OBSERVATIONS OF SOCIAL CHANGE IN PREHISTORIC ORKNEY AND SHETLAND BASED ON A STUDY OF THE TYPES AND CONTEXT OF COARSE STONE ARTEFACTS

Patricia Ann Clarke

Submitted as full requirement for the degree of M. Litt., Department of Archaeology, University of Glasgow.

February 1995

ABSTRACT

This work is a synthesis of coarse stone artefacts from prehistoric sites in the Northern Isles with particular reference to those from the neolithic and bronze age periods. Information from several well-contexted and dated coarse stone assemblages is used to provide a summary of the many different types of artefact which occur with reference to their form, manufacture and use. Their contexts of deposition, both domestic and funerary, as well as the time-scales of use of these artefacts are then examined. This information is drawn together in discussion of the site activities and the nature and extent of the links between Orkney and Shetland in the second and third millennia CAL-BC. Finally, aspects of social change are explored, with reference to the coarse stone artefacts.

CONTENTS

LIST OF FIGURES

The figures are placed in order at the back of the volume.

LIST OF TABLES

These are placed in order at the back of the volume.

ACKNOWLEDGEMENTS

Many people have been involved in my pursuit for information and I should like to thank all of them for being so ready to share their time and knowledge with me. These persons are acknowledged below:

The staff in all of the museums provided a very congenial atmosphere in which to work and in particular I must thank Bryce Wilson, Ann Brundel, Tommy Muir and Jim Clark in Tankerness House, Kirkwall; all of the wardens at Skara Brae; Tommy Watt and Ian Tate in the Shetland Museum, Lerwick; James Nicolson in the Scalloway Museum, Shetland; and Ian Scott and Jim Wilson in the Royal Museum of Scotland, Edinburgh.

Much of the data has been taken from unpublished sources and I wish to thank Historic Scotland and the individual excavators for permission to use the results of their work, as well as the object illustrations, prior to publication: Dr DV Clarke, Links of Noltland and Skara Brae; Dr J Hunter, Pool; Dr S Dockrill, Tofts Ness; Ms O Owen, Kebister; Mr N Sharples, Upper Scalloway; Dr C Richards, Barnhouse.

I was fortunate in being allowed to use many excellent object illustrations which were prepared by the following persons:

Figures 4.1 and 4.5.2 after pencil originals by Marion O'Neil.

Anna Chudecka: 4.5.1; 4.5.3; 4.10; 4.13; 4.20.1; 4.21; 4.23; 4.24; 4.34; 4.35; 5.2.1; 5.8; 5.9; 5.10; 5.12.1; 8.6.1.

Sylvia Stevenson: 4.9.2; 4.11; 4.12; 4.26; 4.29.4; 4.30.1; 4.31.2; 4.31.3; 4.31.4; 5.6.3.

Angie Townsend: 4.31.1; 4.39; 5.5; 5.6.4; 5.11; 8.6.2.

Many thanks too to Paul Musgrove for his considerable help in the preparation of the computer graphics.

Anne Brundel gave permission to draw figure 4.18 after the original in Tankerness House, Orkney.

Olwyn Owen drew my attention to the unpublished information from Skaill and Lekky Shepherd gave permission to use the finds information from Howe prior to publication.

I should like to thank Magnar Dalland (AOC Scotland) for calibrating all of the radiocarbon dates.

The Gunning Jubilee Gift, awarded by the Society of Antiquaries of Scotland, enabled me to work in the museums of Orkney and Shetland.

I should like to thank Caroline Wickham-Jones and Ann MacSween for reading portions of the text. Being artefact specialists themselves, their comments were most constructive, however, any unacknowledged views in the text are my own.

Since the beginning of my interest in coarse stone artefacts, fifteen years ago, I have had numerous discussions on the artefacts and prehistory of the Northern Isles. Many took place in the stimulating atmosphere of the Artefact Research Unit, Royal Museum of Scotland where I worked from 1980 to 1991. In particular, David Clarke, Niall Sharples, Colin Richards, Caroline Wickham-Jones and Ann MacSween have taken much interest in my work.

I am most grateful to my supervisor John Barrett for his guidance and for putting up with the rather erratic production of this text.

This work would never have seen the light of day without the support from my husband and parents who, on numerous occasions, took my young son on extended leave from the house in order that I would get some peace and quiet to work. To them I offer my love and thanks.

Chapter 1

INTRODUCTION AND RESEARCH STRATEGY

Artefacts of coarse stone are commonplace to the prehistoric material cultures of the Northern Isles. They are amongst the most frequent finds to be recovered from excavation and they have been found, in some form or another, at almost every prehistoric site in Orkney and Shetland.

Coarse stone artefacts have aspects of quantity, ubiquity and survival that combine to create a substantial data-base with which to work. They often occur in number, forming large assemblages of particular tool types, and they are also present at a diversity of site-types including both funerary and domestic contexts. Post-depositional processes on archaeological sites of the Northern Isles often allow, at best, only partial recovery of the organic materials which were certainly made use of in the prehistoric period. Consequently, the excavated assemblages of coarse stone artefacts form an important component of the surviving material culture from many sites.

The aim of this study is to explore the possibilities of using the coarse stone assemblages to observe aspects of social change throughout the prehistoric period. It draws together the available data on coarse stone artefacts, much of which is of a rather disparate nature, with a view to providing a standard work of reference for use to those excavators in the Northern Isles who, faced with a large coarse stone assemblage, require a description of the types of artefacts which occur as well as background information on their context and chronology. This is in part a synthesis as it combines proposals for standardised definitions of the various artefactual types together with a record of the type's occurrence. Of more interest, however, is the use to which this information can then be put. By comparing the various artefacts with reference to their form, manufacture, use and deposition it is possible to perceive certain aspects of continuity and change within and between the site assemblages. This variability within the artefactual record is interpreted at a broader organisational level in order to assess the social implications which these

patterns may represent.

This study does not attempt to fossilise these artefacts in time or space: the patterns observed are only those which were produced from the available information and the interpretations which are presented can only be seen as hypotheses against which future data can be set.

1.1 Geographical Scope

This study is confined geographically to the Northern Isles partly because of personal research interests but also because outwith Orkney and Shetland there are so few comparable assemblages. In Caithness there is some field evidence, from an amateur collector, that flaked stone bars and ard points were produced using the local flagstones but none of the excavated sites from this area have produced such assemblages. Recent research on St Kilda by Andrew Fleming has indicated that the local dolerite was quarried in prehistoric times and was worked to produce assemblages of flaked stone bars comparable in form to those from Shetland (Fleming 1995). Elsewhere in Scotland the use of stone for artefacts is confined to the relatively simple forms such as cobble tools and stone discs and there is little or no evidence that stone was worked to the degree and finesse which was achieved in the Northern Isles.

1.2 The Artefacts

The term 'coarse stone artefacts' encompasses a wide group of differing objects which exhibit great variety in the choice of raw material, manufacturing strategies, form and subsequent function. The artefacts may be created simply through the use of a naturally occurring cobble or else they have been shaped, prior to use, from cobbles and blocks of stone by several means. Most of the artefact groups which are examined here may be considered as tools; they were most probably involved in the processing of other raw materials including such jobs as butchery, flint knapping, grinding and tillage. Other artefacts have a more 'passive' role, as for example containers or covers, whilst a few objects which are more decorative in form, or less obviously functional, are likely to have had a more complex social role.

The only common factor that links this group of objects is the nature of the raw material which, although it includes sedimentary, metamorphic and igneous rock, may be defined broadly as all stone which does not exhibit clearly the conchoidal fracture which is characteristic of the siliceous materials such as flint and chert. This in itself is an imprecise definition as many of the rocks, particularly the sandstones, have reasonable flaking qualities which have allowed them to be knapped to shape. In reality, there is no precise definition for coarse stone objects: each artefact type stands on its own. The term itself has evolved as a convenient means of categorising certain pieces which, in the past, have been perceived as rather crude in form. Present day usage of the term tends to encompass all stone objects, except flaked flint, chert and quartz.

Excluded from the detailed analysis of this study are certain distinctive objects such as axes, mace-heads, querns, spindle whorls, gaming pieces, whetstones, stone weights, lamps, and bowls. Although these artefacts may be referred to in passing they are not a field of inquiry here since several, in particular the axes and maceheads, have been the subject of other research (Ritchie 1992, Simpson and Ransom 1992). Of the other artefact types which have also not been examined it should be noted that most of these are objects which were in use during the iron age. Although they represent a considerable portion of the artefactual assemblage from this period it is considered here that, since many are not tools as such, their omission does not diminish this study in any way. Lists of the artefacts included here are given in tables 4.1 and 5.1.

1.3 Time-scale, Chronology and Radiocarbon Dating

The period under investigation is from the neolithic to the end of the iron age: from the beginning of the fourth millennium CAL-BC to 800 CAL-AD. The main part of this work is concerned with the neolithic and bronze age periods, particularly the transition period between the two as, during this time, the use of stone for tools and other objects was at its peak. However, for reasons of continuity it is interesting to examine aspects of the use of stone in the iron age, particularly in

relation to the practices continuing from earlier periods and the nature of their eventual disuse. Towards the end of the iron age and the Pictish period coarse stone was forsaken for other raw materials, in particular metal and steatite, and the use of stone was confined to a small number of specific objects.

The terms 'neolithic', 'bronze age' and 'iron age' are used here in their descriptive sense and as convenient markers of a broad chronology. However, the three-age-system, on its own, cannot be used with success in an artefactual synthesis which spans the prehistoric period; the imposition of these terms creates an overly rigid structure on what were, after all, continually changing prehistoric societies. Since it is aspects of continuity and change which are of interest here a more absolute time-scale of calibrated radiocarbon dates is the preferred chronological indicator. In chapter 8 an attempt will be made to place the artefacts within this chronology.

The radiocarbon calibration is based on high precision C14 measurements of Irish oaks as published by Pearson et al in Radiocarbon 28, 2b, 1986. All of the radiocarbon dates have been calibrated to the nearest equivalent of one sigma level and labelled in the text 'CAL-BC'(see appendix A for further information and a full list of dates).

1.4 Research Strategy

The basis of this work has developed over a decade or more of coarse stone artefact analysis by the author. During this period (1980-1993) several large assemblages of coarse stone were recovered from excavations and reported on by the author such as the sites of Skara Brae, Pool, Tofts Ness, Links of Noltland and Barnhouse, all of which are in Orkney and Kebister and Upper Scalloway in Shetland. The examination of these collections, which often included large numbers of a particular artefact type, allowed a standardised methodology to be developed for the definition of the artefacts in order that comparison of the objects within and between the sites could be made.

Since this research involves as comprehensive a survey as is possible of coarse stone artefacts retrieved from excavation other collections of coarse stone have also been examined. These include most of the relevant material from the Royal Museum of Scotland in Edinburgh, Tankerness House in Orkney and the Lerwick Museum, Shetland and the complete assemblage from the bronze age site at Sumburgh, Shetland. It was not possible to examine personally all of the assemblages included in this study and in many cases use has been made of the finds catalogues and reports produced by other workers, most notably Henshall, Rees and Smith. The results of these workers have been adapted by the author in order to create, as far as possible, a standard terminology and comparative basis for the research.

Since the 1970s a relatively large collection of data from modern excavations has been produced which spans the whole of the prehistoric period. A great variety of domestic and funerary contexts have been investigated and several of the sites are multi-period in character (see chapter 2 for more detail). Excavation procedures have differed on each site in reaction to the nature of inquiry: from rapid rescue excavations to detailed academic exercises. The amount of actual excavated area in relation to the extent of the site as well as the retrieval of the finds differ between sites and these factors must place a cautionary note on any subsequent inter-site interpretation. However, in comparison with earlier archaeological work, the contextual information which has been recorded from the modern excavations is of great value and is of more use to present day interpretations of the archaeology.

For the above reasons the various site assemblages which are used in the study have been divided into core (recorded by author with good contextual information); primary (not recorded by the author but with good contextual information); and secondary (assemblage and contextual information both lacking, these are most often the earlier excavated sites). The core assemblages provide the basis for the definition of the artefact types which are then applied to the primary and secondary assemblages. Full lists of sites mentioned here are given with the site location maps (figures 6.1 and 6.12).

A particular problem encountered in this research has been the general lack of full site reports. To date none of the large domestic sites such as Pool, Tofts Ness, Links of Noltland, Skara Brae, Barnhouse, Upper Scalloway and Kebister have been published. The contextual information and broad phasing which was available at the time of writing the specialist reports for these sites is used here. Although this may be modified in the final excavation reports it is not felt that the interpretation of the functioning of the stone assemblages would be radically different. There is no contextual detail for the bronze age site at Sumburgh although the latter assemblage has been catalogued by the author. Draft coarse stone reports and catalogues for the unpublished core sites which have been studied by myself: Barnhouse; West Midden, Links of Noltland; Skara Brae; Pool; Tofts Ness; Kebister; and Upper Scalloway are presented in Appendix B.

The problems which beset a work of synthesis such as this relate to the vast differences in the past recognition and recording of context and artefact and the availability of the data. Despite these qualifications it can be seen that there are a number of important assemblages from sites which can be compared and contrasted, these form the core sites against which material from earlier excavations may be compared.

Chapter 2

BACKGROUND HISTORY

The history of research into coarse stone artefacts runs parallel to the fortunes of archaeological investigation in the Northern Isles. Three main periods of excavation and collection can be identified since the 1850s (Fraser 1983, 35; Renfrew 1990, 2-6) with each being characterised by the underlying philosophies of the day. There follows below a brief history of past research in these areas with particular reference to the identification and interpretation of coarse stone assemblages.

2.1 Pre-War

The latter half of the nineteenth century up to the first world war was a time of great antiquarian interest in archaeological remains in both Shetland and Orkney and during this period such well known sites as Skara Brae, Maes Howe and Jarlshof were first investigated as well as numerous other middens, tumuli and house sites. At this time excavation practice merely consisted of a clearing out of the structures and there was little in the way of disciplined contextual recognition. However, the finds were considered of interest and those which were retrieved during this period often went to form the large personal collections which were then in vogue.

Artefacts of coarse stone had long been recognised by antiquarians and aside from such pieces as for example querns, grain rubbers and spindle whorls whose functional interpretations stand to the present day there was much speculation concerning the forms and use of such tools that we now know of as Skaill knives, ard points, flaked stone bars and cobble tools. Two gentlemen in particular, George Petrie working on Orkney and Arthur Mitchell on Shetland, made several pertinent observations concerning the recognition and classification of some of these artefacts.

