PART 3

Research themes

Artefacts, monuments and cultural identity

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Identity, as an expression of human behaviour, is central to the status and integrity of The Heart of Neolithic Orkney WHS and this is articulated through the artefacts, of which one element comprises the monuments. For this reason 'Artefacts, Monuments and Cultural Identity' is seen as an overarching theme of central importance to this document. The importance of artefacts and identity is clearly evident in the nomination document (Historic Scotland 1998), which sees the shared artefact types and architectural features of this group of monuments as the product of a single coherent cultural tradition associated with a single people. For the most part this interpretation is based on long-standing artefact and architectural typologies. For instance, it is argued that '…the layout of the early houses at Skara Brae is reminiscent of the chamber plan at Maeshowe' and 'Barnhouse settlement in the buffer zone near Stenness and Maeshowe contains similar carving, and was built by people who used the same kind of pottery and other artefacts as those at the earliest excavated village at Skara Brae' (*ibid*, 7). This might suggest that we know a great deal about these areas, or at least that our framework of knowledge is well established and all that is required is the identification of further empirical research areas, but it is not so.

As in all areas of archaeological enquiry the study of artefacts and cultural identity is far from static so that this research agenda cannot merely advocate the ongoing collection and taxonomic classification of artefacts within established typologies. Indeed, the problems created by a simple taxonomic approach, which treats objects as isolated categories and extracts them from their physical contexts, life histories and relationships with each other, need to be explored and overcome. All new projects require the critical examination of existing categories and the assumptions associated with them, eg culture and identity, ritual and domestic, Grooved Ware and Unstan Ware pottery (Fig 60).

60. Grooved Ware pottery from Stenness

The static objectification of artefacts and monuments can best be avoided by adopting a biographical, or cognitive, approach. Objects, like people, have social lives, they relate to other objects and these relationships change as they move through both time and space. Any study should include research on these relationships: on manufacture, durability, refashioning over time and ultimate deposition; and on the social practices in which they are embedded (see Appadurai 1986; Ingold 2000; Jones, A 1997; Jones, S 1997; Mackenzie 1991).

The landscape within which the artefacts and monuments of the WHS exist provides not only an essential framing device within which to study their complex life histories but it may also be one of the main driving forces behind their creation. In this respect, the experiential landscape is of equal importance to the physical. The natural world of the past - terrestrial, celestial and maritime - was observed and experienced in many different ways and for many different reasons, just like the world of today: the eye of the farmer may perceive a fertile agricultural landscape where the eye of the tourist perceives a picturesque photograph to show the neighbours. It is important to recognise this and take account of the ways in which landscape change through time has been articulated, recorded and interpreted, for this has played an important rôle in establishing and perpetuating the cultural identities of the societies with whom we are concerned.

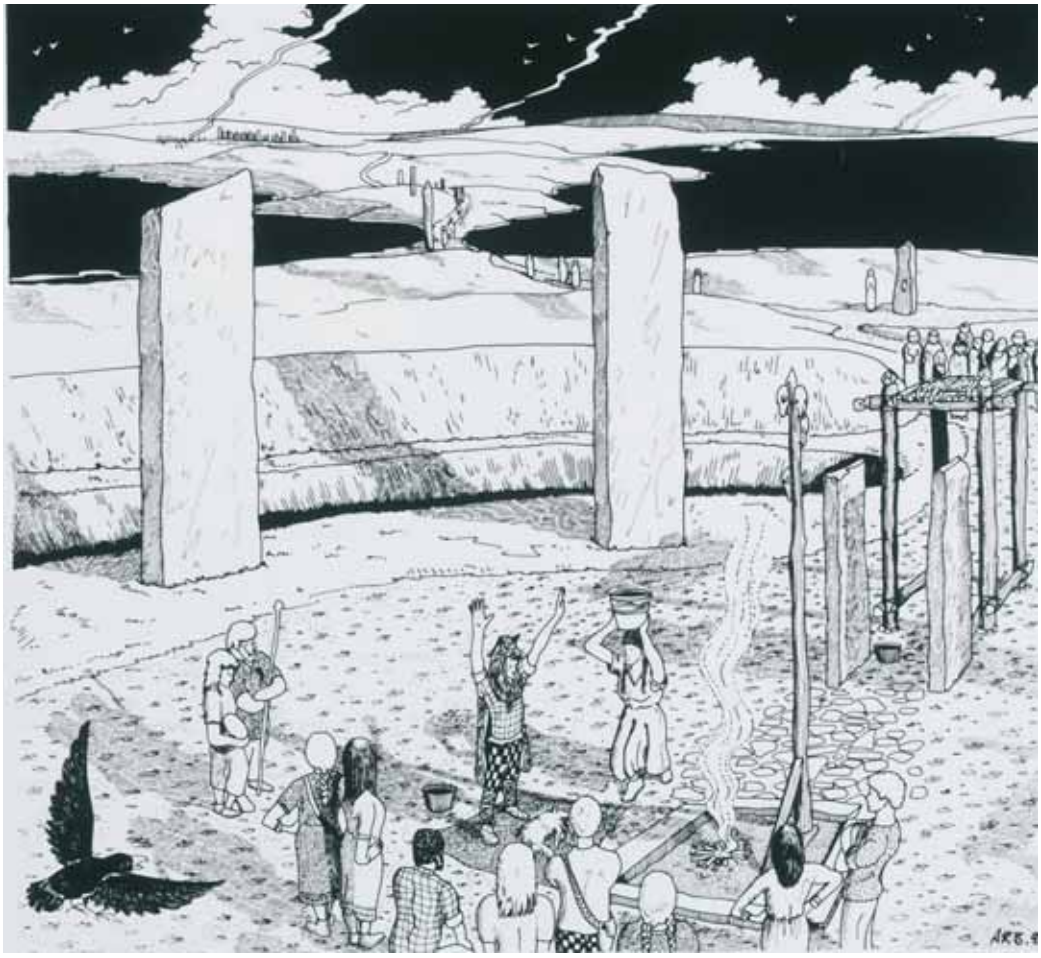
To do this involves the conception of landscape as a tapestry or woven fabric (see Ingold 2000) into which artefacts, monuments, people and resources are interwoven. Importantly, this tapestry is never static as human (and natural) activity ensures that components are constantly reworked or 'darned' over time.

