of monument (e.g. recumbent stone circles) have been well-studied, this is not the case for other monument types and further work could be carried out on this topic: the capstone from the cist at Forteviot, for example, appears to have been taken from the bed of the nearby river (K. Brophy pers. comm.).
- The spatial relationships between Bronze Age monuments and contemporary settlements requires further study in many areas.
- What was the relationship between monumental and non-monumental elements of the landscapes? For example, rock art can be seen as a cultural elaboration of a natural formation while it has been suggested that some of the stones at recumbent stone circles were quarried from mountains considered to be sacred places (Macgregor 2002). What does this say about the interplay between

¹⁰

<http://www.gla.ac.uk/departments/archaeology/research/projects/serf/>

culture and nature during the Bronze Age?

- If certain features of the natural landscape (e.g. mountains, rivers, the moon) were imbued with sacred power, how did that effect land-use and agricultural practice?

5.4.3 Houses or shrines?

Places such as bogs and recumbent stone circles may have been considered liminal parts of the landscape, at least in certain contexts, but ritual activities were not restricted to these areas. In other parts of Britain and Europe, Bronze Age roundhouses and the settlements in which they were located formed a focus for particular types of ritual practice (e.g. Brück 1999b; Gerritsen 1999). Acts of votive deposition were carried out at significant points in the lifecycle of the household (for example foundation or abandonment), while animal burials and deposits of grain and quernstones suggest a concern to maintain the fertility of land and livestock. Deposits of human bone, metalwork and other items marked critical points in settlement space, such as boundaries and entrances. Together, such offerings ensured the well-being of the household, so that the annual agricultural cycle may have become metaphorically linked with both places of spatial transformation and the lifecycle of the settlement and its inhabitants. In Scotland, sites such as Cladh Hallan on South Uist provide similar evidence.

Although some have suggested that finds such as these indicate we are looking not at houses but at shrines (e.g. Becket and MacGregor 2008), it is important to remember that most pre-modern societies are unlikely to have drawn the same categorical distinction between ritual and secular activities as is done today (Brück 1999a; Bradley 2005a). Anthropological research indicates that ritual practice forms an intrinsic element of daily life in many contemporary societies (e.g. Waterson 1990); household shrines are widely found across east and southeast Asia, for

example in Japan, while special ceremonies accompany the construction of houses in many parts of Indonesia. If this was the case in the Bronze Age, it suggests that ritual activities were always not restricted to the elite but were likely to have involved all members of the community, at least on certain occasions.

The similarity between domestic and ceremonial architecture (for example timber circles and post-built roundhouses, or ring cairns and ring banks) has been noted by Bradley (2005a) and this requires further investigation. There are differences in astronomical orientation between roundhouses (which tend to face east or southeast – towards the rising sun) and some monuments (such as recumbent stone circles) which are thought to reference lunar rather than solar cycles. Overall, though, both categories of site display a concern with the movement of heavenly bodies and associated concepts of death, fertility and rebirth. In southern Britain, the circular ceremonial monuments of the Late Neolithic and Early Bronze Age appear to have been replaced by circular domestic architecture in the Middle Bronze Age. In Scotland, the longer chronology for monuments such as stone circles indicates that these may often have been contemporary with roundhouses, suggesting a very different link between ritual and domestic architecture.

Indeed, it seems likely that other aspects of daily life in the Bronze Age, including what modern thinking would normally categorise as productive or technological activities, may also have been accompanied by ritual acts. The swords, spearheads and other objects deposited in Duddingston Loch, Edinburgh, had been deliberately broken, bent and burnt (Coles 1959/60). Such acts of ritualised destruction did not merely symbolically signify death, however. Contemporary technologies such as metalworking and potting subjected artefacts to fire and fragmentation both in the early stages of the productive process (for example, the smelting and casting of copper

alloys) and in later recycling (for instance the use of grog temper in pottery). As such, the deliberate destruction of artefacts acted not only as a means of transformation but was considered essential to the regeneration of life in the face of death (Brück 2006). This means that the sorts of concerns indicated by evidence for Bronze Age belief systems (diurnal and seasonal cycles of death and rebirth) were reflected both in depositional activities and in transformative technologies (such as metalworking and cooking); it therefore seems likely that ritual acts may have been an intrinsic element of productive activities. This is hardly surprising, as there is evidence from other parts of Britain that the making of metal was regarded as a magical process and its practitioners (like the Amesbury Archer) regarded as special individuals (Fitzpatrick 2003). The working of other materials also hints that the boundary between craft and magic was seen as permeable. The curation of jet beads from older necklaces and the deposition of items such as fossils in mortuary contexts hint that certain materials – jet, amber, faience, gold, natural geological freaks – were probably attributed magical powers and used as amulets (e.g. Sheridan and Davis 2002). Again, this suggests that the boundary between the sacred and the profane was not as rigid as it is in the modern, Western world.