During the 1860s Petrie followed closely the excavations at Skara Brae which were being carried out by William Watt. As well as planning the structures as they were revealed and reporting on

them, he also recorded many of the finds (Petrie 1868a). The finds discussion includes a good description of material and form and opinions are also given as to the function of many of the artefact types. He then goes on to discuss one type of stone implement, the stone flakes, which were numerous at the site (ibid, 213-215). After a description of material, shape, size and wear patterns he concentrates on the possible method of manufacture of such pieces. Upon noticing 'a notch on the fractured side of the thickest edge of one of them which had evidently been caused by the stroke or blow by which the flake had been produced' (ibid 213-214), he observed that many bore the same mark and took this as evidence for the deliberate manufacture of these flakes. As to the means of detachment of the flakes from the parent cobble he speculated that direct percussion by a hammerstone would not produce the deep characteristic notch and that a stronger blow would be needed. Fortunately, a happy accident whilst examining a kitchen-midden on Westray revealed the most probable method of detachment:

> 'I was afterwards strolling on the rocks below the cliffs..... when the appearance of a stone, which had recently been broken, attracted my attention. On lifting it I saw with some surprise, that a flake of a circular shape had recently been struck from it, and at the upper edge, where the stroke had taken effect, was a notch, the counterpart of those by which the flakes found at Skara are characterised..... it occurred to me that my son and a companion, who had shortly before gone along the cliffs, had been amusing themselves by dashing stones on the rocks, and had thus unwittingly rediscovered the ancient mode of producing the rude stone implements of the early inhabitants.' (ibid 214-215)

Upon repetition of this action Petrie was able to confirm his supposition and he concluded that the dashing of a cobble on rocks could provide enough force to remove the flakes and leave the characteristic crushed scar. The actual term 'Skail flake' (sic) or 'Skail knife' (sic) appears to have been given to these stone flakes by Childe in his first report on Skara Brae (Childe and Paterson 1929, 242) and they were doubtless named after the Bay of Skaill (present day spelling) by which the site of Skara Brae is situated.

The interests of Arthur Mitchell took him to Shetland from where he reported on discoveries of large numbers of 'rude stone implements'. Initially he had been present at the clearing out of an underground structure at Safester, Sandsting and noticed hundreds of manufactured stones coming from the clearance material. Acting upon information given to him by locals he also visited the nearby site at Houland, Clumly in Dunrossness, and Vaila in Walls where at each he was able to collect many more of such manufactured stones which were often to be found in heaps altogether (Mitchell 1868).

Although commenting that the implements were, 'as rude in execution and design as the rudest implements from the drift, and are in most respects as puzzling', (ibid, 123) Mitchell manages to make some pertinent observations as to their form and function. As well as reporting on the mineralogy of the rocks from which the artefacts have been made he observes that they had all been shaped by flaking and that some had also been pecked. He classified them on morphological grounds and assigned them to club-like forms; long, narrow flattish stones; broad flat stones with a point at one end; and cylindrical with both ends tapering (ibid 125-126). Writing in the present, Rees notes that all four of these classes undoubtedly include what we now know of as ard points (Rees 1979, 9) whilst the rest most probably include various forms of flaked stone bars. A further four of Mitchell's categories include single examples of handled clubs, cobble tools and a probable mortar.

Speculation as to the function of these stone implements concerns Mitchell in the rest of his paper and he quotes a previous writer as observing their similarity to bludgeons used by South Sea islanders (Mitchell, 1868, 130), though this may in fact refer to the handled forms. At this time a small but comparative collection was reported on by Petrie from cists and tumuli in Orkney (Petrie 1868b) and this led to some suggestion that their presence may have been associated with ritual deposits. However, the possible use of these implements in agricultural practices was touched upon too with reference to flint implements recently found in France which

had been interpreted as ard shares and the contemporary use in Ireland of stones in ploughs and harrows (Mitchell 1868).

Cobble tools did not go unremarked either at this time and supplementary notes by Nelson in the first Jarlshof report make observations on the main forms and wear patterns of the large quantities of cobble tools which were recovered (Bruce 1907, 32).

Although the stone tools were seen as very rude in form and thus comparable to 'flints from the gravel drift' (Petrie 1868a, 216), neither Petrie nor Mitchell were willing to assign such a great age to these artefacts. Petrie suggested that their simplicity could not be accepted as proof of great antiquity since they were clearly associated with skills and practices 'greatly in advance of that lowest stage of barbarism which the rudest forms of flint and stone implements are now usually assumed to indicate' (ibid, 217). Mitchell took an alternative view by suggesting that the rudeness of form could represent a degradation of type due to the introduction of new processes, in this case metal working (Mitchell 1868, 131).

The foregoing accounts have been worth looking at in detail. No doubt other nineteenth century antiquarians held opinions as to the nature of these stone implements but both Petrie and Mitchell stand out by their elegant display of observation and enquiry, a forerunner of artefact analysis and experimental archaeology which was not to reappear until relatively recently.

2.2 Inter-War

The second main period of archaeological work in Orkney was during the inter-war years and at this time many of the chambered cairns were investigated by Calder, Callander and Grant (Calder 1937, Callander and Grant 1934). The very nature of these sites meant that little in the way of coarse stone artefacts were retrieved. Those stone artefacts that were found were most often recovered from later deposits and thus not seen as pertinent to the main investigations which concentrated on the contents of the neolithic chambers.

Settlement sites received more attention than previously with the first excavation of Knap of Howar (Traill and Kirkness 1937) and the series of excavations of Rinyo and Skara Brae by Childe, the latter in advance of opening the monument to the public (Childe 1930; 1931a; 1931b, Childe and Grant 1939; 1947). These three neolithic sites were rich in finds and Childe developed a pottery typology from the Skara Brae material which was used to compare with that from Rinyo (Childe and Grant 1939, 25). The pottery styles were also used in an attempt to place the sites in a wider chronology and to compare with the chambered cairns (ibid, 31). Large numbers of coarse stone artefacts, particularly Skaill knives and stone discs, were observed at the sites of Rinyo and Skara Brae (Childe 1931; Childe and Grant 1939, 29; Childe and Grant 1947, 39), but it seems that only a few typical examples of the foregoing were actually collected whilst it is probable that the pieces of more elaborate form such as stone mortars, 'hatchets and cleavers', carved stone and other of the more unusually shaped pieces were saved more carefully. These latter pieces are described by Childe in his various reports in some detail, together with their location on site (Childe 1931b). Apart from the description of the objects a few of the pieces are subject to comparison with stone artefacts from elsewhere, but there is little acknowledgement of the role of the stone assemblages in the life of the site.

Excavations at the Calf of Eday by Calder revealed structures with iron age pottery and an assemblage of coarse stone tools which included Skaill knives, ard points, flaked stone bars, stone discs and cobble tools (Calder 1937; 1939). The similarities of the coarse stone assemblage from this site with those from the early iron age sites at Jarlshof and Wiltrow, both on Shetland, was noted (Calder 1939, 172) but nothing further was done with the material save an exhaustive listing. Other types of site were also investigated during this time including bronze age tumuli, brochs and later underground chambers or earthhouses but few finds of coarse stone were recovered in comparison to those from sites of the earlier period and little in the way was done with them apart from a brief recording.

The inter-war period in Shetland was less productive of archaeological research than in Orkney and was composed mainly of the series of excavations at Jarlshof by Curle and latterly Childe (Curle 1932-1936a, Childe 1938). Curle also excavated the prehistoric house site at Wiltrow (Curle 1936b). The tools which were found at Wiltrow included 'spatulate tools and rounded clubs' (ibid, 157) and Curle immediately compared them to similar tools coming from the bronze age levels at Jarlshof which he had recently excavated, although the latter site also had tools of slate which were noticeably absent at Wiltrow. The finds from Wiltrow were associated with the remains of iron smelting and Curle observed that at both Jarlshof and Wiltrow the use of the stone implements was not superseded by bronze or iron (ibid, 164). Curle goes on to list the jobs that would have required the use of such tools: tillage; quarrying; peat cutting; clay extraction; butchery and hide preparation, but acknowledges that it was not possible to determine the use to which these tools were certainly put (ibid, 165).

This period of archaeological work was characterised by a large number of excavations with the emphasis on investigations of the structures themselves. Several large assemblages of coarse stone were recovered and were used to compare against each other to determine the broad dating of the sites but without any detailed analysis. Reasonable synthesis of this material would have been difficult at this time as there were relatively few sites with which to compare and information for the bronze age was significantly lacking. Those assemblages from prehistoric sites which had been investigated served to blur chronological distinctions, particularly because of the relatively long time span of the use of many of the tool types and because, as is now known, several of the artefact types were in use in Shetland long before their appearance in Orkney.

2.3 Post-War

From the 1960s onwards an intellectual shift occurred in archaeology with emphasis on environmental and spatial analyses and the application of anthropological theory to archaeological patterns. There were also great developments in artefactual investigations particularly with regard

to the technological aspects of the material culture. This period is also characterised by the eventual use of radiocarbon dating, and the relative freedom which this gave to dating the sites allowed other aspects of research to come to the fore.

Little work was done at the beginning of this period; only a small amount of excavation was carried out in the 1950s in Orkney and these were secondary excavations at the chambered cairns of Quoyness and Maes Howe by Childe and the first of a series of excavations at Isbister. In Shetland at this time Calder ran a series of excavations and survey of house sites including Stanydale and Whalsay but in the 1960s there was almost no excavation of note.

The 1970s and onwards in contrast saw a great deal of recording and excavation and this was in a large part due to the setting up of the North of Scotland Archaeological Services unit (NOSAS) which was based in the Northern Isles in response to the (then) Scottish Development Department policy of rescue excavation. Many excavations of note were carried out by NOSAS and these include an important contribution to knowledge of the bronze age with investigations of burial mounds and burnt mounds of this period (Hedges 1975; Hedges 1977).

Neolithic settlements were also well represented in the archaeological record and since the last excavations by Clarke of Skara Brae in the early 1970s five other early prehistoric settlements have been excavated on Orkney up to the time of writing: Pool; Tofts Ness; Barnhouse; Links of Noltland; and Knap of Howar. On Shetland the excavations of Sumburgh, Scord of Brouster and Kebister have greatly increased the information available for the early prehistoric period in this area.

Sites dating from the iron age were also excavated and many of them comprised the latest settlement of multi-period sites such as Pool, Tofts Ness, Pierowall Quarry, Howe and Kebister. Recent excavations of broch sites include Upper Scalloway, Howe and Bu.

This was also a period of research and synthesis with almost exclusive concentration on the Orcadian chambered tombs. Henshall had by this time published her corpus of work on the chambered cairns of Scotland (Henshall 1963) which included all the available contextual and finds information for these monuments from the Northern Isles. This has recently been revised to bring the information on the Orcadian tombs to date (Davidson and Henshall 1989) and provides a most useful discussion as to the period and complexity of use of the chambered cairns. During the 1970s Renfrew proposed his model of the Orcadian neolithic society with reference to the typology of the cairns, the effort involved in building them, the demographics of the skeletal remains and the territories of the monuments (Renfrew 1979). Later, Fraser, again working in Orkney, combined aspects of locational data of the tombs such as inter-visibility, situation on agricultural land and chamber alignment to investigate further aspects of social reconstruction (Fraser 1983).

Theory building for the later prehistoric period of the Northern Isles is less substantial though a combination of excavation and survey has produced some site synthesis work. In this respect Hedges has contributed much research which includes the investigation of the location and character of the bronze age burnt mounds and the development and dating of iron age house and broch sites (Hedges 1975, 1987). On Shetland Fojut did a geographical and archaeological study of the brochs (Fojut 1983).

Excavation practices during this period developed rapidly due to improved techniques and according to changing intellectual demands in order to gain as much relevant information as possible from the sites. This was in part due to the large numbers of rescue excavations being carried out on sites which were eventually to be destroyed by modern development and for this reason many of the sites, or at least sampled areas of the site, were subject to total excavation. Contextual recording was more rigorous than for previous excavations and less selective retrieval of finds took place on most sites meaning that the artefact assemblages have more integrity. In consequence, excavations since the 1970s have produced a vast number of finds of all types,

particularly ceramics, stone, and, from sites where preservation conditions have allowed, bone and metal all of which are from relatively well documented contexts.

Despite the large amount of excavation and subsequent theoretical research into the prehistory of the Northern Isles, the 'portable' material culture has received relatively little attention as regards substantive synthesis or theory building. Reasons for this may include the emphasis on rescue excavation which did not allow the time or money for consideration of the wider functioning of the material culture or else the tardy nature of research excavations which remain unpublished. Also, the good quality of the Orcadian monuments in comparison to the rest of the British Isles, attracted workers who were interested in developing general social models of the neolithic.

Most of the published sites include some form of finds report and these are appended with, often, lengthy catalogues. However, the use to which the artefactual information is put is on a presence-or-absence basis in comparison with other sites whilst attempting some form of chronological linking. The ceramic assemblages of the Orcadian neolithic are a case in point as here the long-running debate on the chronological associations of Unstan and Grooved ware has taken precedence over other considerations of the functioning of these assemblages. Only recently, at the neolithic site at Pool, has more detailed analysis of the technological attributes of the pottery assemblage been attempted (MacSween, 1992). This includes analyses of clay sources, tempering and manufacture as well as form to investigate their changes within the stylistic sequence (ibid, 261).

One important exception to this chronologically orientated analysis has been the work of Sian Rees. Certain artefacts of coarse stone have been studied in detail, initially as a part of her research on prehistoric and Roman agricultural implements (Rees 1979) and later in artefactual studies from individual sites (Rees 1986a, 1986b). Stone ard points from the Northern Isles were included in the earlier work and on the basis of a study of all of the, then known, occurrences of ard points she was able to identify and classify this artefact type on the basis of form and function.

The proposed classification scheme was based on the types of cross-section and butt ends of the points (Rees 1979, 13) whilst an examination of the wear traces indicated the most probable methods of use (ibid, 18). At the time of that research she was unable to trace any possible chronological development of these tools because of the lack of precise dating (ibid, 25). Another type of stone tool, the 'heart-shaped' implement of slate, was included in this work to explore the possibilities of its use as a shovel; a term given to this object by Hamilton in his Jarlshof report (ibid, 319). She concluded that there was no evidence for their use as shovels on the basis of their form or wear traces.

The form and function of flaked stone bars have also been examined by Rees using the assemblages from the Shetland sites of Tougs and Scord of Brouster (Rees 1986a, 1986b). A morphological classification was attempted which divided these tools into three or four types on the basis of shape and the wear traces were also examined (see chapter 4).