Taking these overarching arguments as a starting point, four specific themes of research (below) have been identified which draw together information on the nature of the materials, their changing place in society both past and present, and their potential for adding to present knowledge of the WHS. The remit for the research covers both the WHS and related sites as well as artefacts in their broader spatial and temporal contexts. In this way specific research projects can be placed within broader regional and comparative frameworks in order to provide the WHS with meaning in the wider world. These themes crosscut many of the traditional specialisations into which the study of the past has been divided, such as artefact analysis, oral history, or monument typology. Such divisions are increasingly found to pose problems for the construction of archaeological interpretation. At this point it is important to remember that, as with the definition of landscape, there is no universal archaeological 'truth': new studies and new work on old studies will constantly come up with individual interpretations. This is a factor that must be taken into account in the presentation and management of the WHS (discussed above, Part 1).

The materialisation of memory and identity

This theme focuses on the artefacts and monuments associated with the WHS and its buffer zones, it considers their biographies and their subsequent rôles in the production of memory and identity in the past. Although the temptation is to stress the Neolithic, this research theme encompasses the entire social lives of these artefacts and monuments (ie across all periods, in order to examine the ways in which they are reconceptualised, reused and refashioned).

This research theme can be divided between artefacts and monuments. It considers their production as well as their life-histories. Artefacts are traditionally regarded as the portable elements of life and this theme is interested in circulation and movement, as well as deposition, in order to explore their rôle in the creation of relationships and identities. Monuments, on the other hand, are less mobile, though they can be changed in



61. Artist's reconstruction of a ceremony at the Stones of Stenness. This was just one phase in the monument's use
Drawing by Alan Brady, © Crown Copyright reproduced courtesy of Historic Scotland.

structure and design. As such, it is the durability of the monuments, their various architectural forms and their changing rôles, that are of concern in order to consider their place in the creation of memory, tradition and identity.

Extensive research has been carried out on Orcadian monuments and artefacts throughout the 20th century (eg Renfrew 1979; Childe 1930; MacSween 1992), but very little of this has focused specifically on the social lives of artefacts and monuments and their rôle in the production of memory and identity. A number of studies of this kind have emerged over the last few years (see Hingley 1999; Jones, A 2002; Richards 1993a; 1996a; 2004), but for the most part it concentrates almost entirely on the Neolithic which, as we have seen, does not fully explain the WHS as we see it today and it is very uneven in the facets covered. In artefact studies, this kind of research often involves the application of specialised techniques such as petrological analysis and residue analysis, which have been carried out on assemblages from some sites but not others.

Currently, within the WHS this theme of research has centred on the late Neolithic period and has been restricted to ceramic analysis and social practices within the Barnhouse village. This study, though limited, gives a good idea of the potential awaiting, should research like this be expanded to cover other artefact types, more sites and different periods. At Barnhouse, aspects of production can be linked with particular households. For instance, the procurement of materials for inclusion within the ceramics of individual households can be shown to have taken place from separate locations within the landscape and this ties in to the basic residential structure of the village. Interestingly, this contrasts with the decoration of the vessels as individual decorative schemes tend towards an overall village or communal identity (Jones, A 2002; Richards 2004).

Given the wealth of archaeological evidence in Orkney, which comprises both habitations and monuments ranging chronologically from the Neolithic to the present day, there is a place for period specific research, but it would be of more value as part of a larger programme of research designed to examine the changing nature of social identity. One important theme, for example, would consider the ways in which material culture has been used in different ways and in different contexts in order to create a variety of identities and, indeed, how these identities have articulated together to form groups (Fig 61). In this way, the changing nature of social identities in the past can be considered. For instance, one starting point is provided by the presence of a broch, Big Howe, adjacent to the Stones of Stenness. This immediately raises questions of social identity relating to the builders and later users of Big Howe, and their own use of the past around them.

This perspective, transcending period boundaries, enables an exploration of the ways in which sites, monuments and landscapes are reconceptualised, reused and refashioned in the dynamic production of identities and cosmologies.

The social construction and constitution of monuments: questions of architecture, place, the human body and materiality

This research theme moves on from the above to focus attention onto the people who used and experienced these artefacts and monuments. It looks at the social use and human experience of monuments, but it also places more emphasis onto the actions and context of construction. It aims to get away from the old idea that construction comprises simply a mechanism by which to erect a monument. It suggests that we should regard it more as an ongoing 'project' and one which, importantly, never quite leads to the final form that we recognise today. A good example of this lies in John Barrett's work at Avebury (1994). Consequently, this theme draws in people, places and things beyond the WHS monuments. The inclusion of monumental construction introduces an understanding of 'landscape' that must appreciate the full significance of the ways in which the people in the past engaged with the physical world that they inhabited. In particular, the engagement of the people with the resources is important for these comprised materials encountered in different places, at different times and under different social conditions that were brought together to create the 'monument'. Only through a close understanding of their world could people create the architecture and material components of the monuments. For the archaeologist, this appreciation demands a more critical view of the nature of the monuments (and indeed of all areas of architecture) in terms of how they were constructed, what materials were employed and the on-going social significance of the act of construction.