Key research questions include:

- Are the ritual practices evident in the houses at Cladh Hallan the exception or the norm? This site, unlike those excavated in other areas, was exceptionally well-preserved, with floor levels surviving intact.
- Are there regional differences in the prevalence or character of rituals of foundation, abandonment, etc.?
- How do these practices change over time?
- How do they relate to the increasing ‘monumentalisation’ of the domestic domain over the period?

- What was the relationship between roundhouses and pre-existing and/or contemporary circular monuments?
- What was the role of the craftsman in Bronze Age society?
- How did economic, ritual and political power intersect?

5.5 Funerary and Burial evidence

Burial architecture and monuments

A rich variety of types of Bronze Age burials structures and monuments are found in Scotland, showing both temporal and regional variation (see sections 2, 5.1, 5.2 and 5.4). In common with the rest of the British Isles, the burial record is rich in relation to other types of site, and so had formed a key, if not dominant, role in writing about the Bronze Age. The burial record is on the whole in keeping with types and traditions from the rest of British Isles, especially northern uplands, with some exceptions such as large reusable cists, and corbelled structures.

Beaker burials occur in pits and cists, with some of the earliest examples in Britain, for example Sorisdale on Coll (2.2 above; Ashmore 1996). As has been noted above, there is great regional diversity in the occurrence of Beaker burials, with earliest Beakers being numerous in North-East Scotland, and in the Hebrides with pottery occurring in graves and in domestic contexts.

Complexity of monuments and longevity of use characterises varying types of Early Bronze Age burials. At Broomend of Crichton, Aberdeenshire, the construction of a small Class 2 henge around a Beaker shaft grave was but the latest in a series of monuments constructed perhaps either to high-ranking individuals or esteemed ancestors, the others including a Beaker cist cemetery, a recumbent stone circle and an avenue of standing stones (Bradley 2011). Large cists (e.g. Sandfield, Orkney; Mill Road, Linlithgow) some of which were constructed in a way as to be re-enterable can contain multiple burials, show re-use, and sometimes a mix of

inhumation and cremated remains. The example from Sandfield (Dalland 1999) was first used c.2500BC and continued to have burials added until the later Bronze Age.

Throughout the Early Bronze Age 'rich' individual burials were interred, with men, women and children being buried with weapons and jewelry (above), in cists or pits, sometimes covered in large cairns as epitomized in Kilmartin Glen, and sometimes inserted into earlier monuments such as chambered tombs (e.g. Isbister, Orkney); These 'rich' burials were more numerous in the North-East, South-West and parts of East Scotland, and almost absent in some places – North-West, and Northern Isles. In common with the rest of UK, cremation became much more common than inhumation during this period.

Cists were utilised more frequently through the Bronze Age than pits - often called 'short cists' usually a term to describe burials not obviously marked by cairn or barrow. Burials in cists and pits were often not covered by monuments but were inserted into natural knolls or earlier monuments. Cemeteries of both inhumations and/or cremations were sometimes enclosed by ditches, banks or ring cairns, and were in other instances not enclosed at all.

Cairns are a more frequent form of burial monument in Scotland than barrows – this almost certainly related to availability of stone in comparison to soil. Cairns were occurred as single monuments or in groups (e.g. Archan and Claggan Argyll). Clava cairns have a very particular form of wide ring cairn, and kerb cairns are a distinct Scottish type, found mainly in Argyll and Perthshire (see above). Ring cairns usually containing or surrounded by pits containing cremations (eg Portlethen, Aberdeenshire; Cloburn Quarry, Lanarkshire) are also found – and both kerb and ring cairns cover a broad period from earlier into middle Bronze Age.

Corbelled burial structures occur that may be distinct to (west) Scotland (e.g. Rosinish, Benbecula).