The use of wear traces to determine the possible functions of stone tools has also been applied to Skaill knives (Clarke 1989). Here, in an experimental study, the stone flakes were made and then used as butchering tools to assess their usefulness in such work. The resultant edge damage on the flakes was then compared with that found on the prehistoric tools (see chapter 4).

Certain stone artefacts have therefore been the subject of quite detailed research in respect to identifying their form and function and this has been an important first step in their analysis. In all cases though, the objects have been examined in some degree of isolation and the broader issues such as their use within and between sites have not yet been explored. Indeed the apparent ubiquity of many of the coarse stone tool types at prehistoric sites and the long span of their use has almost numbed attempts at synthesis. Hedges remarks on the ard points and flaked stone bars from Knowes of Quoyscottie:

> 'The finds themselves need little comment (they) . . . form a rather unimpressive

catalogue chiefly composed of the sorts of crude stone implements which could be attributed to almost any period of prehistory in the Northern Isles' (Hedges 1977, 143).

Now, some several years on there is enough contextual and artefactual information to take this work on and raise the awareness of coarse stone artefacts.

Chapter 3

RESOURCES AND EXPLOITATION

The Northern Isles have a rich lithic resource-base and many different types of rock were available for use by the prehistoric communities. This chapter discusses the stone resources in terms of geological type, availability of the resources, manufacturing and use capabilities, and resource access.

3.1 Geology of the Northern Isles (figs 3.1 and 3.2)

The solid geology of the Northern Isles has been fully detailed in the British Regional Geology Handbook for Orkney and Shetland (Mykura 1976). This section summarises the rock types from the Northern Isles and is entirely based on the information abstracted from the Handbook.

In Orkney the solid geology is composed mainly of extensive flagstone and sandstone beds which form the gently shelving landscape typical of the island group. The majority of the rock is from the Middle Old Red Sandstone and comprises the Stromness Flags, the Rousay Flags and the Eday Beds. The Rousay and Stromness Flags are both similar in form being thinly bedded sedimentary rocks of varying grain size from mudstones and siltstones to fine-grained sandstone. Their bedding structure causes the rock to cleave into a slab form which gives the name of flags and these have been quarried in recent past for paving stones. These two types can be easily distinguished in beach deposits as the Rousay Flags commonly weather to a grey colour whilst the Stromness Flags are ochreous. The Eday Beds consist of yellow and red sandstones alternating with flags or marls. The sandstones here are often quite soft and are of a fine to medium grain. On Hoy there are sandstones from the Upper Old Red Sandstone which are medium-grained and red or yellow in colour.

Cobbles and pebbles of metamorphic rock occur within the sedimentary beds and are associated with the breccias (a type of conglomerate) and the pebbly sandstones. The most common of these

are granites, granite-gneiss, diorite, quartz and quartzite.

A series of volcanic dykes and sills occur in the SW of the island group. These are composed mainly of camptonite and monchiquites but there are a few bostonites. Dolerites and basalts are found as isolated outcrops of igneous rocks associated with the Eday Beds. Metamorphic rocks, mainly granite, outcrop near Stromness. Volcanic rocks on Hoy are associated with the Upper Old Red Sandstone and are comprised of tuffs, tufaceous sandstone and the Hoy lava.

The geology of Shetland is more complex than that of Orkney being composed of metamorphic rocks and igneous intrusions of a Devonian age and sedimentary and igneous rocks associated with the later Old Red Sandstone. Shetland is divided into two geologically distinct parts separated by the Walls Boundary fault henceforth termed W and E. Sedimentary rocks occur in the Walls Peninsula and SE Mainland. Those to the extreme west are red to buff in colour whilst those of the Walls Peninsula are dark grey. The sedimentary rocks in the E Mainland are more complex being composed of flagstones and pebbly sandstone (of either a buff, grey or purple colour), conglomerates and basal breccias. Intrusive pebbles from the latter three types are composed of locally derived igneous and metamorphic rocks such as granite and siltstone.

The metamorphic rocks are mainly metasediments and to the W they comprise schists, gneisses and granite gneisses. To the E there are several major divisions composed of: psammites; quartzites, pelitic schists and gneisses; flaggy psammites with thick bands of limestone; phyllites and spillites.

Igneous rocks are associated with the Old Red Sandstone and form intrusions of granite, diorite and gabbro to the W.

Drift deposits of glacial till overlie the solid geology in both Orkney and Shetland. In Orkney the till is confined mainly to low ground and is exposed in coastal sections often 3m to 10m in

thickness. Most of the material in the till is of local origin; in the W mainland and Rousay the underlying flagstones provide the material in the till but, because of the direction of ice movement, in the E and N the material is largely derived from the Eday Beds. Some material is derived from outside Orkney, particularly Sutherland and Caithness, and this includes granitic, felsitic and schistose rocks as well as quartzites. In Shetland the glacial till is thinner and more irregularly deposited than that of Orkney and there are fewer big exposures. The directions of ice movement are also more complex and the material within the till matrix reflect both the underlying geology and the type of rock over which the ice has passed.

3.2 Availability of Resources

The prehistoric population would have had access to stone from three main types of deposit: coastal erosion; glacial till; and bedrock. The coastal erosion deposits are the most accessible and numerous and this is in the main part due to the extensive coastlines of both of the island groups: in Orkney the coastline measures some 800km in length and in Shetland it is 1450km (Mather et al 1975, 10). Both the solid geology and the glacial till are exposed around the coastline. Where the bedrock is sandstone or flagstone it is eroded, first into blocks and slabs, and then worked further by the sea to form beach cobbles. Another important source of beach cobbles are those which are derived from the drift deposits which have been exposed by the sea; in Orkney it is thought that much of the material in the shingle beaches actually comes from the glacial till itself (Mather et al 1975) and consequently some of the rock types found in these deposits may not be derived from the immediate locale. In the present day there are fewer, and less extensive, natural exposures of glacial till inland from the coastal areas (Mykura 1976). Although this will in part be a function of the peat which now covers much of the ground surface in the Northern Isles it is unlikely that there were ever any large exposures of till in the period before massive peat accumulation as there were no large river systems which would have cut through and exposed the till in the early prehistoric period.

Exposures of bedrock were probably exploited for the raw material for tools but there is little

actual evidence for this in any of the assemblages. However, during excavations on Whalsay, Shetland Calder noted that:

> 'along the slopes of the Hamars above the school are many outcrops (of sandstone) which have been used as quarries. Dumps of waste material in front of them contain rock chippings and flakes in which implements are also found, presumably wasters or left-overs in the manufacture of tools on the spot.' (Calder 1956, 356).

Circumstantial evidence for the quarrying of sandstone comes from the debitage which was associated with the manufacturing of the flaked stone bars at Kebister (see chapter 4). Here the sandstone flakes were all fresh inner flakes and there was no remnant cobble cortex on the surface of any of the flakes. Given the large size of many of the flaked stone bars it is likely that quite large parent blocks were used from which to form the piece and that the available cobbles were just not big enough. Advantage may have been taken of sandstone blocks already partially split by natural weathering rather than directly quarrying the blocks from exposures. Some debitage has also been found at Benie Hoose on Whalsay (Calder 1955, 37), and evidence for the manufacture of flaked stone bars in Orkney comes from two separate locations at Bu which have both flaked stone bars and debris from their manufacture (Hedges 1987, 39).

The laminated materials such as the pelitic schists would have been relatively easily quarried most probably by taking advantage of a more friable weathered exposure (Dixon pers comm) which would produce the thin slabs more easily.

3.3 Manufacturing Capabilities and Use

No detailed analysis has been carried out on the physical properties of the many different types of rock which were used in prehistoric assemblages and in consequence, it is not possible to explore to any great extent the relationships between material selection, artefact type and use. The discussion which follows takes a broad view of the geological properties of the raw material and includes detail from only a few sites.

Several factors combine to determine the choice of materials for the various types of artefact: grain size; hardness; and fracturing properties. These physical properties affect the degree and type of manufacture as well as the use to which the artefacts may be put.

Sandstones are the most common raw material types found on prehistoric sites. They are able to be shaped with relative ease by flaking, pecking and grinding and often quite sophisticated shapes were produced such as the handled clubs. The sandstone which was used is most often micaceous and fine-grained and thus relatively hard wearing. However there are differences between the various types of sandstone which occur in the Northern Isles. In Orkney the black Rousay flagstone is very fine-grained and is bedded with micaceous inclusions which makes it more laminate whilst the greyer sandstone is more homogeneous and less liable to fracturing along a bedding plane (Collins pers comm). This means that these rocks cleave in different ways and at the sites of Tofts Ness and Pool, where both grey and black sandstones were used for Skaill knives, those flakes made on the latter material had a tendency to be more elongated in form than those made on grey sandstone. It is probable that the shape of the flake was determined by the original cobble which would be more elongated if it were black sandstone.

At Kebister in Shetland there are differences between the grey and red sandstones in that the red sandstones tend to have more obvious bedding planes along which the rock is often split, whilst the grey sandstones have higher clay content than the red giving them a more homogeneous character (Collins pers comm). It was noted from this site that the grey sandstones were preferred for the more finely made objects such as the handled clubs whilst those ard points made on this material tended to be rounder in cross-section (presumably because of the lack of bedding planes). These ard points were also more likely to be broken from an end rather than laterally, which was more common to those of red sandstone, and suggests that this grey sandstone was more tractable and less likely to break laterally through use.

Finer-grained sedimentary rocks such as siltstone or mudstone are most common to Orcadian

sites where they are used particularly for the small and finely-produced ground-end tools. A very homogeneous micaceous siltstone was used for all of the complex three-dimensional sculpted objects found at Pool and Quoyness (see chapter 5).

The laminated materials such as the finely-bedded sandstones and shales and their metamorphosed equivalents: phyllite; and pelite, are used for a wide variety of artefact types but most of these simply involve the chipping around the circumference of the thin blank to shape it (see chapter 4.3). Neither the form of these artefacts nor even the material suggests that any were used for heavy or destructive work. However, at Sumburgh a laminar-type material was used for the flaked stone bars which are of similar proportions to those flaked stone bars made on sandstones such as at Kebister. This shale-like material is more homogeneous than the true laminated materials and was obviously able to be shaped and used without problem.

The physical properties of the rock may not have been the only factors in material choice and in a few cases more abstract characteristics may have motivated selection as, for example, the aesthetic qualities of the rock. At Upper Scalloway a few of the smaller stone discs are made on an attractive mottled pelitic schist. Also from Upper Scalloway are stone balls which are made on a variety of sedimentary and metamorphic rocks one of which, a quartz-feldspar-muscovite-schist, glistens as it is held. As well as aesthetic value, some types of rock may have held value for rarity or perhaps because they came from a certain place. From Barnhouse there is one complete stone ball and several fragments of probably similar balls, as well as two of the multi-hollowed stones all of which are made on a volcanic rock which is present on Hoy.

3.4 Resource Exploitation

It is likely that the assemblages from each site were derived almost entirely from rocks which were local to the area whether they were exploited originally from till, beach or quarried deposits (fig 3.1 and 3.2). There are, though, problems in assessing just how much effort was involved in the collection of the stone and how far from the sites themselves the material was extracted.

Certainly the evidence from Whalsay would suggest that at least at this site there was easy access to quarriable material, whilst at Kebister it is possible that the sandstone may have been collected from further afield and brought back as large blanks for further shaping. Given the very large numbers of these flaked stone bars and the apparent lack of heavy use or curation of many of them, they may be regarded as easily disposable. It is unlikely therefore that much effort was made in procuring the raw material and that use was made of nearby resources.

The same principle of a large quantity of artefacts meaning easy access to resources most probably holds true for many of the other artefact types such as Skaill knives and cobble tools. Since such a large proportion of all the assemblages is made on cobbles, including flakes, flaked blanks and cobble tools it is clear that these were an important source. The cobbles from most of these sites were most certainly derived from beach deposits as they are all well-rounded and have a strong cortex. At Barnhouse, which is an inland site, the assemblage is quite abraded and many of the stones selected are more irregular in shape than is normally seen in other assemblages. The abrasion may be related to post-depositional factors on that particular site. Alternatively, it may be a result of selecting cobbles from local till deposits which have not been sorted to the same degree as those from coastal deposits.

With a few exceptions most of the excavated prehistoric settlement sites lie close to, or on, the present day coastline (fig 6.1 and 6.12). However, the configuration of the coastline of the Northern Isles has changed much since prehistoric times with the submergence of the land; in Shetland peat found at a depths of up to 9m beneath the sea has been dated to around 5500bp (Mykura 1976, 111) indicating that sea level must have been at least 9m lower than present. This difference in sea level means not only that there was further to go to get to the beach, but that the actual character of the coastline and land will have changed since the sites were originally inhabited. The site at Skara Brae, which is now artificially protected from the storms around the Bay of Skaill, was in fact sited away from the immediate coastline at the head of a lagoon just

prior to the main period of settlement (Davidson and Jones 1990). In a shorter time-scale the coastline is subject to storm action which can radically change local areas by causing massive shifting of sands which both cover and expose cobble beaches, and which also causes rapid erosion of the till exposures. The physical changes in the coastline during and since the prehistoric period mean that it is impossible to state with certainty just how distant from the site the beach deposits were which were being exploited for stone.

There is very little evidence in any of the assemblages that stone was procured from any significant distance from the site. The presence of rocks which are 'foreign' to the area can normally explained as coming from glacial till. The main exceptions to this rule are the materials which have been used for axes and other polished stone; in Shetland many of these pieces are made on porphyry and a quarry and workshop of this type of material has been identified at the Beorgs of Uyea (Scott and Calder 1952). In Orkney there is no evidence that the stone for the axes was quarried (see chapter 9) and the materials, although often being very different to the rest of the stone assemblages, have not been sourced. The volcanic rock which was used at Barnhouse, and possibly Skara Brae, for specific objects may have been derived directly from Hoy and here should be noted the presence of lumps of haematite at many of the Orcadian neolithic sites which must also have come from Hoy originally. It is not certain however, whether the presence of these materials suggests a mobile contact or whether they were found in deposits closer to the sites. Only during the iron age is there evidence that the raw material came from a further distance: at Upper Scalloway a pale, fine-grained sandstone was exploited which is thought to derive from the E coast of Shetland (Dixon pers comm). This sandstone has been used mainly for whetstones and hones. Rotary querns of garnetiferous schist from iron age sites in the Northern Isles were also probably quarried from particular spots further afield.