Regardless of the intentions of the builders, once architecture comes into being its social meanings are open to re-interpretation and negotiation through social practice and human experience. Here the rôle of architecture, as a planned physical entity that embodies both cultural concepts of order and a mechanism of control, becomes important because thus it can restrict and control human movement so that the human experience becomes structured in specific ways. Herein lies a profound conceptual difference between those monuments that are built to be used and viewed on completion and those that are used and viewed during a prolonged period of construction. At Maeshowe, for instance, we see a concern with the final form of the site and with the human experience of that form. It appears that an enclosing ditch was central to the design of Maeshowe, but what we see is in fact the careful sculpting of natural features so that a cut 'ditch' is only present on the western, southern and eastern portions of its supposed circuit. In other words, the final appearance of the site was of more importance than the act of cutting the 'ditch'. Equally, there is a dramatic contrast between 'inside' and 'outside' at

Maeshowe, revealed by the impressive masonry of the interior when contrasted with the unprepossessing exterior mound (Figs 2 and 15). These architectural devices indicate a monument that was built with great attention to the visual imagery of the site. In this light the different nature of the monuments sited within the WHS and its buffer zones requires careful consideration and we can see that the concept of 'monument' as applied to the WHS may be extremely problematic.

Studies like this drastically alter our understanding of the ways in which people engaged with the various monuments during the Neolithic, but it appears that such distinctions blur through prehistory. Once the monuments were constructed, later generations would engage ever differently with the ever changing architecture of the landscape. The main point to draw here is the fluidity of human experience within the monumental landscape of the Stenness-Brodgar promontories. As monuments came into being and were altered, standing stones were erected and demolished, cist graves were dug and covered over, and burial mounds were constructed, so the landscape and people's lives within it changed. This is important for memory and landscape: some buildings and monuments were actually built from the materials of others, while others were built from specific materials only available in distant places. The choice of material was obviously of vital significance and some were chosen and brought over long distances with considerable effort. Today we, the managers and researchers of this place, perceive this striking area as a palimpsest of sites to be revealed through archaeological activity, but, to the generations inhabiting Orkney in the 2nd and 3rd millennia BC, this was a place of addition and change, of memories and remembering. This is a theme that has repercussions for today and it is discussed in more detail in the next theme.

As these different understandings of 'place' and past come into existence so the human engagement with the landscape, as articulated through social practices, must be changed accordingly. Here architectural representation provides a focus of further study in order to look more deeply at the use and later lives of the monuments. This must include approaches to bodily experience: how was the form of a monument designed to control its use? How could this be manipulated and altered? In order to be successful in providing insight to any built monument, a clear and detailed knowledge of architecture is necessary. Artefact studies are also important here for they have a rôle to play as evidence of the ways in which people have moved through and treated a landscape or site. Of course, this work is not restricted to individual sites but should, in the long run, embrace the entire landscape. Rather than limiting such studies of human experience to single chronological periods (eg Richards 1993b), a more rewarding line of enquiry would involve comparing and contrasting people's encounters with the built environment over longer periods of time.

Without doubt this small part of Mainland Orkney took on huge significance at least during the 3rd millennium BC, as well as, perhaps, at later times. This directs attention to the earlier occupation of this area and how the landscape was conceived at the time when construction began. What made these places so special that they were transformed through a process of spectacular monumentalization? Why was this location chosen? How were they used before the construction of the physical remains that we see today? These must be key questions for any full understanding of the WHS. Under this scrutiny it is clear that our knowledge of the early Neolithic is as thin as that of later prehistoric periods in this region.

The past in the present: the rôle of monuments in the production of contemporary narratives, memories and cultural practices

This theme shifts the focus of attention to more recent times, to look at the rôle of the WHS in Orkney today. The relationship

between archaeological heritage and discourses of authenticity, identity and place in modern societies has become an important field of research. Empirical and historiographical studies have provided new insights into the relationship between archaeology and national identity in particular countries (Díaz-Andreu and Champion (eds) 1996; James, S 1999; Kohl and Fawcett (eds) 1995; Meskell (ed) 1998). However, understandings of how specific archaeological remains are involved in modern societies in a more general way, for example in the construction of multiple identities and in the reinforcement of interests, have received less attention (although see Bender 1998; Herzfeld 1991). This is, nevertheless, an important theme that involves both archaeological enquiry and heritage management. Such issues are particularly pertinent in relation to the WHS given its importance to the local communities and the ways in which the assignation of a heritage status like this can transform the ways in which people experience and engage with the monuments. Existing research relating directly or indirectly to the WHS consists of heritage management, tourist and consumer surveys usually involving questionnaires or focus groups (see Historic Scotland 2001 for discussion of the results). To date this research has provided very basic quantitative data that often focuses on the visitor to the islands rather than on the local resident. Recent surveys have, for instance, been concerned with the proportion of tourists that are attracted to Orkney for its archaeological heritage, and the relative attractions of Maeshowe, Skara Brae, Stones of Stenness and Ring of Brodgar. However, there is considerable scope for more detailed anthropological and sociological research into the relationship between archaeological materials, practice and knowledge on the one hand and the narratives, memories and cultural practices of both locals and visitors on the other.

This information is important and both interview-based and ethnographic research can provide a more fine-grained understanding of people's engagement with the WHS, and related sites and institutions (including museums). At present little research of this type has been carried out in Orkney (but see McClanahan 2004). Ethnographic work has taken place in Orkney (eg Forsythe 1980), but few of the studies focus on the archaeological monuments and their place in contemporary society. Existing studies concerning archaeological remains and archaeological practice have been small in scale though their results show great promise, such as the interview study concerning local attitudes towards the excavations at Stonehall and Crossiecrown (Jones and McClanahan 2000). In this respect, it is, of course, important to include the preconceptions and expectations of those outwith Orkney who, while not tourists *per se*, have played a major rôle in the designation and management of The Heart of Neolithic Orkney as a WHS.