Barrows although less common than cairns, can vary from single monuments to large cemeteries and, as with cairns, individual barrows often associated with many burials (e.g. Barns Farm, Dagety, Fife; Linga Field, Orkney, Knowes of Trotty, Orkney). Examples of very large and complex burial mounds comparable with those in southern and middle England have been excavated, such as North Mains, Perthshire where a line of posts and fences created bays which were filled by turves and topsoil to form a large bank which was covered in turn by a mound which had two inhumations with food vessels and eight cremations set into it (Ashmore 1996).

A wider range of mortuary rites are apparent than those that resulted in 'formal burials', and it is perhaps increasingly diverse mortuary practices that cause the burials to become less common though the later part of the Bronze Age. The finding of mummified remains at Cladh Hallan is instructive in alerting us to a form of mortuary practice that was hitherto unknown, and which may often leave little trace. In addition, the Cladh Hallan burials were located within the houses; where preservation levels are equally good and large enough areas are examined such as other parts of the Western Isles and the Links of Noltland, Orkney inhumation and cremation burials have been found in close proximity to houses and date to the earlier Bronze Age – indicating that burials of various forms can have been situated within or in close proximity to dwellings throughout the Bronze Age.

As found in other parts of UK and Ireland, bodies would also have been interred in bogs and other wet places; the process of arresting decay to mummify the bodies found at Cladh Hallan appears to have been affected through putting the bodies in a bog for a period of time. The human remains found at The

Sculpter's Cave, Covesea (above) are indicative of other forms of mortuary practices wherein display of human remains, and the use of human remains in ritual alongside a range of other materials and artefacts, is apparent.

Funerary rites

The same generalisations have been made for Scotland as for the UK regarding Bronze Age burials: that Neolithic 'collective' rites were succeeded by inhumation burial of individuals in the early Bronze Age, to be replaced by cremation as a rite, grouped in cemeteries in the later Bronze Age. There was, however, considerable regional and chronological diversity in mortuary practices.

Cremation in Scotland, as in the rest of UK, was widely practised. Cremation is evident during the Neolithic (e.g. in Quanterness tomb Orkney) but has, in the past, been overlooked, and conversely inhumation could have been quite widely practised throughout during the Bronze Age - so the dichotomy between the two is overstated. For example, the inhumation and cremation burials at Cnip, Uig, Isle of Lewis, appear to be roughly contemporary and were both deposited in the mid second millennium BC (Dunwell *et al.* 1995). Survival affects the visibility of inhumations, as burials often disappeared in acid soil conditions, but instances of inhumations appear in cists and pits, and in the middle and later Bronze Age, can be stratigraphically above cremation burials. Recent discoveries in the Western Isles and the Northern Isles have revealed inhumation burials from the earlier Bronze Age. At the Links of Noltland, Orkney a cemetery of 15-16 burials was discovered. If conditions of preservation had not been so favourable only evidence of cremation, and not inhumation, would have survived.

'Individual' burial is rarer than was thought previously; large cists can be re-entered and re-used over long periods of time (e.g. Sandfield, Orkney) and contain a variety of individuals, cremated and inhumed, and

cairns and barrows (and pyres) are frequently multiple - as increasingly detailed analysis is revealing. In some cases, 'token' cremation burials and partial inhumations (suggesting either the deposition of only part of the body or the later removal of pieces of bone from the mortuary context) suggest very different concepts of the body and the self to those prevalent today. Analysis undertaken in the past few decades is also revealing that animals are often buried too - Gavin MacGregor (2003) has postulated a predominance of pigs associated with inhumations and sheep with cremation. Thus, although rich single burials are known, perhaps suggesting the appearance of an elite, this is unlikely to have been the case in every region or during all periods of the Bronze Age. Most Scottish Bronze Age burials comprise small deposits of burnt bone without grave goods suggesting that the expression of personal status was not always a major concern and that other aspects of social identity may have been equally important.

Burial Technology

Both inhumation and cremation are forms of burial technology; both serve to transform the body from one state to another, by the media of earth in the former, and of fire in the latter. Cremation is a rite which is more immediate, more visible, and over which the technologists has the most control, and moreover cremation may have been considered the more effective in completely reducing the body and eliminating polluting elements.