Chapter 4

THE ARTEFACTS: PART ONE

The following two chapters define and discuss many of the different types of coarse stone artefact which were in use during the prehistoric period in the Northern Isles, particularly those which have not been published in much detail before. It is not an exhaustive list as several distinctive and well-known forms have been excluded, especially those from iron age contexts (see chapter 1). Further excluded are the more miscellaneous objects which do not, in themselves, form a cohesive group for description, or else which do not appear in significant enough quantities to allow detailed attention, these are referred to in passing. It must be noted here though, that a particular artefact type which occurs as a single piece in some assemblages may be more numerous at another site; the recent excavations at Barnhouse and Upper Scalloway have produced stone assemblages with relatively large collections of several previously unseen or rare artefact forms and it is quite possible that some artefact types which are rare or unknown at present may prove to be a more common form in future excavated assemblages.

In this chapter attention is paid to those artefacts which occur in significant quantities at several sites and which are also common to many other sites. The data used here has been taken, where possible, from the relevant core assemblages studied by the author: Links of Noltland; Skara Brae; Pool; Tofts Ness; Barnhouse; Kebister; Upper Scalloway and Sumburgh, and each artefact type is discussed with reference to raw material, form, manufacture and use. A list of the artefact types under discussion is given in table 4.1.

The type-names which have been given to each of these objects most often refer to the form of the piece rather than its function since, in most cases, it is not certain to what use these tools were actually put. For some artefacts though old names which imply a particular function have been retained, partly because they best describe the shape of the piece e.g. 'cleaver' or 'club', or else because these are terms which are most commonly used in the literature and may cause confusion

if renamed e.g. 'Skaill knife' or 'Knap of Howar borer'.

The most common artefact types may be divided into four mutually exclusive groups on the basis of form: flakes; flaked blanks; chipped laminated material; and cobble tools. Within each of these groups there are several specific artefact types (table 4.1).

4.1 Stone Flakes

The flakes are of three main types: flakes manufactured for use; flakes produced as a by-product of tool manufacture; and flakes produced as a by-product of tool use.

4.1.1 Skaill knives

Those flakes which are manufactured directly for use are more commonly known as Skaill knives. These stone flakes were named by Childe after the Bay of Skaill in Orkney where Skara Brae, the first excavated site to produce large numbers of stone flakes, is situated (Childe and Paterson 1929, 242).

The flakes are invariably made from beach cobbles of the local flagstone though very occasionally a different raw material such as quartz or amphibolite may have been used. Many of the beaches in Orkney and, to a lesser extent, Shetland are littered with such cobbles and they would have been freely available for use in the past. The geology of the different flagstones: their bedding formations and inclusions, influences not only the shape of the original worn beach cobble but also its flaking properties. These factors must have modified the production of the Skaill knives to a certain extent but no significant differences in the form of these flakes between the various flagstones was noted in analysis (though see chapter 3.3).

Skaill knives are produced by throwing a parent cobble hard against an anvil stone in order to detach the flakes. This method was first noted by Petrie (Petrie 1868a) and is discussed in some detail here in chapter 2. The resultant flake has a characteristic 'powdery' crushed scar at the point

of detachment indicating the input of force needed for their manufacture (figs 4.1 and 4.2). Several of the smaller flakes do not carry this scar but instead have a little nick as if detached by direct percussion. Observations from experimental tool replication suggests that these small scars can also be made through the cobble shattering when thrown at an anvil.

The resultant flakes are most often primary (retaining all the pebble cortex on the dorsal face) though secondary (only partial cortex present on dorsal face) and inner flakes are also present. In long-section the flakes tend to exhibit a thick, rounded end (generally at the point of detachment) which tapers to the distal end. The morphology of this distal end varies from feathered to stepped or rounded and often these different morphologies will occur on the same flake forming a complex edge (fig 4.1). Their shape, in plan, can vary from squat to elongated (fig 4.3) though, as groupings from several sites show, they exhibit a greater tendency towards a slightly squat or rounded shape (table 4.2). The shape of the flake is determined by the original parent cobble and the selection of suitably-shaped cobbles must have been necessary to produce the required flake.

The flakes have a wide weight range. Comparison of the data from several sites shows that there is a remarkable standardisation in the weight distribution between assemblages (fig 4.4) and over half of each assemblage have individual weights up to 80g. Subtle differences occur in the weight distributions between Pool and Tofts Ness, and Skara Brae and Links of Noltland because the practice of wet-sieving on the latter two sites allowed the recovery of a smaller flake component.

Very few of the flakes have evidence for secondary working; in most cases the original flake edge has sufficed, and secondary retouch is present on 7% or less of the large flake assemblages (table 4.3). There are often no uniform characteristics to this retouch. In many cases only a small part of the edge has been re-flaked by either overlapping unifacial or bifacial flaking, whilst on a few flakes the edge modification is more extensive (fig 4.5.2 and 4.5.3). The removal of single flakes around the edge forms a denticulate outline and on other pieces the flaking has produced a steep edge (fig 4.5.1). On a few pieces though the original edge has been completely altered by flaking

to form a heavily angled outline.

The typical Skaill knife is therefore often squat to round in shape with a thick proximal end which enables it to be gripped comfortably in the palm of the hand leaving free a long, unmodified working edge. No physical evidence remains to indicate that these flakes were ever hafted prior to their use.

A varying proportion of each of the large flake assemblages bear traces of macroscopic edge damage in the form of rounding, flaking, crushing and denticulation (table 4.3 and fig 4.6). These forms of edge damage are apparent to the practiced eye and are often quite distinct from any damage incurred through post-depositional processes. Where there was any uncertainty the edge damage was not recorded; at Skara Brae the small proportion of edge damaged pieces is a reflection of the recent breakages along the edge caused by retrieval and storage methods which prevented further examination. Experimental use of Skaill knives has produced edge damage characteristics similar to that noted on the original tools (Clarke 1989) and it is likely that most of this damage was formed as the result of use of these tools.

The most common forms of edge damage are simply a rounding or dulling of the edge, light unifacial or bifacial flaking with rounding (fig 4.1), and denticulation formed by the snapping of a fine edge. An experimental programme to assess the usefulness of these flakes as butchery tools showed that edge damage is more influenced by the original edge morphology than by the actual type of work being carried out. This was observed particularly because most of the flakes were used in combination work, for example, cutting both meat and gristle sometimes against the bone and those flakes with a finer edge exhibited more edge reduction than the thicker flakes although the types of use to which they were put may have been similar (fig 4.2) (Clarke 1989, 26).

The experimental work has shown that such flakes are very efficient as butchery tools. The modern-day butcher uses a selection of knives and choppers of varying shapes and sizes; this was

reflected in the choice of flakes in the experimental butchering session where the butcher selected the smallest flakes for skinning and the largest for chopping bone with intermediate sizes used for a wide range of tasks (Clarke 1989). The shape and size ranges of the flakes found in the prehistoric assemblages would easily accommodate this need for selectivity in tool shapes and sizes.

Although the potential functional repertoire of such tools has not been fully explored, butchery being just one option, it is likely that their use was confined to the processing of reasonably pliant substances, particularly as the sandstone is a fairly soft rock. The Skaill knives proved to be very efficient as butchery tools during the experimental session, and it is highly probable that butchery tool-kits are present within the large prehistoric flake assemblages. This is explored more fully and with reference to context in chapter 9.

The Skaill knife therefore can be regarded as a tool which is quickly and easily produced from an almost infinite stone resource. There is very little evidence for the curation of these flakes, and they can be viewed as highly disposable items which may well have been used only once before being discarded.

4.1.2 Flakes as by-products of manufacture and use

Those flakes which are present as a by-product of tool manufacture and use are less easily recognisable but, in general, they are much smaller than the Skaill knives and have a smaller cortical component. At Skara Brae (1972-3 excavations) and the Links of Noltland, where detailed recovery techniques such as wet-sieving were used, there is evidence that flake debris occurs in quantity; at the former site, where the analysis is complete, over 1400 flakes with dimensions of less than 40mm have been recorded with the majority coming from two large midden layers (fig 4.3). At these sites there are a few flaked blanks (see chapter 6) but certainly not enough to have produced this quantity of debris. It is most probable that the debitage is related to the production of Skaill knives as the shattering of a cobble can produce a vast amount

of such debris. This would mean that the tools were actually produced on site rather than nearby on the beach. This is an interesting point and is discussed in chapter 9.

Flake debris also occurs in association with the flaked stone bars at Kebister and Tougs in Shetland and Bu in Orkney. At Kebister over 1100 flakes were recovered 87% of which were samples from two distinct concentrations and it is likely that these are representative of original knapping floors. All of the flakes from this site are of a red sandstone, the same as that used for the flaked stone bars and they are squat in shape (fig 4.7) with a tendency for the thicker flakes to be rounder in plan. The evidence from this debris suggests that the sandstone was quarried directly from outcrops; there is no cortex present on either the flaked stone bars or the debris to indicate that beach cobbles were used, and, given the length of many of the stone bars (see 4.2.2), it is unlikely that the beach cobbles were large enough to serve as blanks. Although no experimental replication has been carried out, the flakes, many of which are small in size, most probably represent the final stages in the shaping of the flaked stone bars, with the blanks being shaped roughly at the source of outcrop and then brought onto site for final production.

The use of some tools also leads to flake production. At a few sites there is some evidence that flakes became detached from cobble tools during their use. These flakes can only be identified by the presence of former wear traces which are normally on the cortical surface at the proximal end.

4.2 Flaked Blanks

Those artefacts which have been produced as the result of flaking a cobble or block of stone to shape are termed flaked blanks and three main forms are recognised: ard points; flaked stone bars; and flaked cobbles.

4.2.1 Ard points

Stone ard points are a distinctive class of artefact the characteristics and function of which have been well documented by Sian Rees (Rees 1979, 1986a, 1986b, and see chapter 2). A summary

of their main features, following Rees, is given below.

Ard points are made on sandstones of a variety of types and both quarried blocks of sandstone or suitably shaped beach blocks or cobbles were used. At Kebister both red and grey sandstones were used for ard points and these are reflected in specific differences in the shape of the final tool; those tools made on the grey sandstone were much rounder in cross-section than those made on the red sandstone and this is due to the differences in geology of the two materials (figs 4.8, 4.9.2 and see chapter 3.3).

The pieces are flaked to shape from the parent block and many were subsequently altered by pecking over one or both faces (fig 4.10). This pecking may have been to facilitate hafting as Rees has suggested (Rees 1979) whilst it may also have acted as a final shaping to remove some of the flake scars and thereby strengthen the tool.

Rees uses a morphological classification for ard points which is based on cross-section and end shape. In cross-section the ard point can vary from round to oval (fig 4.10) and, in some cases, they can be quite flat (fig 4.9.2). The working end may be pointed, or at least rounded, whilst the butt end is more roughly flaked and varies in shape from tapering to squared or curved (fig 4.10). Occasionally a double pointed ard may have been produced, and these are often amongst the largest pieces.

These ard points have been prepared for hafting in different ways. On many pieces pecked areas over the face has led Rees to suggest that this was roughen the point for purchase in the bindings or socket of the ard (Rees 1979, 16). On other ard points there is evidence for the additional shaping of the piece: at Kebister two of the points have additional notching on either side towards the butt end whilst at Sumburgh and Catpund it was common for the ard points to have areas of deep pecking at cardinal points towards the butt end (fig 4.9.1).

These artefacts functioned as stone shares held within a simple crook ard which was used to till or plough the soil (ibid, 7). Typical to ard points are the wear patterns which they bear. These wear traces take the form of a characteristic worn upper face and U-shaped wear at the tip on the lower face (fig 4.10). Often this wear will occur on both faces indicating that the point has been turned for re-use. Work by Rees has shown that such wear patterns occur on these pieces because of their form of hafting and angle of penetration in the soil (ibid, 19).

4.2.2 Flaked stone bars

Flaked stone bars are usually made from quarried blocks of stone, most commonly sandstone, schist, or shale but in some cases suitably shaped or prepared cobbles were used. They are manufactured by removing flakes from the parent block in order to produce the required shape. The majority of the bars which are made from stone blocks have been flaked over the entire surface including ends, sides and faces to give an oval cross-section (figs 4.11, 4.12.2). Other bars have been shaped only around the ends and sides and the unworked faces are formed by cleavage along the bedding planes which gives these pieces a flat cross-section (fig 4.12.1). Flaked stone bars may also have been made on cobble blanks and these include naturally flat cobbles, rounded cobbles which have been split longitudinally or else long, primary flakes. The blank has then been flaked bifacially around the edge to outline the shape and in some cases thinned by flaking over the cortical face (fig 4.13). On these pieces cobble cortex remains on part of the face. Evidence for the manufacture of flaked stone bars is present in the form of manufacturing debitage which has been found at three sites (see 4.1.2 above).

Rees has attempted a classification of flaked stone bars from the sites of Tougs and Scord of Brouster based on morphology and she observes three possible groupings namely: axe-shaped tools; oval-shaped tools; and cushion-shaped tools (Rees 1986a, 1986b). This classification is rather subjective as many of the tool types merge into one or other form with no distinctive cut-off point between categories. Problems also occur in assigning the broken pieces to such a grouping, of which there are a high percentage at each site. The flaked stone bars from Kebister,

Sumburgh and Tofts Ness form the largest assemblages which I have examined and this forms the basis for discussion below.

In plan the flaked stone bars are most commonly a tapering rectangle or sub-rectangle though several are quite broad in relation to length, particularly those from Sumburgh. The bars have a wide size-range and this is very similar between sites despite the contrast in raw materials used (figs 4.14, 4.15 and 4.16). The Kebister assemblage exhibits two clusters at certain size ranges (fig 4.14) but this is not noticeable from the other sites.

The morphology of the ends of the bars is varied and they include curved (figs 4.11.2, 4.11.3), squared (fig 4.12.1), and pointed ends (fig 4.11.1) though it is most common for the ends to be gently curved or asymmetrically curved in plan (figs 4.11.4, 4.12.2, 4.13.2). The long-section of the bar is generally straight though in a few case it appears to have been deliberately shaped into a shallow curve. The cross-section varies from flat to oval and in many cases this is asymmetrical, forming one more rounded, or thicker, long edge (fig 4.11.2, 4.11.4). There is certainly some variation within the morphological characteristics of the flaked stone bars but this is difficult to quantify; end morphology and cross-section appear to be most variable but there are no clearer patterns.

Wear traces, in the form of macroscopic damage, are apparent on many of the pieces and this normally takes the form of a rounding of the edges and areas of smoothing and striations on the faces. In addition some flaking was no doubt a result of use but this is often indistinguishable from that used to shape the piece. The most common form of wear is edge rounding and this is normally present on the broadest end and continues down one, or less commonly, both sides (figs 4.11.1, 4.11.2, 4.11.3, 4.12, 4.17). Where both sides are rounded one is usually more extensively worn than the other. Areas of smoothing are present on some pieces and in most cases it is located on one face only, at the end which has been rounded (fig 4.11.2, 4.11.3, 4.17.1, 4.17.2, 4.17.5). Associated striations are visible on some of these pieces. There does not appear to be

any relationship between the type of wear and the morphology of the ends of the piece although most of the wear traces are concentrated at the broadest end.