This theme is important for there are large gaps in our knowledge both as to the ways in which archaeological monuments figure in people's personal narratives and memories and as to how they are embedded in people's daily practices and perceptions of landscape. Research such as this is vital if we are to understand the rôle played by the archaeological monuments in the construction of identities, whether personal, local, regional or national. In this respect the work initiated by McClanahan is of particular interest.

Another key area of research related to this theme lies not just in the monuments themselves but in the work done on them. Whether it be research, management or presentation of the archaeological heritage, the work undertaken by the various institutions impacts upon the local community, but we have, as yet, a very hazy idea as to the nature of this impact. Research on this would contribute to an understanding of local values and interests and fulfil UNESCO's expectation that development be guided by policies that respect the cultural life of the community. More specifically, it would provide a body

62. The Ring of Brodgar c1780

of knowledge that can inform the development of sensitive and effective management strategies for the WHS. For, just as it is impossible to manage a site unless we understand it, it is also impossible to manage the relations that people have with sites (including the limitation of potentially damaging activities) unless we understand the values and actions of those people.

Representing monuments: the place of archaeological materials in folklore, literature, map-making, art and other forms of visual depiction

The final theme moves away from people to consider once more the archaeological artefacts and memory. In this case the focus centres upon art and literature as the receptacles of tradition. The monumental scale and aesthetic and mystical qualities of the WHS monuments have had a powerful hold on the imagination and representation of the Orcadian landscape in visual/textual materials. These representations in turn influence people's sense of place and identity, objectifying their relations to the land and to archaeological remains within the landscape. There are obvious connections with the other themes in terms of the issues and subject matter which can be addressed, but this theme concerns research of a different nature, focussed upon texts and images rather than upon people. Substantial studies of Orcadian folklore have been carried out (eg Marwick, E W 1975; Muir, T 1999). However, few of these focus directly on folktales concerning or containing reference to the archaeology, or more specifically on the WHS (though see Marwick, E W 1976 for an exception). Similarly, there are, to date, no thematic studies which focus on the representation of Orcadian archaeology in literature: most studies of Orcadian literature focus on the work of specific authors. There has been much work on changing representations of landscape, but again few of these consider Orkney specifically, much less the representations of archaeology (Figs 62 and 63).

There is, therefore, great scope for research on the representation of archaeology in literature and the visual arts in Orkney, and on the ways in which changing ideologies have influenced our constructions of landscape, history and identity.

63. Ring of Brodgar, Painting by Stephen Seymour Clancy (2000)

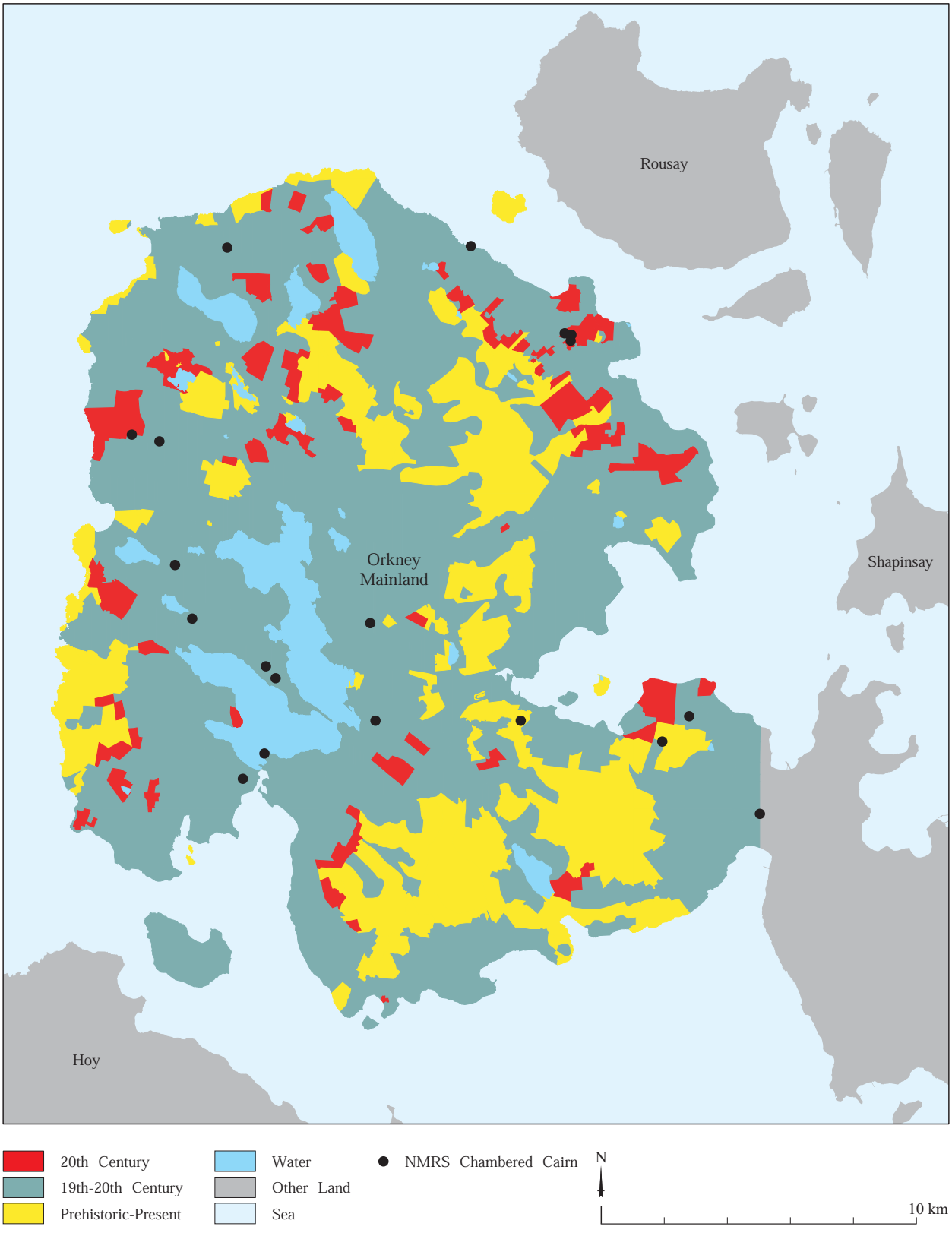
The formation and utilisation of the landscape