Inhumation and cremation also both produce remains which are fragmented or partial, and which can subsequently be subjected to further, secondary, rites, and/or deposited in a range of different contexts and places. In the Bronze Age, it would appear that inhumation and cremation burial rites were both primary burial rites - although in the case of cremation the stages of the rite could be protracted. That is to say that inhumations were interred and not subsequently moved - unless to be pushed to the side if a cist was

re-entered – and that cremation was undertaken on fleshed bodies (rather than bodies which had been interred for a period of time before cremation took place). There are significant differences though in the way inhumations were deposited usually whole and complete, whereas deposits of cremated bones rarely comprise the expected weight of a whole person – and are thus often referred to as ‘token’ deposits.

Interpretation of the findings from the Orkney barrows sites indicates, through the inversion of materials, that properties were assigned to substances and materials, and the manner in which they are categorised and ordered speaks of a close relationship of people with the land, perhaps within which land was inalienable. The construction of the burials and the burial monuments can be seen as a re-ordering of the world to restore ontological security against the chaos that death can bring. Moreover, cremation can be viewed as part of the cycle of reproduction, and the particular configuration and use of the land in the barrow ties this practice into the resource of the land, and is indicative of an indissoluble link between people and land. In the context of the Bronze Age in Orkney, cremation can be seen as a technology which transforms one thing into another, and thereby creates new things. The practice of cremation is about regeneration and a strategy for continued

fertility, cremation produces a series of substances – including cremated human bone – with powerful generative properties. The strategic deployment of human remains in the context of barrow cemeteries could be seen as a strategy for continued fertility and reproduction of society (Downes 2009).

As has been detailed (above) there is a great deal of variety in the forms of burials and burial monuments, and variety also in the types of treatment of the dead and funerary rites (as well as obvious changes through the period of the Bronze Age and regional variation). The deployment of cremated remains in barrow (and cairn) cemeteries in a strategy relating to fertility and regeneration may well have been just one strategy for the disposal of human remains, which could perhaps be contrasted with the insertion of burials into earlier monuments, and natural features; here a concern with claiming and stressing links to significant ancestors, or to sacred places, may have been paramount. It is apparent that there is a great deal of complexity to mortuary rites which cannot be interpreted simply as relating to one’s status or role in society – and in which contingency and ritual efficacy would have played important roles. The burial evidence from Scotland has enormous potential to answer some of these questions fundamental to our understanding of the Bronze Age.

Cremation Technology and Burial

Figure 66: Linga Field Orkney Mound 7, showing cremation features around barrow, and mortuary building in foreground, © Jane Downes

Detailed study of cremation technology and cremation burial has been undertaken in Orkney (under the auspices of the Orkney Barrows Project funded by Historic Scotland) at a range of barrow cemeteries, in particular Linga Field, using an approach aimed at investigating the spatial and temporal aspects of funerary rites rather than focussing simply on burial (Downes 2005; forthcoming). Cremation technology was found to be efficient; using predominantly boggy turves as fuel excessively high temperatures were achieved. Cremation pyres, identified through geophysical survey in advance of excavation, were set close to the edge of barrows, or on the side of existing barrows. Several examples of more than one person being burnt on the pyre at once were found. Very few burials contained a quantity of burnt bone that matched what would be expected in weight for a whole body, but instead it was found that other elements of the pyre remains were being buried – that is charred wood and ash, cramp (fuel ash slag), burnt turf and scorched earth - and that there was a careful order to how the burials were constructed. In the case of primary burials that were central to a barrow, it could be seen that cremated bone would be interred first, followed by cramp, followed by burnt turf and charcoal, followed by scorched earth. This order reversed the order that the remains appeared on the pyre upon completion of burning. This order could not be interpreted as being interred simply in the manner the pyre might have been dismantled, for elements were carefully sorted and cleaned before being placed in the burial cist or pit. Soil micromorphology was employed to investigate the barrows structure: the barrows were then constructed in the reverse order of the natural stratigraphy, with turves on the lowest layer, loose topsoil next, followed by clay subsoil, and sometimes capped with stone. Thus the burial and barrow comprise an unbroken inverted sequence in which the human remains comprise the lowest part, and in which the whole of the natural order is inverted. This careful and purposeful re-ordering of the world is seen as indicative of a cosmology or world view – detailed by Kristiansen and Larsson (2005), and expressed in the Nebra disc - in which the world is ranked vertically in three tiers – the

lower domain or underworld, a middle domain which humans and the living occupy, and an upper world of the sacred of gods and ancestors (Downes 2009; Downes and Thomas in press).