There is evidence on several pieces, particularly those from Sumburgh, that they may have been hafted. Some have been notched on either side (fig 4.17.3, 4.17.4, 4.17.5) but in most cases discrete areas of rounding, smoothing and in some cases a light gloss are located on opposite sides towards the middle of the piece (fig 4.17.1, 4.17.2). This wear is most likely to have been produced by the friction of a soft binding, such as leather, rubbing against the tool whilst in use. Tankerness House Museum in Orkney has a model of how the bars may have been hafted or attached to a handle. In this reconstruction it is used as a type of hoe or mattock (fig 4.18). Here it is interesting to note that they have selected a bar which has been deliberately broken widthways in order to provide a secure setting for the working head. Over three quarters of the flaked stone bars from Kebister were broken widthways and there was a greater tendency for the broken pieces to have a flat cross-section (fig 4.19). This flat shape would certainly make the breakage of the pieces more likely though whether they were broken deliberately, as part of manufacture, or accidentally, during use or deposition, is not certain. Some of the bars from Kebister and Sumburgh retain pecked areas over the faces and this may also be associated with hafting in some way.

The precise function of these tools remains obscure and no replicative experiments for manufacture or use have been carried out. They are normally found at sites which also have ard points and Rees has suggested that they would be useful in breaking up soils prior to cultivation with an ard (Rees 1986a, 88). It is highly likely that they functioned as some form of tillage implements given their pattern of wear traces and agricultural context (see chapter 9). The gross differences in size, shape and end morphologies also suggest that a range of functions is represented in each assemblage including perhaps hoeing, mattocking and picking.

4.2.3 Flaked cobbles

These are cobbles which have been flaked unifacially or, more commonly, bifacially around part of the circumference prior to use in order create an acute edge angle. A few flaked cobbles have been found on neolithic sites (fig 4.20.2) but these appear to have been less heavily utilised than those from later contexts. The bronze age assemblage from Tofts Ness is the largest examined and this together with the few from neolithic sites form the basis for discussion.

Cobbles of sandstone, quartz and quartzite have been used and these are normally quite flat in cross-section and vary from circular to ovoid in plan (fig 4.22). The majority of these pieces cluster at around 70mm to 120mm in length (fig 4.22).

On most of the pieces the edge has been flaked bifacially in order to create a more acute angle (fig 4.20, 4.21). The flaking may be extensive, in some cases removing most or all of the cortical material from one face (fig 4.20.1, 4.21.1) but in general it covers only up to half of the circumference usually on the longest side (fig 4.21.2).

Most of these flaked cobbles are subsequently worn through use leaving wear traces. This wear varies from a light rounding and abrasion of the flaked edge (fig 4.20.1) to heavy faceting which has presumably destroyed the original edge angle (fig 4.21.2). In some cases the use to which the tool was put may have caused additional flaking but there are very few cases where the abrasion is actually truncated by flaking and it is most common for it to occur over the original flake scars. Some areas of pecking are also present on one or both faces of a few pieces.

The function of these tools is not known. Certainly the original idea was to produce a chopper-like edge on a cobble with some weight, but this edge appears to have been considerably altered as it was used and there is no evidence for re-flaking on the original piece. If the flaked cobble was used as a chopper then it must have had a short life or else the need for a chopping edge was just in the initial stages of the processing activity.

4.3 Chipped Laminated Material

These artefacts are all made on laminated stone such as slate, shale and phyllite as well as the finely-bedded sandstones. In many cases, particularly for the material found in Orkney, the exact geological definition has not been sought; the fine bedding layers of these materials which cause the stone to fracture into very thin, flat sections is the main characteristic of this group. The original blank is shaped around the edge to the desired form by chipping, probably by holding the blank on an anvil and lightly flaking the edge with a suitable hammerstone. In some cases the edges have been worked bifacially, but this normally only takes place on material such as the sandstone which is more homogeneous and less likely to shatter than the shales. There are several different types of artefact in this category and these are discussed below (table 4.1).

4.3.1 Stone discs

This group includes all artefacts which have been made on thin, flat slabs of stone and which have been chipped around the edge to form a circular to sub-circular shape. Most of the discs required no further modification after the edges were chipped (figs 4.23, 4.24.1) but on several the circumference (fig 4.24.3) and sometimes the whole piece has been ground to a smooth finish (fig 4.24.2, 4.24.4).

Stone discs vary considerably in the choice of raw material, their manufacture, size and, to some extent, shape. The large assemblages from the multi-period site at Pool and the broch site at Upper Scalloway provide the basis for definition and discussion of these artefacts as there are some interesting patterns between the form of the stone discs and the phasing of these sites.

Several factors can be identified which distinguish the neolithic material from the iron age phases at Pool. Those discs from the neolithic phases are almost exclusively bifacially chipped to form an acutely-angled edge (fig 4.23.1) and both finely-bedded sandstones and shales are common. In the iron age and Norse phases the discs are shaped by rough chipping (figs 4.23.2, 4.23.3, 4.24.1) to form a more abrupt edge, a few have been ground right round the edge and all are of sandstone

(fig 4.24.2, 4.24.3, 4.24.4). The size ranges of the discs in the earlier and later periods also vary: in the neolithic deposits the majority of the discs are larger than 80mm in diameter whilst in later phases the majority are smaller (fig 4.25).

At the broch site of Upper Scalloway about three quarters of the discs are made on schists and the rest of finely-bedded sandstone. They have been shaped in the main by rough chipping and several have been ground. The majority, including all the ground discs and those made on mottled schist are smaller than 80mm and this is a similar pattern to those from the iron age at Pool (fig 4.25). However, unlike Pool the rest of the discs have a wider size distribution with a tendency for the larger discs to be made on sandstone rather than schist (fig 4.25).

Given the differences in form and size of the stone discs it is probable that they represent several different uses. In archaeological reports these artefacts are commonly referred to as pot lids, regardless of size; often they are described as having been found lying on top of, or at least closely associated with, ceramic vessels. It is highly likely that many of these discs did indeed function as lids; given their rather careful shaping they were most probably intended for placement within or on a circular vessel. This argument would be supported by the evidence from Pool where about one third of the discs had evidence for heat damage in the form of a surface discolouration, often reddish-brown. On most of these discs this burnt or heated area is located very discretely around the edge of the disc on both faces. The size distribution of these heat-damaged discs is interesting as, with one (smaller) exception, they all have diameters larger than 120mm (fig 4.25). It seems likely that they served as overhanging pot lids whilst the pot was on the fire and that the projecting edge of the disc got burnt in the process. A projecting lid on a hot pot would facilitate, in the absence of a handle, the removal of the cover in order to inspect the contents of the vessel. The smaller discs may thus have served a different function, perhaps more closely associated with storage in pots or other containers. In this case the stone disc may have sat inside the neck of the vessel, perhaps with the addition of a more malleable material such as leather or dried grasses to form a sealed closure. Unfortunately, it is not possible to compare the

diameters of stone discs and ceramic vessels at Pool as much of the pottery was distorted through post-depositional processes.

The stone discs from the iron age and Norse contexts at Pool and the majority of those from Upper Scalloway, are considerably smaller than those from the Pool neolithic phases. Nevertheless, the range of the Scalloway discs is similar to those from the neolithic at Pool and, as none of these larger discs have evidence for heat damage, it is probable that they were associated with the use of storage in vessels. Several of the smallest discs have been quite finely shaped by grinding and smoothing (fig 4.25) and it is possible that these, and others of their size, are some form of gaming counter (probable gaming counters from Upper Scalloway are not included here). A few of the smallest pieces from Scalloway are made on an attractive mottled schist and this may have been selected for specific, but here unknown, use. Hamilton has also suggested the use of some of the smaller discs from Jarlshof as plugs for skin containers (Hamilton 1956), although here he may have been referring in particular to the small steatite discs which are not discussed here.

4.3.2 Rectangles

These tools, made on laminated materials are flaked bifacially around the edge. They vary in plan from a tapering rectangle to sub-rectangular or ovoid in shape and their cross-sections are flat (fig 4.26.1, 4.26.2). They are very similar to flaked stone bars in size (fig 4.27) but they have a flatter cross-section. Most of the ends are curved in plan although some have distinctive points. The rectangles from Kebister have no visible wear traces but since this material is very friable it is possible that some of the original surfaces had peeled off.

It should be noted here that there is at present some uncertainty as to the attribution of many of the artefacts from the site at Sumburgh. The greater proportion have been classified as flaked stone bars as, despite the fact that they have been made on a laminated material, this shale-like stone is more capable of being flaked like sandstone than the other more friable laminated

materials. This assemblage therefore includes pieces which have been made like flaked stone bars but many of which have proportions and a flat cross-section like the rectangles. The measurements of these pieces show a continuum and consequently, it has been difficult to identify the point at which the flaked stone bars can be separated from the rectangles, if indeed there is such a division. Contextual information, unavailable at present, may help to clarify this problem.

4.3.3 Points

Points are long and narrow and they tend to be smaller in size than the rectangles (fig. 4.27). They have been flaked bifacially around the edges to shape (fig 4.26.3, 4.26.4) and the end opposite the point is curved or squared. None of the pieces from Kebister have visible wear traces.

4.3.4 Other shaped pieces

Laminated material is also used for more complex forms of artefacts and the most common types include 'heart-shaped' implements, 'cleavers', 'knives', discs with 'handles' and lobate objects; their basic forms are best understood with reference to the accompanying illustrations.

'Heart-shaped' pieces are characterised by a roughly triangular form with a large perforation made in the centre of the piece, often towards the broad end (fig 4.28). The broad end may be shaped by either a neat break which forms a straight edge (fig 4.28.1) or sometimes it is chipped to create a slightly in-curving edge (fig 4.28.3, 4.28.4). The perforation is often quite large and shaped to a sub-oval form which tends to flatten at the side nearest the broad end. Hamilton has referred to these pieces as shovels (Hamilton 1968, 31) with presumably the perforation being used to hold the piece. There is however little left for a useful shovel end after the perforation has been formed in the face. There is also no actual evidence for any wear traces on the edge or faces which would undoubtedly have been present if the pieces had been used in this way. The lack of wear traces together with the fact that many are liable to breakage across the perforation suggests

that these objects may not have been used as tools but instead served a more passive function. If the perforation was designed to hold a certain thickness of rope then the piece could have been held in place or rested against something by the careful shaping of the broad end.

'Knives' and 'cleavers' are mainly distinguished from each other in terms of size. Both have one end which could be described as a head or blade with a projecting handle formed to one side. The knives often have a curved blade end reminiscent of the flensing knives but the edge on these pieces is not at all sharp (fig 4.29.3, 4.29.4). Occasionally a serrated edge has been formed by minute notching. This serration is present on forms without handles too and Rees has suggested their use as reaping implements (Rees 1979). Cleavers are larger and heavier, usually being produced on less friable material than the knives. The heads on these pieces vary in shape and size; some are like 'hatchets' whilst others are longer and more curved (fig 4.29.1, 4.29.2).

A few pieces have been shaped as discs but also feature a single projection formed on the circumference. This projection is sometimes relatively long which would enable it to be gripped as a handle but occasionally it is small and tapers to a point.

Lobate objects are not common but they are easily recognisable by the presence of normally three to five isolated lobes forming a star-type shape (fig 4.30). The function of these pieces is not known.

4.4 Cobble Tools

These artefacts are produced on cobbles which are unmodified prior to use. The tasks to which these tools were put have left distinctive wear traces on the exterior of the cobble and it is the type and location of these wear traces which form the basis for the classification by artefact type. There are of course always some types of cobble tool which do not fit readily into the classifications below but these are not likely to be central to the role of these tools on any one site. The major groups of tools are each defined and discussed below on the basis of those from

the sites at Upper Scalloway, Pool, Tofts Ness and Kebister.

4.4.1 Pounder/ grinders

These artefacts have a very distinctive form. They are distinguished by broad areas of faceted wear on one or both ends of the cobble (fig 4.31.2, 4.31.3, 4.31.4) and on some of the rounder cobbles the bands of faceting continue around the edge (fig 4.31.1). These facets can occur singly but in many cases two or more facets are worked on one end of the cobble with ridges formed between them (fig 4.31.2, 4.31.3). The texture of the facets can vary enormously from a very smooth, ground face to a heavily pitted and roughly worn surface. Flaking around the edge of the facet is also very common. Many of these tools also exhibit an extensive area of smoothing on one of the faces and some may have pecked areas also on a face.

These tools tend to be longer than broad with a rounded cross-section. The size ranges are similar between sites although some diversity can be seen; those from Pool are amongst the largest of this type whilst the pounder/ grinders from Upper Scalloway include a number that are smaller and more rounded in form (fig 4.32). The materials used for pounder/ grinders are quite varied; sandstones are common to all sites but where metamorphic rocks were more freely available, as at Upper Scalloway and Kebister, these were preferred (fig 4.33).

It is probable that these tools were used for crushing and grinding a variety of substances, from grain and seeds, to mineral inclusions used in ceramic production. The larger pounder/ grinders are often the most heavily worn pieces and these may have been used on less tractable materials. The smoothly worn face on some of the tools would probably have been created by a stirring motion to collect or spread the material being processed.

4.4.2 Faceted cobbles

These tools exhibit areas of faceted wear on part of the surface (fig 4.34.1, 4.34.3). They are easily distinguished from pounder/grinders as they are often smaller in size (fig 4.36), have a

greater shape range and the area of faceting is often smaller.

4.4.3 Facially pecked cobbles

These cobbles have areas of pecking on one or both faces. The pecked areas may form a spread across the face but often they are seen as one or two discrete patches (fig 4.34.2). Sometimes the pecking may take distinctive circular or linear forms.

4.4.4 Combination of above

Some cobbles exhibit both faceted wear around the circumference of the tool and facial pecking on the surface of the piece (fig 4.35).

The stone selected for the faceted, facially pecked and faceted/ facially pecked cobbles is as varied as that used for the pounder/ grinders (fig. 4.37) and used in similar proportions. At Tofts Ness, which has a large number of these three tool types, the size ranges of all the types are similar to each other (fig 4.36) but it can be seen that during the various phases of the site different sizes of cobbles were used: small cobbles in the neolithic; medium-sized cobbles during the bronze age; and larger cobbles in the iron age. During the neolithic at Pool smaller cobbles were also preferred for use. This pattern is not so noticeable at the other sites.