Ingrid Mainland, Ian A Simpson, Richard Tipping, Palaeoenvironment and Economy Group, and Formation Processes and Dating Group

During the last glaciation Orkney may have been part of a peninsula that stretched from Caithness to Shetland (Lambeck 1993; 1995). It is not entirely clear whether it was ice-covered at *c*20000-18000 BC or whether the glacial deposits, common for instance in the Finstown-Evie area, reflect an earlier glacial period. Since the onset of rapid deglaciation around 13000 BC, Orkney has been gradually inundated by the sea. This process may have been halted or reversed during the Loch Lomond re-advance, which ended around 9600 BC, and since then it has operated unevenly. It is, however, important to recognise that the islands were, in the late Devensian, hills on a larger landmass. Current orthodoxy is that Orkney was separated from the Scottish land mass between about 9500 and 7000 BC (Verhart 1995). Thereafter a continuing combination of erosion and inundation has led to the island pattern seen today.

From the end of the last glaciation there was a gap of at least 1500 years before humans first become detectable as potent forces in the landscape of Scotland. A general lack of evidence has meant that Orkney was thought to have been entered by and affected by humans even later, but this may well reflect the biases of modern scholarship (and this is now an important research issue).

The people who inhabited the world of the WHS did not live in isolation and the physical world around them was not itself static. The relationship between the two is complex and dynamic, but it is essential to understand it if we are to interpret fully the history of the WHS through the ages. The second overarching theme for research in the WHS thus comprises research into that physical world and its application in terms of human activity. These studies are of human-landscape interaction but the key is to focus on the dynamism of that relationship. The WHS occupies a multi-period agricultural landscape, emphasising the need to focus on long-term changes in land organisation and land management as well as on the transformations of monuments and sites, from the pre-monument site through to present-day conservation management



64. The broad brush mapping of the contemporary landscape and its historic components is a useful means of appreciating general patterns and processes. This map of West Mainland Orkney is derived from the period component of RCAHMS' Historic Landuse Assessment and highlights the predominately 19th- and 20th-century character of the Orkney landscape. Within this zone of the landscape, survival of upstanding earlier material is largely limited to discrete monuments such as the chambered cairns shown on the map, while the majority of sites have little to show on the ground surface. The areas identified in yellow on the map are those areas of rough grazing in which there may be the upstanding remains of sites dating from the Neolithic to the present

activity. Critical to all formation process research is comprehensive application of absolute dating methods.

Although there is now a body of data relating to the understanding and management of the contemporary landscape, ie Landscape Character Assessment (Land Use Consultants 1998) and Historic Landuse Assessment (Fig 64; Dyson Bruce *et al* 1999), the development and character of the Orcadian archaeological or historic landscape is poorly understood, and the establishment of baseline levels of understanding of archaeological (ie past) and contemporary patterns and processes must be a priority.

Palaeoenvironmental data plays a key rôle in elucidating the nature of the landscape and environment within which Skara Brae, Maeshowe, the Stones of Stenness and the Ring of Brodgar were situated and operated, and it provides evidence for long-term environmental change in response to climatic and anthropogenic factors within the WHS and its buffer zones, as well as in the context of the wider Orcadian landscape (Fig 65). The mechanisms that add, remove or transform materials within landscapes and archaeological sites include both natural and anthropogenic processes. In order to discriminate between the two we need to understand the environmental and cultural drivers of landscape formation processes including:

- climate change;
- processes of glaciation and deglaciation;
- sea-level change and the history of Orkney as an archipelago;
- changing water levels and conditions in the Loch of Stenness and the Loch of Harray (both part of the WHS IBZ);
- human activity and the interplay between natural and anthropogenic processes.

65. Taking a core to obtain palaeo-environmental material

The related palaeoeconomic research gives us a valuable insight into the plant and animal resources available to and exploited by human populations living within Orkney and the various economic strategies employed by these peoples both through time and spatially, between different settlements: for example, pastoral vs. arable farming; agricultural intensification; resource diversification and other buffering strategies for dealing with environmental and/or social marginality. Moreover, in addition to elucidating past human diet and subsistence, bioarchaeological evidence is crucial for exploring the social significance of animals and plants in society and how this was articulated.

To fully understand past environments and economies within the specific context of the WHS, it is important that research focuses on palaeoenvironmental and palaeoeconomic trends within the wider context of Orcadian archaeology, both spatially and temporally.

Climate change and Holocene environments

The major impetus in research into climatic reconstruction has come in recent years from:

1. the recognition that Holocene climate change has been abrupt and frequent;
2. the identification within the North Atlantic region of major, repeated and abrupt climatic events and observed

terrestrial environmental repercussions;
3. the suggestion that these events produced impacts on resource availability, access and the viability of human coastal and other communities;
4. a concern to quantify the cyclicity and rates of climate change in order to predict likely events to be faced in the near future;
5. the need to define past climates that might serve as analogues for the future.