In the many instances of cremation burials added subsequently around the barrows, some of these replicated the same vertical ordering of the cist or pit content, whereas in others the various types of pyre debris were spread between two or three cists or pits – sometimes with cleaned human bone in one feature, cramp in another and charcoal and burnt turf, or even burnt soil in another. What is striking about these findings is that parts (or ‘tokens’) representative of the whole pyre, not just the individual person or people, are being interred. What was apparent also was that some cremated bone was left on the pyre – the amount selected for burial being a deliberate choice, and a rapid series of actions taken immediately after quenching the pyre, and not a factor of leaving the pyre to cool for some days and having the remains disperse through eg wind and rain before collection. The methodological implication of this work are clear: using geophysical survey over a wide area is key to putting a burial monument in its context – for example locating pyre sites, mortuary structures, paths and approaches to burial sites; use of soil micromorphology in combination with pollen and charred plant analysis was important in determining methods of pyre technology, and burial and monument construction. The excavation and analysis of the contents of a whole range of features, irrespective of whether they contained human remains or not, provides lessons for future approaches to the recording and analysis of burial sites.

Further research and analysis

Funerary and burial evidence from Scotland is a rich and varied archaeological resource, with some levels of preservation and unique types of burials that make the evidence outstanding in a UK context. This resource has been enhanced and increased in recent decades through development work, and more particularly through the HS funded ‘human remains call-off’ contract – and although this may have skewed distribution of finds (for eg through roads development and coastal erosion respectively), there is great potential for research into the material.

National Museums Scotland has begun to bring the material together into a Scottish human remains database; their ongoing programme of radiocarbon dating also continues to illuminate changing burial practices, although to date this has focused on burials with diagnostic forms of material culture. Stable isotope and DNA analysis have now become much cheaper and more reliable and have much to offer in terms of understanding patterns of human movement in the past, diet, kinship, etc. Such work needs to become a more routine element of mortuary analysis in order to build up a nation-wide picture. At present, for example,

only a small percentage of Scottish burials (predominantly dating to the Beaker period) have been subject to stable isotope analysis and it is therefore impossible to assess whether the patterns of movement and dietary preferences identified were the norm for the Scottish Bronze Age.

Some topics for further research:

- Reassessment of earlier finds of cremated remains (pre-1980s) – routine identification of number of individuals, sex, also check for animal bones, cut marks etc.
- C14 dating of a wider range of cremated human remains – will help to ascertain chronology for burials without gravegoods, or with artefacts that are difficult to date for example ‘flat rimmed ware’.
- Collation and analysis of information – better informed characterization, chronological resolution, and assessment of regional variability and traits
- Analysis of context and setting of various types of burials
- Study whole range of vessels in burials – including early BA urns,

- steatite urns, flat rimmed etc - assessment of sourcing of vessel material, use etc
- Detailed collation and reanalysis of cremation burial data – to cast light on changing ways of treating the body, cremation technologies, depositional practices, etc.
- Radiocarbon dating of burials/human remains from settlements/domestic contexts.
- Introduce stable isotope and DNA analysis as a routine element of mortuary analysis.

5.6 Research Recommendations

- Exploration of the nature of Bronze Age identity, societal structure and organisation, belief systems, and how these vary over time should be explored in a wider context of connections between Scandinavia and the Atlantic seabords . An awareness of the potential information that sites might reveal in terms of e.g. astronomy or belief, should be promoted.
- Assessment and collation of the burial record across Scotland and across the whole of the Bronze Age.
- The potential of archaeoastronomy and the importance of the heavens in the past should be explored in the widest possible variety of prehistoric contexts – settlements, funerary sites, ceremonial sites cairnfields and field layouts.
- Further work on the character and location of votive deposition should be encouraged, and any regional traditions investigated.
- Metalwork sites should be related to cropmark evidence and their palaeo-environmental context investigated.
- Cosmological elements of landscape should be considered, with proactive approaches to identifying sites (e.g. metal-detecting at fords). Craft activities, especially metalworking, and artefact deposition, should be researched in a wider context of house and landscape architecture, considering their place in cosmological understandings of the world.

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