It is likely that the difference in the sizes of each tool type between the phases at Tofts Ness is because the tools were used for different tasks in different periods. This means that in these cases classification by wear type alone is not sufficient to identify particular tasks. At least some of these tools, particularly those with faceting and/ or facial pecking would have been used as hammerstones in flint or quartz knapping; such wear has been replicated during experimental knapping (Callahan 1987). Those smaller ones from the neolithic phases at Pool and Tofts Ness certainly bear wear traces compatible with their use in flint knapping and the preferred use of quartz and quartzite in this period suggests that they were using a very hard hammer. Other possible tasks for these tools are not so obvious but many, particularly the larger ones are most

probably under-developed forms of pounder/ grinders.

4.4.5 Group A cobble tools

These are a discrete type of faceted cobble which have been observed in large numbers at Upper Scalloway. They are all sandstone cobbles, often long and narrow with a flat cross-section (fig 4.38). Bands of faceting run down the sides and sometimes occur on the ends (fig 4.39). The facets are often quite rough in texture and occasionally the pecking is so deep as to form notches (fig 4.39.3, 4.39.4). The faces on some of these tools have been smoothed and striations are visible. Many of these cobbles also exhibit patches of glossy residue over one face or towards one side (fig 4.39).

The function of these tools is obscure and no other site has produced them in such quantity. Some were certainly subjected to heavy work as shown by the complete alteration of the cobble's outline while yet others bear only lightly ground facets or else none at all. These worn edges must have been produced by crushing or grinding and since they are much narrower than the broad faceted edges of the pounder/ grinders they may have been used in a more confined space; perhaps in trough or dish rather than on a slab. The glossy residue present on many of these pieces is doubtless the remnants of the material being processed. The thickness of the residue deposits on some of the tools would suggest that it may originally have been a viscous or sticky liquid and therefore some container must have been necessary in which to hold it. No analysis has yet been done on this residue to confirm whether it is of animal or vegetable extraction.

4.4.6 Other cobbles with polish/ gloss/ residue

Some cobble tools exhibit no obvious physical alteration to the exterior of the cobble but instead may show areas of polishing or gloss residue. These form a disparate group in terms of raw material, size and form and no further analysis has been done on these tools.

4.4.7 Ground cobbles

The neolithic site at Barnhouse has a small collection of several ground cobbles. These tools are made on flat cobbles of a medium-grained sandstone and bear traces of grinding, formed through use, on specific parts of the surface of the piece. Most often the ground areas are on the broad face of a flat cobble and the surface has been altered to form a flat or slightly askew profile (fig 4.40.1, 4.40.2). On other stones the grinding is present down the side to create a slightly angled edge (fig 4.40.3). Those stones with facial grinding would appear to have been used against a larger, hard surface whilst those with ground edges may have been used as some form of sharpener or smoother.

Individual ground stones occur throughout prehistoric assemblages though they are relatively few in number. They are distinct from whetstones, hones and other sharpening stones because of their size and shape.

4.4.8 Plain hammerstones

Within any assemblage there are some cobble tools which do not fall into any specific category. Often the largest group of cobble tools from a site is that described as 'plain hammerstones'. These are cobbles whose wear traces are neither distinctive nor repetitive so it is not possible to give them a type name. In most cases the use-wear is light and randomly placed suggesting that they were not task-specific tools. Some plain cobbles it must be remembered are most likely to be under-developed forms of other more distinctive types, where for reasons of under-use, perhaps because of breakage, a full and characteristic pattern of wear has not been developed.

Chapter 5

THE ARTEFACTS: PART TWO

This chapter is concerned with those artefacts which cannot be placed so readily into the broader groupings of chapter 4. They tend to form only a small component of any particular site assemblage or else, as in a few cases, the artefact type may be common on just one site though occurring singly in other instances (table 5.1).

5.1 Knap of Howar Grinders

Only a handful of artefacts of this form have been found, most from the settlement site of Knap of Howar on Orkney. They are made on cobbles of sandstone and are distinguished by their domed upper face and flat, ground under-side. All are very similar in form and size (fig 5.1). It is likely that these pieces were shaped prior to use, initially by splitting a rounded cobble widthways and then by grinding this broken face to prepare the flat working surface. Discrete areas of heavy pecking, or pitting, are located centrally on this flat face (fig 5.1) and these most probably represent further preparation of the working face. Areas of pecking are also present on the domed upper surfaces of the piece; these too are often indented but are less localised than on the flat face (fig 5.1).

These tools most probably functioned as some form of grinder. They are all rather small and would have been capable of being held in one hand. They must have been used on a flat surface and the pecking on the upper face most probably results from an initial crushing of the substances to be processed prior to being more finely ground. The discrete area of pecking on the flat face seems integral to the function and Inskeep notes that:

> '... the function of the small pit in the grinding surface is to reduce 'skid' and improve the efficiency of the tool' (Ritchie 1983, 92).

5.2 Knap of Howar Borers

These artefacts are few in number and, as with the grinders, most have been found at the site of Knap of Howar. The borers are distinguished by the presence of a rounded or pointed knob which has been formed on one end of an elongated pebble (fig 5.2). This knob is usually isolated from the main body of the pebble by the presence of a shoulder which is worked, by grinding, around the entire circumference; on these pieces the knob is circular in cross-section with a rounded or blunt end (fig 5.2.3). On other pieces the shouldering is seen in cross-section only giving the knob a more oval cross-section (fig 5.2.1, 5.2.2). Occasionally the working end has not been isolated; it has simply been ground around the circumference at one end to produce a point with a circular cross-section. The knobs themselves are not very deep, the largest being just over 10mm in length with a similar diameter.

These pieces were undoubtedly shaped prior to their use with the requirement being for a circular protuberance with a blunt, rounded end. Their function remains obscure but the excavator at the Knap of Howar noted that the direction of the visible striations confirmed their use as borers and suggested their use in perforating the bone and antler hammers (Ritchie 1983, 56). From the available evidence though, it would appear that the borers were too small to produce the rather larger perforations found on these tools. It is uncertain too whether the striations were necessarily produced through the use of these tools or whether they were formed during the manufacturing process.

5.3 Ground-End Tools

This small group comprises a number of rather disparate objects which have all been ground, particularly on the end, to form distinctive shapes. Most of these pieces come from the site at Barnhouse but single objects have been found at a number of other neolithic sites.

All of the pieces have been made on small fine-grained sandstone pebbles and two main groups can be identified. The first group consists of a series of small, narrow, elongated pebbles, some of

which have been worn down the sides, but all of which have a ground end which may be blunted or faceted (fig 5.3.1, 5.3.2). Some of these pebbles have also been ground all over and may bear fine facets down their length whilst others bear less extensive wear often in the form of a light gloss or pecking on a narrow side and/or end. The second and smaller group is composed of spatulate objects (fig 5.3.3, 5.3.4). These are again made on small pebbles, but with a flatter cross-section than those above. They are distinguished by the formation of spatula-type ends which were created by grinding on both faces. Multi-directional striations are often visible on these worn ends.

5.4 Multi-Hollowed Cobbles

These are a distinctive form of worked cobble and the few that have been recorded are mainly from Barnhouse. They have not been included under the cobble tool category because it is still uncertain as to whether the hollows were deliberately produced prior to use or else formed as a result of wear. All the pieces are very similar in size and shape and they are made on harder types of stone such as granite or volcanic rock. They each bear two or more hollows which have been worked by pecking on the sides and/or faces of the stone (fig 5.4). On some pieces there is additional pecking which often forms a broad facet around the edge of the stone.

5.5 Pestles

Only a handful of these objects have been observed, all from the site at Upper Scalloway. They are made on cobbles of sandstone and are distinguished by their regular tapering shape and similar size (fig 5.5). For some of these objects a suitably-shaped cobble may have been used (fig 5.5.3) but several have been deliberately pecked over the whole of the surface to shape it (fig 5.5.1, 5.5.2). Both the broad and narrow ends bear ground facets and each piece has four discrete areas of pecking forming indentations at the cardinal points about 30mm from the broad end.

The indentations may have been formed to facilitate gripping or some form of hafting. The pieces are similar in form to some ard points, particularly those with pecked indentations, but they have

not been used as such because the wear traces are quite different.

5.6 Handled Clubs

These are an interesting tool type which have long been recognised at sites but which appear to have been neglected in the literature in terms of description and discussion. The site at Sumburgh has the largest excavated assemblage of such objects and these, together with the collection from the Lerwick museum, are used to define and discuss this type.

The handled clubs are almost always made on sandstones though occasionally other homogeneous material such as micaceous schists may have been used. Their common characteristic is the presence of a finely-shaped handle on which a larger club-like head has been formed (fig 5.6). They have been shaped from a blank initially by flaking and then by pecking and grinding.

The handles are very finely formed with a round to oval cross-section and are broadest at the head end and taper to form a rounded or pointed end (fig 5.6). The heads tend to be more varied in shape though all may be described as sub-rectangular with an oval cross-section. Many of the heads are quite damaged and it is often difficult to note any general trends in shape.

The shouldering which forms the head on the handle is always seen in plan and more often than not these shoulders are distinctly asymmetrical; on one side the shoulder is shorter and more abrupt whilst on the other side the shoulder is formed at a greater angle (fig 5.6.2, 5.6.3, 5.6.4). On a few pieces a slight shouldering is also seen in profile and this also tends to be asymmetrical in form.

There is not a great variation in the sizes of these pieces and they are also of similar proportions (fig 5.7). Occasionally some pieces bear decoration in the form of a series of ridges and channels across the base of the head (fig 5.6.1).

The function of these pieces has not been determined. The head often bears traces of wear in the form of flake damage and many of the pieces are very damaged through breakage or from the removal of large flakes across the top of the head. The handled club appears to be very vulnerable across the junction of head and handle as many breakages occur here. The function of the 'handle' is questionable; it forms only about a third of the total length of the piece and would not function well as a handle owing to its tapering shape and short length. Nevertheless, the careful shaping of this end, the intentional asymmetry of the shouldering, and the lack of damage here suggest that the handle was in fact made to support some form of hafting.

These were most probably utilitarian objects but the decoration applied to some of the pieces suggests that they also fulfilled a wider function.

5.7 Single-Hollowed Stones

This group encompasses a number of different forms whose common factor is the presence of a worked hollow on the face of the piece. More finely worked objects such as stone lamps and bowls are not included here. The most distinctive form of hollowed stone is the 'mortar' which is found in neolithic deposits. These are often the smallest of all hollowed stones and are fashioned on blocks of flagstone (fig 5.8.1). Sometimes the block appears to have been shaped as a rough hexagonal and it has been suggested that these echo the forms of similar objects made from whalebone which are found in contemporary contexts (Childe 1931b). The hollow is circular in plan and quite steep-sided with a rounded base. At Skara Brae several of these mortars were coated inside with a reddish substance which suggested to the excavator their use as paint pots (Childe 1931b).

Other forms of single hollowed stones occur in later prehistory and these tend to be larger than those from the neolithic. At Pool a relatively large collection of such objects was retrieved of many different shapes and sizes. These can initially be distinguished on the basis of whether they

were made on large cobbles (5.9.3) or else on sub-rectangular blocks with rounded or flat bases (5.8.2, 5.10). Those made on large cobbles have deep, round-based hollows whilst those made on blocks more commonly had shallow, flat-based hollows. The precise functions of these objects are not known; some may have been used as mortars, anvils or containers whilst others may simply be unfinished forms of different artefacts. Yet other pieces have counter-sunk hollows (fig 5.9.1, 5.9.2).

5.8 Stone Balls and other Sculpted Objects

Stone balls are occasionally found on archaeological sites. The only ones to have been excavated in recent times have been from broch sites. Those from Upper Scalloway vary in size between 45mm and 85mm in diameter and all have been pecked and/ or ground all over to form a spherical shape often with discrete areas of flattening on one or more faces (fig 5.11). The materials include fine-grained sandstones, granite, psammite and quartz-feldspar-muscovite-schist, the latter piece which glistens as it is held. The three stone balls from Howe are all smaller in size than those from Scalloway and are of fine-grained sandstone, one has been artificially coloured by a black oily film (Ballin-Smith 1994).

The function of these objects is not known. The deliberate flattening on some of the pieces suggests that they were intended to sit in place whilst the choice of an attractive material or the application of colour suggests a decorative role.

There are references to plain stone balls appearing on some neolithic sites (Childe and Grant 1939, 27) and the site at Skara Brae has also produced the more complex carved stone balls (Childe 1931b). The latter have not been included here since they have been the subject of detailed research and discussion elsewhere (Edmonds 1992, Marshall 1977).

Sculpted objects other than carved stone balls are also present at neolithic sites. From Pool there are four sculpted stones and one possible related fragment all from the same phase of the site. All

of the pieces are made on black micaceous siltstone which has been pecked and ground to shape; striations from the grinding are visible on some of the pieces. They are all similar in form though there is a great variety in the quality of working. The finest piece (fig 5.12.4) has one conical projection at one end, two at the opposite end and four conical projections worked around the upper half, one of which has been removed and the scar pecked over. Another object (fig 5.12.1) is incomplete but appears to have been more symmetrical than the previous piece. It has two large conical projections and a smaller, more bulbar one at one end whilst the centre of the piece is slightly waisted and the opposite end worked to a flat face. Two other pieces are rougher: one has been quite badly damaged with three broken conical projections whilst a fourth projection has been completely removed and the scar pecked over; the last is larger and more crude in form suggesting that it is an unfinished piece.

These objects would have required a great deal of time and effort in their production. It is unlikely that their function was ever of a utilitarian nature and instead they are most probably representative of abstract meanings. On two pieces there is deliberate pecking over the scar of a removed projection but there was no subsequent grinding to smooth over the area. This raises questions as to whether the projections were removed deliberately and the scars left or whether the pieces were subject to accidental breakage the repair of which was less careful than the original manufacture.

The style of these sculpted objects: three-dimensional with conical projections, is most similar to two objects which have been found in the chambered tomb at Quoyness, Sanday (fig 5.12.2, 5.12.3) though in actual form they are quite different. The conical element is also seen on objects found during the early excavations at Skara Brae which are more symmetrical in form and some of which have additional decoration (Clarke et al 1985, illustration 3.22).

Chapter 6

DOMESTIC CONTEXTS

The term 'domestic' is used here to describe those prehistoric sites relating to daily life and where there is evidence for economic practices as well as, in some cases, overlap into the ritual sphere. Domestic contexts are taken here to include all excavated sites with evidence for habitation or domestic use and this can take the form of contexts such as rubbish tips or middens, and structures which are commonly interpreted as houses. Burnt mounds are also included in this section as, though there is no evidence for the actual permanent habitation of these sites, they did appear to function mainly in a domestic sphere. Earth houses or souterrains which exist on their own have been omitted from this survey because of the lack of dating evidence and the general paucity of the finds.