In Scotland research has been concentrated in the Western Isles where the scale of past impacts on previous human communities is now better understood. Recently, however, the research interests of many archaeologists have diverged from those of the palaeo-climatologists towards an exploration of internal, societal-induced change, with hostility to arguments that appeared overtly environmentally determinist. These linkages are, however, useful and need to be re-established.

The most exciting data-set relating to climate change comes from North Atlantic ocean sediments, where Bond, G *et al* (1997) suggested that severe disruptions to ocean circulation have occurred throughout the Holocene at regular intervals of around 1500 years. These major impacts occurred at *c*11100, 10300, 9400, 8100, 5900, 4200, 2800 and 1400 cal BP, though other workers have found more frequent oscillations in North Atlantic circulation patterns (Bianchi and McCave 1999; Chapman and Shackleton 2000). These fluctuations are likely to have impacted directly on sea temperature. Bond, G *et al* (1997) suggest that sea-surface temperatures may have dropped by around 2˚C during each event. Early Holocene (11100-8100 cal BP) events may have differed from later Holocene events (Stager and Mayewski 1997), and the event at *c*8200-8000 (8100) cal BP is known to be exceptionally severe, around 6±2˚C in central Greenland (Alley *et al* 1997). Other effects that have been modelled but not demonstrated include marked changes in the amount and intensity of precipitation as well as increased storminess.

Some of these events, but not all, are identified in Greenland ice core studies (O'Brien *et al* 1995), but what effect did they have in Orkney? Some have been recorded in marine sediments around Orkney (Klitgaard-Kristensen *et al* 1998; Kroon *et al* 2000) and certainly the biggest impact, at *c*8100 cal BP, is known to have disturbed vegetation and lake environments elsewhere in Europe (von Graffenstein 1998). Very recently, the majority of these events have been identified within the terrestrial lake sediment record across northern Scotland (Tisdall 2000), but more detailed correlative records are needed to quantify the impact at a local, Orcadian, level.

We are only just beginning to understand the scale of these events, but Bond, G *et al*'s (1997) dates coincide with many previously recorded episodes of significant stress on human populations in northern Scotland. The most recently observed discontinuities relevant to the WHS programme from western Scotland are those suggested by Mithen (2000) at *c*8200 cal BP and Schulting (1998) and Richards and Hedges (1999) at *c*5900 cal BP. These changes may well have led to resource crises, mediated through abrupt shifts in coastal, nearshore and/or marine resources driven directly by North Atlantic ocean change. The impacts need not always have been disadvantageous to human communities: the major climatic deterioration at *c*4200 cal BP appears to have coincided with colonisation of upland areas (Tipping 1994), perhaps through reductions in woodland cover and expansion of montane grazed grasslands and heath (Davies *et al* forth).

We do not know whether each mid-Holocene climatic event generated a human response, though it has been suggested that this was likely given their probable scale (Rahmstorf 1995). Our understanding of the broad-scale impacts on human populations are, at present, limited because they can only be inferred through correlation between different regions and from different parts of the

climate system. It is likely, however, that externally applied forces, such as a climatic shift, act as prompts in the teaching and rehearsal of adaptive strategies, so that frequent stresses lead to the reinforcement of new strategies. This is an important connection between people and climate in which ideas of 'social memory' play a vital rôle (McIntosh *et al* 2000).

Climate change involves the complex interaction of many processes and in Orkney the nature and relative isolation of the archipelago may have magnified its effects. Changing precipitation, air temperature and marine conditions all worked together to determine both resource availability and human access. Travel by sea and access to marine resources were both vulnerable to changing storm frequency and intensity. Abrupt climate change is likely to have driven the rates of sea-level change in the past, much as it does today.

With regard to vegetation, earlier palaeoenvironmental research in Orkney has established broad-scale post-glacial vegetation sequences for the area. By the late Neolithic (late 4th/3rd millennium BC) the scrub birch-hazel woodland, which had developed in the 9th/8th millennium BC, had given way to a largely grass and heathland vegetation, comparable to present day Orkney (Davidson and Jones, R L 1985; Keatinge and Dickson 1979). Recent research, though broadly confirming these trends, has emphasised a greater degree of local variation in vegetation cover (Bunting 1994) as well as indicating that Orcadian woodland may have been more species rich than previously envisaged (Dickson 2000).

On- and off- site palynological and other palaeoenvironmental analyses allow invaluable insight into long-term processes of vegetation change and landscape development at both a regional and local scale. Moreover, in the absence of detailed archaeological evidence, off-site palaeoenvironmental data currently provides the only means to quantify and date the presence and impact of the first human inhabitants of Orkney (Edwards and Whittington 1997). Anthropogenic modification of the environment, including the kinds of grazing and arable practices discussed above, is more likely to be detected at the local rather than the regional scale, particularly if sample sites are located in proximity to known settlements or structures and are carefully placed across the landscape. A key priority for future palaeoenvironmental research within Orkney must, therefore, be increased sampling both on- and off-site, including buried soils as well as peat and loch sediments. In this way the reconstruction of local vegetation development can be integrated with the excavation of settlement sites and the interpretation of off-site structures, such as field systems and boundaries.