A total of 23 sites or separate site phases (16 from Orkney and 7 from Shetland) are discussed here and these include all sites for which there are both radiocarbon dates and reasonable contextual information. A few assemblages from excavations with either no radiocarbon dates or less contextual detail are also included where relevant. The Orkney and Shetland sites combined represent an almost continuous time span from the early neolithic to the end of the iron age, however the majority of the radiocarbon dated sites are from Orkney and these show a preponderance of sites of a neolithic or iron age date with only a few from the bronze age. In Shetland there is less absolute dating but it would appear that the neolithic is less well represented in excavated sites than the later periods.

Where feasible, each site has been divided according to the available dating evidence on broad chronological grounds into neolithic, bronze age and iron age. A short description of each site is given together with a summary of the phasing which has been taken from the excavators' publication or pre-publication notes. The main reference for each site is given at the beginning to avoid repetition in the text. As has been noted earlier certain artefact types are outside the remit

of this study and are not discussed here and, since this can be no more than a summary of the available information, the reader should refer to the site reports themselves for outstanding detail. Draft reports and catalogues for all the stone assemblages studied by myself are available in appendix B and these include the sites of Barnhouse, Links of Noltland, Pool, Skara Brae, and Tofts Ness, all of which are in Orkney, and Kebister and Upper Scalloway in Shetland. One further site studied by me is Pierowall Quarry and this is already published. A separate discussion of the artefacts with reference to more absolute chronology forms chapter 8 and this includes assemblages from other sites with less contextual information and dating evidence.

6.1 Orkney Neolithic (location map fig 6.1,)

6.1.1 Midden sites

Knap of Howar (Ritchie 1983)

The excavated structures comprise two adjoining stone-built houses linked by a passageway at the point where the walls abut. The houses are divided internally by partitions and house 2 has recesses built into the walls. Both of the houses are built into and on top of the primary midden which is phase 1. An upper layer of midden deposits represents phase 2. The radiocarbon dates and the material culture are similar between these phases which suggested to the excavator that there can have been little time difference between phases.

Skara Brae 1970s excavations (Shepherd 1993)

Excavations were carried out in the centre of the surviving settlement (trench 1) and on its eastern edge (trench 2). In trench 1, phase 1, several new structures were identified which were built in or on the midden. A period of sand accumulation followed suggesting spatial or temporal abandonment. This early phase is broadly equivalent to Childe's phase 2. Phase 2 of trench 1 comprises the full scale accumulation of middens through to end of settlement occupation. The material recovered here is related primarily to the previously known passages A, B and F. Only one putative new building was found here and it is suggested that it is a defined working area

rather than a house. In trench 2 the lower half was almost entirely composed of a wet, black midden, which was identified by Childe in his test pit 4, whilst the upper levels of the trench were composed of alternate layers of sand and midden.

Two areas were investigated outside the village (trenches 3 and 4). In trench 3 there was a series of walling divided into at least three phases of building. The upper contexts of this trench had been eroded although some midden was identified at lower levels of walling. Trench 4 was composed of episodes of sand accumulation and ard marks. There is no dating for these two trenches.

Links of Noltland, West Midden(Sharples 1982)

The whole site comprises a series of trenches laid out to examine a large, single structure (Grobust) and the developmental history of the midden deposits lying to the west. Only one trench in the site has been fully excavated and this is the West Midden. It is represented by two earlier periods of cultivation during which midden was used to fertilise the soil (phases 1 and 2). Phase 3 is the formation of midden deposits on the top of which a wall was built. The final act of this phase was the deliberate deposition of at least 11 deer carcasses. A period of abandonment followed represented by sand accumulation and then ploughing resumed in the sand and on the midden (phase 4). Lastly there is a robbed-out field wall.

Pool(Hunter et al forthcoming)

The occupation comprises a series of tips and middens with structures. Two horizons of windblown sand have been used as markers to form three chronological phases. Phase 1 has dark tips and structures. These structures are sub-circular with no indication of hearth or furniture; one rather ruinous structure may have had wall recesses. Phase 2.1 has ardmarks and possible fencing posts and phase 2.2 some unidentifiable structures. The excavator suggests that these phases may represent a continuous process of deposition and that there may be a hiatus between this and later site activity. Phase 2.3 has more substantial structural remains and two of the three structures had

evidence for a possible specialist industrial function. Phase 3 had the remains of a total of eight, probably domestic, structures all of which were in a ruinous condition with the exception of S8 which was the largest structure and appeared to have served as a focus of settlement. This is seen by the excavator to be similar to H8 at Skara Brae and area G at Rinyo.

Tofts Ness(Dockrill pers comm)

Phase 1 comprises the remains of a free-standing structure with evidence of a hearth and robbed-out orthostat furniture. It is part of a larger unexcavated complex of buildings and is similar to the structures from phases 2.3 and 3 at Pool. Phase 2 comprises a midden sequence dating from the neolithic through to the early bronze age which seals the earlier building.

The Finds (Clarke forthcoming a, b, c; Ritchie 1983; Appendix B)

Each of the assemblages can be broadly characterised by a comparison of the relative frequencies of the three largest artefact groups: Skaill knives; stone discs; and cobble tools (table 6.1 and fig 6.2). All but one of the assemblages, Knap of Howar, is dominated by Skaill knives. Cobble tools are present at all sites though in much reduced numbers by comparison with the flake tools. Stone discs are frequent at only two sites: Skara Brae and Pool. There is no significant difference in the relative frequencies of these artefact types between the different phases of each of the sites.

Most of the cobble tool types are present at each site but there are differences in their distribution (fig 6.3). At Skara Brae and the West Midden, Links of Noltland the most common form is for plain hammerstones including a significant number of those with flaking damage. At other sites the plain cobbles are less numerous and most of these are simply pecked on the surface. These two sites also have the smallest proportion of their assemblage as cobble tools (fig 6.2). In contrast, the sites with a larger proportion of cobble tools, have greater numbers of the more distinctive forms such as those with facial pecking and/ or faceting (fig 6.3).

Flaked blanks are present at a few sites and the most common forms are unifacial or bifacial

cobbles with lightly utilised edges, as at the West Midden. Two of the flaked cobbles from Barnhouse have a rough notch worked on one side. Those from Pool more closely resemble flaked stone bars as they are made on sub-rectangular cobbles and flaked down the sides and on one end though they do not bear the distinctive wear patterns of the type.

The remainder of the assemblage from each site comprises small numbers of other artefact types (table 6.2). The grinders and borers are, apart from the cobble tools, the most frequent artefacts found at Knap of Howar. A borer similar to those from Knap of Howar was recovered from the phase 3 deposits at Pool and a smaller one was found in trench F, the earliest area in the West Midden at Links of Noltland (outside the area recorded here). Single finds of Knap of Howar grinders were made in the phase 2 contexts of both Pool and Tofts Ness. The ground-end tools which are common at Barnhouse (see 6.2 below) occur as single examples at Pool and Knap of Howar and two have been found in trench F and one from Grobust, both at Links of Noltland (outside the area recorded here). A multi-hollowed cobble, similar to those from Barnhouse has been found at Pool. From Skara Brae (trenches 1 and 2) there are a few pieces which have no parallels: a bifacially ground flake; a decorated Skaill knife; a radially incised stone (a similar one was found during earlier excavations (Childe and Paterson 1929, 235)); and a broken club-like object which appears to have originally had a handle. One other piece from Skara Brae is a rounded lump of volcanic rock with a single shouldered knob worked on one face and this may be compared with the sculpted knobbed objects from Pool although the latter are not shouldered.

Context

All of these sites are dominated by midden or tip contexts and, unsurprisingly, the largest proportion of each of the stone assemblages is found in these types of context (fig 6.4).

The most common artefact type, the Skaill knife, dominates the middens of all the phases of the sites (fig 6.5) and the largest number of Skaill knives occur in middens which have been undisturbed by ploughing or construction; in the West Midden at Links of Noltland 57% of the

Skaill knives were found in the four clayey midden layers whilst over 70% were recovered from the main midden layers at Skara Brae. The flake debitage also follows a similar pattern to the Skaill knives: 73% from the main midden layers at Skara Brae; 80% from similar contexts in the West Midden, Links of Noltland.

The other artefact types are less numerous than the Skaill knives and at most sites their distribution follows a similar pattern to the Skaill knives (fig 6.6) though, where there are enough pieces to make a meaningful comparison, some differences between sites are apparent. At Skara Brae and Pool stone discs are most common in midden or tip deposits, though they also appear in other types of context in larger proportions to the Skaill knives (fig 6.7). The large number of discs at Skara Brae may be misleading because it comprises a large proportion of fragments; only about 20% are complete specimens and though an attempt was made to re-fit the disc fragments here it was not successful. This is of interest in itself since most of the breakages were not fresh so it seems that these discs were broken prior to, or just after deposition and the fragments scattered in the middens. At none of the other sites is there such evidence for the fragmentation of the discs. The few discs from Tofts Ness are more complete and tend to be distributed in layers other than midden deposits (fig 6.7).

Cobble tools are only numerically abundant at Pool and Tofts Ness and at the latter site they occur in a similar pattern to the stone discs, i.e. they are more common to contexts other than middens. At Pool the cobble tools are more common to the midden layers (fig 6.7).

Due to the nature of these sites with their extensive tip and midden deposits and the lack of concordance of context and its location it has not been possible to associate particular dumps with specific structures. It is therefore not possible here to examine the detail of artefact type and specific location.

6.1.2 Non-midden sites

Barnhouse(Richards 1990)

This Grooved Ware settlement comprises a series of free-standing houses which are similar in form to the early houses of Skara Brae and Rinyo. They appear to cluster around a larger more elaborate house (H2) and they have been subject to rebuilding or alteration. Towards the end of the use of the settlement a structure (S8) was built which was different to the houses, being monumental in plan and use. There are no middens present as such though in one area there is an accumulation of occupation debris associated with one of the houses.

Pierowall Quarry (Sharples 1984)

This is a stone platform and structure built on the chambered cairn.

The finds (Clarke 1984, Clarke forthcoming d; Appendix B)

At Barnhouse the assemblage is dominated by cobble tools, many of which are fragments (table 6.1 and fig 6.2). The cobble tool assemblage is slightly different in composition to those of the midden sites by the inclusion of a few pieces with polish or gloss and a number of flat cobbles with distinctive bands of faceting around the perimeter of piece (fig 6.3). At this site there are also several other artefact types which either do not occur at other sites or else are less common elsewhere (table 6.2). Stone discs are absent and the few flakes which are termed Skaill knives here may be heat spalls or breakages from cobbles rather than flakes intentionally made for use.

Finds from Pierowall Quarry were limited to a few Skaill knives from the wall collapse and shillet layer as well as an interesting and unparalleled cobble tool which is a regular oval cobble with four smoothed facets placed at the cardinal points (tables 6.1 and 6.2).

Context

The distribution of the artefacts from Barnhouse is varied. Types such as the cobble tools, stone flakes and ground cobbles were more commonly found outwith the structures although no

specific activity areas could be recognised for these tools. In contrast the ground-end tools were more likely to be found within the structures. Stone artefacts were recovered from all of the structures and in most cases these comprised small numbers of the types mentioned above. Only the assemblages from the structures H2 and S8 and their immediate surroundings are significantly different; not only were there more objects from these contexts but, as well as the foregoing types, there were also a relatively high proportion of the more carefully-shaped pieces such as the multi-hollowed stones, stone balls and bifacially edge-ground pieces.

6.1.3 Function

There is clearly a difference in the composition of assemblages between the sites which have large middens and the site at Barnhouse which has no such contexts. At the former sites Skaill knives and stone discs are common whilst at Barnhouse stone discs are absent and Skaill knives rare. The assemblage from Barnhouse is of interest not only for this lack of the most common artefact forms but also for its collection of tools which are uncommon or absent at other sites; this points to fundamental functional differences between sites during this period. Also, the close association of middens and the presence of large quantities of artefacts raises questions about the development and use of the middens themselves. These points are discussed fully in chapter 9.

The use of cobble tools remains fairly constant between assemblages but there are differences in the occurrence of particular types. If types such as the facially pecked and/or faceted pieces are indeed associated with flint knapping (see chapter 4.4) then the patterns seen may reflect the common practice of flint, chert or quartz knapping on all sites and the lack of these particular cobble tools at sites such as Skara Brae and West Midden, Links of Noltland may suggest that flint knapping was either not carried out in the contexts excavated or, more likely that other material such as bone or antler was used as a hammer. The larger flaked hammerstones from Skara Brae and the West Midden may have been used in activities not present at the other sites such as stone dressing. At Barnhouse there are a large number of grinding stones which are not present at the other sites.

Although many of the artefacts are utilitarian, there are a number which may be considered as holding a spiritual value. These include the sculpted objects from Pool, all from phase 3 midden deposits; a sculpted object and a decorated Skaill knife from Skara Brae (Saville 1994); and, by association with context, the stone balls and multi-hollowed cobbles from Barnhouse.

6.2 Orkney Bronze Age (fig 6.1)

Tofts Ness (Dockrill pers comm)

Phase 3 comprises the badly robbed remains of a building which was cut into the midden of phase 2. Phase 4 has a small oval structure with a flagged floor and stone tank. This building is very similar to, though smaller than, the structure associated with the burnt mound at Liddle although no burnt stone was found at Tofts Ness. This small building is contemporary to a big round-house with a central hearth and radial orthostat divisions.

Liddle and Beaquoy (Hedges 1975)

These are the only two burnt mounds with stone finds to have been excavated in recent times. Liddle has a single structure with a large burnt mound butting against it and Beaquoy is formed from two structures, occupied sequentially with two mounds. The mounds were composed of fire-cracked stone, ash and carbon.

Finds(Clarke forthcoming a, Hedges 1975; Appendix B)

The assemblage from Tofts Ness is dominated by flaked blanks which include ard points, flaked stone bars and flaked cobbles (table 6.3 and fig 6.8). Between phases the assemblages differ markedly in the type of blank which was selected for the flaked stone bars; cobble blanks are most numerous in phase 3 whilst during phase 4 the choice is for flaked stone bars to be made on tabular sandstone blanks (fig 6.8). Cobble tools of all types are present but faceted grinders are most common particularly in phase 4 (fig 6.8). A significant number of Skaill knives are also found at Tofts Ness.