A further issue is the identification of sea-level change, a critical element in understanding landscape development and use. Palaeoenvironmental analysis of inter-tidal peat deposits is an important source of evidence for marine inundation, as was demonstrated by Keatinge and Dickson (1979) at the Bay of Skaill. At least 15 further inter-tidal peat deposits are known in Orkney; analyses of these would allow insight into both the timing and impact of sea-level change at various locations throughout the island group. Sediments from the Stenness and Harray lochs may also prove informative. In all cases, research should attempt to make full use of the wide range of palaeoenvironmental proxies; although there has been some use of molluscan evidence (eg Evans 1977), other sources such as insects, diatoms, ostracods or even avian and mammalian evidence have been under-utilised. In this respect the application of research on diatoms to the development of a curve for sea-level change in Shetland (Dawson and Smith 1997) is exciting and bears great potential for development in Orkney.

Chronologically the data on climate change and the development of the Orkney landscape is still poor. The record of vegetation change in the few Orkney

pollen columns is generally not well tied into ^{14}C dates. As with dates for monuments, many existing ^{14}C ages were measured when techniques were less refined so that their usefulness is limited, for instance the ten dates from Keatinge and Dickson's study in 1979. Better chronologies from ^{14}C and tephra are required. Bunting suggests, for instance (Bennett *et al* 1997) that the vegetation on the hills of West Mainland, Orkney (predominantly *Betula-Corylus* with *Salix*, *Alnus*, *Quercus* and *Pinus*), shows evidence of modification by hunter-gatherers after about 8000 BP. She argues that this was compounded in the Neolithic to the extent that woodland cover was finally lost around 5000 BP. More, and stronger, dating sequences are needed, however, to demonstrate the scale of such changes: did they cover wide areas, or were they of mostly local impact?

Clearly, there is great scope for further work on palaeoenvironmental issues in relation to the WHS. We have only just begun to grasp the scale of development and change within the Orkney landscape and the complex relationships between this and the local communities through time. Many areas could be targeted for research and some are identified above. One change to existing directions might lie in increased work below present water levels where improved technologies are reinforced by an expanded awareness of surviving deposits. In particular, the Bay of Skaill offers great potential in the form of suitable sediments in close proximity to known archaeology, as do the Lochs of Stenness and Harray. On land, the application and refinement of work which can then fit into known wider interpretations will continue to provide a sound basis for our understanding of change within the human communities.

Biogeography: migration, colonisation and extinction

Archaeological research into the biogeography of island communities allows unparalled insight into the dynamics of migration, colonisation and extinction over long time scales and, moreover, may provide evidence for contacts, such as trading and exchange networks, between past societies as well as human population movements. Although recent research suggests that Orkney may have been joined by a land bridge to Scotland during the early Post-glacial (McCormick and

66. North Ronaldsay sheep. Studies into this ancient breed give important palaeoenvironmental information
Thomas Kent, © Orkney Archives.

Buckland 1997), the extent to which the colonisation of Orkney by its Holocene fauna was achieved naturally or represents deliberate or accidental introduction by humans remains unclear. Clutton-Brock (1979), for example, suggests that red deer are unlikely to have reached Orkney naturally and hence must reflect human introduction, while McCormick and Buckland (1997) indicate that this species may have been able cross over the land bridge prior to inundation. Interesting also in this context is the presence of pine martens at Pierowall Quarry, Westray (McCormick in Sharples 1984).

A further dimension is provided by the marine resources which are abundant in the archaeological middens. The history of the marine species is of interest in its own right, but it can also shed important light not only on diet and exploitation and, by inference, aspects of technology, but also on the predominant conditions and currents of the Orkney waters. As there are marine resources from a number of middens of differing dates, there is information to be gathered on environmental changes within the Orcadian seas from some 5000 years ago to the present.

It is generally accepted, however, that there was no indigenous domestication within Orkney and that the cattle, sheep and pig present on early farming sites reflect a 'Neolithic package' of introduced species (Fig 66). Noddle (1983) suggested a Scandinavian origin for the cattle and sheep on metrical grounds. Little further work has been undertaken to evaluate more fully the origins of the domestic, or indeed the wild, fauna represented on early Orcadian sites, despite the considerable potential of such research to assess the origins of the first farmers themselves, particularly given recent developments in biochemical analyses within archaeology (DNA, isotopes, trace elements, etc). Haynes *et al* (2001) have, for example, recently demonstrated how DNA analysis of the Orkney vole could potentially be used to explore human migration and colonisation as well as contacts between communities within island groups. Human and/or animal migration and colonisation is of interest in later periods also, the most obvious being the settlement of Orkney in the 1st millennium AD by peoples and perhaps also livestock of Scandinavian origin.

Of equal importance is the question of species extinction in Orkney, particularly for the larger mammals such as red deer and fox, but also for species with highly specific habitat requirements, such as birds. Long-term trends in local or regional extinction will provide useful insight, of interest to conservation biologists as well as archaeologists, into human and climatic impact on island ecosystems, including factors such as population pressure, intensification of farming, anthropogenic or climatically induced reduction of preferred habitat and changing attitudes to animals.

Agricultural landscapes, diet and subsistence

Archaeobotanical and archaeozoological analyses at settlement sites in Orkney have established the palaeoeconomic basis for Orcadian society from the Neolithic onwards, indicating reliance on a mixture of arable and pastoral subsistence farming augmented by (unusually frequent instances of) utilisation of a variety of wild resources (eg Clarke, D V and Sharples 1985; Ritchie, A 1983a; Davidson and Jones, R L 1985; Ballin Smith (ed) 1994; Rackham *et al* 1996). Nevertheless, it could be argued that, with a few exceptions (Barrett, J H 1995; Bond, J M 1995; Guttmann 2001), such research has in general done little more than establish the range of species cultivated or exploited. Moreover, it tends to emphasis continuity with the present or the recent past (eg Renfrew 2000; Rackham *et al* 1996) rather than attempt to explore how subsistence farming, social relationships with animals and other palaeoeconomic activities may have varied through time or between contemporary sites in response to social or economic forces either in Orkney or further afield.

67. Ard marks - traces of prehistoric agriculture at Tofts Ness, Sanday

This in part reflects the archaeological evidence available, which is often restricted to one or two settlement sites with large archaeofaunal or archaeobotanical assemblages per 'period'; in the Neolithic, for example, interpretation is currently mainly based on only one fully published site, Knap of Howar (Ritchie, A 1983a), due to inadequate publication of the work at Skara Brae and Links of Noltland, and to the lack of survival of bone at sites such as Barnhouse and Stonehall. However, the existence of large Neolithic bone assemblages in Orkney should be stressed as an invaluable resource which is unusual in a Scottish context.

The Orcadian middens contain not only terrestrial information but also bird bone and marine resources, both fish and shell fish. In this way, they have the potential to provide vital detail of wider aspects of the environment, human exploitation of that environment and, as information from different sites is added, of changes through time.

Agriculture, arable cultivation, the grazing of domestic animals and the collection/cultivation of fodder, is one of the primary factors behind human modification of the natural environment (Fig 67). Farming practices have been implicated in environmental change at various periods in Orcadian prehistory (Davidson and Jones, R L 1985; Whittle 1989; Dickson 2000). Yet, very little is known about the articulation of cultivation or grazing practices within the wider landscape in particular periods and how this may have changed over time: was early cereal cultivation, for example, restricted to small-scale intensive plots, as has been suggested elsewhere in the Neolithic (Barclay, G J 1997; Halstead 1989) and, if so, when and why did more extensive arable cultivation practices develop; how were grazing animals managed, intensively within enclosures or paddocks, or were more extensive grazing practices, such as transhumance or outfield systems, employed; indeed, at what point did the in-field, out-field system, evident in early historic periods, develop? Exploration of these issues requires an integration of on- and off-site environmental evidence for animal management (Bunting 1994; Mainland forth), cultivation and manuring practices (Hillman 1981; Bond, J M 1998; Simpson *et al* 1998a; 1998b) with structural evidence such as barns, byres and field enclosures.

Several phases of agricultural intensification of varying scales, including expansion or resource specialisation, have been indicated in the Northern Isles, in particular during the early 3rd/late 2nd millennium BC (Hunter 2000; Sharples 1992), the early 1st millennium AD (Bond, J M 1998; Simpson 1998) and the later 1st /early 2nd millennium AD (Barrett *et al* 2000b; Simpson 1997; 1994; 1993). Agricultural intensification and resource specialisation may arise from a variety of socio-economic factors, including population pressure, a response to marginal environments or environmental change, the development of hierarchal societies or of commercial economies.

Further research is needed to address how representative the economic trends identified in particular time periods are for Orkney in general, as well as within a wider archaeological context, and, moreover, to evaluate more fully what resource specialisation reflects within environments, like that of Orkney, which are marginal for arable agriculture (see, for example, the contrasting explanations given for high level of livestock infant mortality in the Northern and Western Isles by Halstead (1998), McCormick (1998) and Bigelow (1992)).

Insight into human diet has traditionally been gained through archaeozoological and archaeobotanical evidence. Recent developments in archaeological biochemistry, specifically isotopic analysis of human skeletal material and lipid analyses of ceramics and other artefacts, are, however, providing new and often more detailed insights into human dietary behaviour in the past (Dudd *et al* 1999; Richards and Hedges 1999). Barrett *et al* (2001) have recently used isotopic analysis to explore changing diet during the Viking colonisation of Orkney. Further such research within Orcadian archaeology, particularly if integrated with more conventional bioarchaeological sources, is likely to allow invaluable new evidence for past foodways, as well as more specific questions, such as the varying utilisation of dietary resources by different segments of past societies (eg Hastorf 1996).

Exchange circulation, status, identity and ritual activity

There is a growing recognition within archaeology that bioarchaeological data does not merely reflect human diet and subsistence or past environmental conditions, but that archaeobotanical and archaeozoological assemblages will often have been structured in response to a variety of non-economic values or activities, including social status and identity, ritual activities and socially-embedded exchange of animal and plant resources (Crabtree 1991; Marshall 1994; Grant, A 1991; Hill 1995; Campbell, E 2000). It is argued that insight into such processes can potentially be achieved through the identification of structured spatial patterning in animal or plant assemblages in terms of the representation of particular species, age groups or body parts within specific deposit types, areas of a settlement or between sites of differing function, as well as through associations between biological and artefactual evidence. Hill (1995), Grant, A (1991) and Campbell, E (2000) have demonstrated how such detailed taphonomic and contextual analyses can be used to elucidate ritual and symbolic attitudes to animals within the British Iron Age. Similar approaches to environmental evidence have been used to explore kinship relations (Zeder and Arter 1996), gender relations (Hastorf 1996), social status and ethnic identity (Crabtree 1991) in various archaeological contexts.

Very little attempt has been made to address such issues within Orcadian archaeology. In the Neolithic, environmental data has typically been used to infer palaeoeconomic activities, and in particular subsistence farming strategies, (Clarke, D V and Sharples 1985) unless derived from funerary and monumental contexts where ritual interpretations prevail (eg Renfrew 1979). Notable exceptions are Sharples (2000) and Jones, A (1998) who both explore the symbolic rôle of animals in Neolithic society through a consideration of faunal evidence from settlement and funerary contexts. In later prehistoric and early historic periods, where archaeological evidence is mainly derived from settlement sites, the reconstruction of subsistence farming practices is again emphasised (eg Ballin Smith (ed) 1994; Rackham *et al* 1996). Sharples (2000) and Jones, A (1998) have demonstrated the viability of non-economic analyses of bioarchaeological data within the context of Orcadian archaeology; arguably further research addressing such issues is required.