Most of the finds from Liddle and Beaquoy are cobble tools the illustrated examples of which are faceted on both ends and/ or sides, a few show signs of facial pecking. At Liddle there is one possible flaked cobble similar to those from Tofts Ness although perhaps smaller (LF32). No flaked stone bars were present at Liddle and Beaquoy and there are only single finds of ard points from both sites.

Context

Middens and other layers are the most common contexts of deposition in both phases at Tofts Ness though in phase 4 one third of the assemblage was recovered from walls and rubble contexts (fig 6.9) of which the majority was composed of flaked blanks. Since there is no indication in the contextual information from this site of the concordance of layer and structure it has not been possible to examine the contexts in detail.

At Liddle and Beaquoy all of the stone implements were recovered from either the burnt mounds or from the redeposited mound material in the building.

Function

Flaked blanks are clearly dominant at Tofts Ness and are particularly numerous in the latest phase. The difference in the manufacturing techniques of the flaked stone bars between phases appears significant. Although the association of some of the tabular pieces with phase 4 wall deposits suggests an earlier presence for this type, it does not necessarily mean that the contrast between the use of the cobble and tabular blanks can be assigned to chronology. It is more likely to be a functional difference given the differences in structural types between phases. On a few of the ard points from phase 4 there was evidence for remnant cortical material indicating the selection of cobbles, at least for these, as the parent blank.

At Tofts Ness Skaill knives continue in use as do many of the cobble tool types which are present in the neolithic phases.

At Beaquoy a large pile of unburnt stones in one of the structures was most probably a store for future use because the excavator noted that:

> 'most of the stones appeared to have come from the land but several discarded implements were included' (Hedges 1975, 56)

It may be that at least some of the stone artefacts were collected together with the natural stones from field-clearance heaps.

6.3 Orkney Iron Age (fig 6.1)

6.3.1 Round-houses and early brochs

These are considered together for ease of discussion since it is still not certain in some cases when a late round-house can be considered an early broch. All of these settlements do have a shared time span of about 850-400 CAL-BC though the settlements at Pool, Tofts Ness and Howe extend into the early centuries AD.

Quanterness (Renfrew 1979)

This round-house was built into the side of the neolithic chambered cairn and has four phases indicating the development from a simple circular structure with subsequent internal division to the final thickening of the round-house wall.

Pierowall Quarry (Sharples 1984)

This large round-house was built over the neolithic cairn. Very little of the house survived to be excavated. An occupation layer was present in the round-house and a partly-paved occupation deposit was found externally.

Tofts Ness (Dockrill pers comm)

The round-house of phase 6 is smaller than the one from the bronze age of phase 4. Sub-phases 6.1 to 6.4 relate to the construction and subsequent occupations and extensions.

Pool (Hunter et al forthcoming)

Round-houses with developmental phases ending in a cellular structure.

Bu (Hedges 1987)

This structure is defined as a thick-walled round-house or broch. The broch was built on ploughsoil which sealed an earlier occupation (phase 1a) of unknown extent and date which comprised a rubble of horizontal flagstones in which there was a scatter of stone implements. This phase must date before 850 CAL-BC (the earliest for the broch) and may therefore be considered bronze age. Phase 2 comprises the broch and associated structures and included in this phase is a pile of stones found outside the structures and which contained stone tools. Phase 3 indicates the re-use of the structure as an earth-house and subsequent decay.

Howe (Carter et al 1984)

This complex site is formed of a series of settlements spanning the whole of the iron age. The earliest phases (3 and 4) comprise the remains of settlements enclosed by ditches and walls. Phase 5 is a round-house and ring fort with an earth-house built into one of the neolithic tomb cells. Phase 6 is a later round-house or an early broch (most of the finds from these latter two phases are combined in the stone catalogue as phase 5/6).

The finds (Ballin-Smith 1994, Clarke 1984, Clarke forthcoming a, Hedges 1987; Appendix B)

Cobble tools are the most common artefact at all sites except Pool (table 6.4 and fig 6.10). It has not been possible to classify most of these pieces since the catalogue descriptions from Bu and Howe were insufficient. Certainly at Pierowall Quarry, Quanterness, Tofts Ness and Pool the pounder/grinders or larger faceted cobbles and plain hammerstones were the most common forms. At both Bu and Howe a small number of cobble tools were described as having brown stains on the surface of the piece and this may be similar to those Group A cobbles found in greater quantity at the broch of Upper Scalloway (see 6.6.2).

Skaill knives are present at Pool, Pierowall Quarry and Tofts Ness, the latter site having a significant number whilst those from Pool at least may be residual. At Pool hollowed stones, of various forms, and stone discs, are the dominant artefact types and these occur in relatively smaller numbers at the other sites.

The finds from Bu consist of, amongst others a number of flaked blanks and the debitage associated with their manufacture (table 6.4). A collection of flaked stone bars, an ard point and working debris from phase 2a were found amongst a pile of stones located at the extreme end of the trench outwith the structures. Further finds of flaked stone bars, chipped laminated rectangles and the occasional piece of debris came from within the broch. At Howe, a few flaked stone bars and a piece of chipped laminated material came from within the structures. The flaked blanks from Tofts Ness are much less numerous than in the preceding phases and are from the very earliest phases of the iron age.

Context

At most of the sites the majority of the finds are from structural or rubble contexts (fig 6.11). Most of the finds from these contexts may be regarded as secondary but in a few cases, as at Pool, a number of the hollowed stones were associated with orthostat or post settings suggesting that they may have been shaped to contain or hold an upright. Where there are middens present as at Pool and Tofts Ness these contexts accounted for a number of varied types of artefacts. Direct association of artefacts and occupation was limited but at Pierowall Quarry most of the finds were retrieved from occupation deposits as were several at Bu and Howe.

At Bu, the stratigraphical relationship of the stone pile containing the manufacturing debris and flaked blanks is questionable: this is described as being on or above the ploughsoil horizon and led the excavator to assume its contemporaneity with the broch itself. Unfortunately there is no information from the section drawings to discover how deep the ploughsoil layer was at the point of this stone accumulation or whether the accumulation was formed in the soil. Thus, it is not

absolutely certain whether these artefacts can be assigned to the period of use of the broch. Further finds of flaked stone bars and the occasional pieces of debris come mainly from wall and rubble contexts at Bu though one flaked stone bar came from the ashy deposit in the broch itself.

Function

The common factor between all the assemblages is the dominance of cobble tools; at most sites they include pounder/ grinders and the larger faceted cobbles most of which may have been used in processing food stuffs. Hollowed stones are present at all sites but since they vary widely in type it is not possible to determine a common function for them between sites. The composition of the assemblages then diverges into those with flaked blanks: Bu, Howe; and Tofts Ness, and those without: Pierowall Quarry; Quanterness; and Pool. These flaked blanks tend to be associated with the earliest phases of the sites though they do not occur in any great quantity. The assemblage from Tofts Ness has the greatest variety of artefact types and this is due to the presence of forms such as facially pecked cobbles and Skaill knives which occur in the earlier phases of the site and which appear to have continued in use through to the iron age.

6.3.2 Brochs

Howe (Carter et al 1984)

Phase 7 is the fully developed broch tower and external settlement, and phase 8 is a Late Iron age/ Pictish settlement built into the ruins of the broch.

Finds and context (Ballin-Smith 1994)

A very large assemblage was retrieved from these phases (table 6.4, fig 6.10) with cobble tools again the dominant artefact type. Stone discs were also more numerous than in preceding phases. A significant number of chipped laminated rectangles and cleavers were recovered, these being virtually absent prior to the building of the broch. Two small stone balls were also found.

Most of the tools were found in rubble contexts or else re-used structurally though some were

recovered from the domestic floors and others, particularly groups of cobble tools, were found placed within the wall of the broch. There is little other locational information for the artefacts though it was noted that four of the chipped laminated rectangles were found in earth floors near to hearths.

Unlike the distribution pattern noted for the finds from Upper Scalloway broch (see 6.6) there appears to be no difference in the occurrence of the finds between the broch itself and the external buildings.

6.4 Shetland Neolithic (fig 6.12)

Scord of Brouster (Whittle 1986)

This is the only firmly dated neolithic site in Shetland. The dates range from the mid fourth millennium and into the mid second millennium CAL-BC which mean that it extends into the bronze age though the whole site is considered here. The structures include three houses, a kerb cairn, and a field system comprising clearance cairns and field walls.

Finds (Rees 1986a)

The assemblage is dominated by ard points and flaked stone bars with some laminated rectangular tools, handled clubs, cobble tools and stone balls (table 6.5). Although not recorded as such in the report by Rees several of the cobble tools are actually bifacially flaked cobbles.

Context

Three-quarters of the artefacts are from redeposited contexts: in house and field walls; clearance cairns; and incorporated in stone accumulations around the houses (fig 6.13). This in itself makes any analysis difficult however, certain patterns in artefact type and context are apparent. The ard points and flaked stone bars appear in all types of context, and when their relative percentages within contexts are compared they are found to occur in similar proportions to each other (fig 6.13). With a couple of exceptions the ard points and flaked stone bars are the only two types of

artefact to be found in the contexts from the field system and the house construction. In comparison to the ubiquity of these two types, the rest of the artefacts are more context or area specific: the cobble tools, laminated rectangles and stone discs are most likely to occur in occupation levels inside the houses (fig 6.13). In this respect the finds from trench G, an accumulation of stones against part of the wall of H1 is of interest. Larger stones were found at the base and overlain by smaller stones including stone implements. This suggested to the excavator that a gradual accumulation had taken place. The finds here include ard points and flaked stone bars, in similar proportions, as well as a few laminated pieces, stone clubs and a cobble tool. This sub-assemblage may be compared with the finds from the final phase of decay in H1 which are relatively similar in composition. The finds from this phase were scattered over the whole of the internal area and suggested to the excavator that they represented the collapse of a roof in which these objects may have been stored. These, therefore, may be linked to the actual occupation of the house. Those from Trench G may also be linked to the occupation of that house and perhaps represent the discard of these onto rubbish dumps. The stone heap would certainly appear to be contemporary with the occupation of the house.

A further point of interest is the presence of the stone balls, of which all but one are associated with H1 phases 2 and 3, and the stone clubs which are only associated with H1 phases 2 and 3, and the accumulation of stones around H1 (trench G). Rees noted that the ard points from these contexts were more finely fashioned in comparison to the rest of the assemblages (Rees 1986a, 91). Since over half of the laminated rectangles come from these contexts too, it is possible that the stone balls, handled clubs, fine ard points and rectangles represent a later assemblage (see chapter 8). The latest dates for the site are associated with H3 from which a further quarter of the rectangles come though there is nothing in the rest of the assemblage from these contexts to suggest any difference to that from the rest of the site.

6.5 Shetland Bronze Age (fig 6.12)

Kebister (Owen and Lowe forthcoming)

This phase has no radiocarbon dates but the pottery from this phase is bronze age in date (MacSween pers comm). Phase 1.1 is represented by a timber-framed structure with gullies and other surfaces and phase 1.2 by a fragment of a stone building, two drain complexes (A and B) which are separated spatially, and an area of flaked stone bar manufacturing.

Tougs (Hedges 1986)

Phase 1 comprises a burnt mound and associated structure with hearth and cooking trough. The fill in the building comprising burnt mound material and silt is post phase 1. The later oval house is phase 2 and the derived material from its walls is pre-phase 2. Artefacts from excavation of the field system were unphased.

Sumburgh

No contextual information is available at present but as this site has an important comparative assemblage a provisional breakdown of the assemblage is given in table 6.5.

Finds (Clarke forthcoming e, Rees 1986b; Appendix B)

The assemblages from all of the sites are dominated by flaked stone bars and ard points (table 6.5 and fig 6.14). The flaked stone bars from Kebister and Tougs are all made on sandstone whilst those from Sumburgh are predominantly of a shaley stone though there is a small proportion at this site made on sandstone. The shale-like stone was capable of being flaked to produce stone bars of similar sizes and proportions to those of the sandstone and it is for this reason that they have been included as flaked blanks rather than as chipped laminated material. The lack of chipped laminated rectangles from Sumburgh (table 6.5) is due chiefly to many of these pieces being subsumed under the flaked stone bars.

The ard points appear to be very similar between sites though at Sumburgh a significant

proportion of the ard points have distinctive areas of pecking towards the butt-end of the piece.

Chipped laminated material forms a small proportion of each assemblage and the rectangles and points are the most common forms. At Sumburgh several of the more elaborate forms are present such as the heart-shaped pieces, lobate objects, and the occasional serrated piece. A lobate object is present in the bronze age deposits at Kebister but other pieces from this site such as the small 'knives' and the heart-shaped piece are unstratified.

The cobble tools include those with facial pecking and/ or faceting and a number of plain hammerstones are present.

Sumburgh also has a large number of handled clubs and cleavers; only a few of the former were found at Kebister. Skaill knives are also present at Sumburgh.

Context

At Tougs just under half of the assemblage is composed of material derived from the walls of the house and a quarter from the unphased contexts in the field system. The excavator noted that though many tools were found in the clearance cairn associated with the field system, none were found in the pile of unburnt stones against the burnt mound structure, which was presumably derived from field clearance, and none were found collected along with the heating pebbles; this is in contrast to the context of the finds at Beaquoy. There is no patterning of the cobble tools between phases. The laminated material is common to all phases but the points are confined to the burnt mound and associated building.

At Kebister many of the objects from phase 1.1 were recovered from feature fills and many of the objects from phase 1.2 were redeposited. The make-up of assemblages from both of these phases is very similar but there are certain patterns of artefact type by context. Many of the artefacts were derived from the two drain complexes (A and B) of phase 1.2 where they were re-used for

the lining of the drains and for the capstones. The composition of the artefacts between these two drains is significantly different: all the flaked stone bars and ard points from complex A are of red sandstone whilst those from complex B are all of grey sandstone. Complex B also had much of the worked shale from this phase and three of the handled clubs whilst no such artefacts appear in complex A (table 6.5). The differential use of grey sandstone for ard points was repeated in the rubble over the stone structure, which is in the same area as the drain complex B, and there was also a significant amount of worked laminated material here. In complex B and in the rubble the ard points are more numerous than the flaked stone bars; a pattern which is not repeated elsewhere on the site. This pattern suggests that activity in the B area was perhaps limited spatially, or even chronologically and that there may be unexcavated areas nearby which are more closely related to this deposit.

Evidence for in situ working areas is provided by an area in trench 2 which had a large amount of manufacturing debris and associated flaked stone bars.
The cobble tools from this phase do not have a significantly different distribution to the rest of the objects.

Function

The assemblage from Sumburgh is different from those of Kebister and Tougs because it includes a greater variety of artefact types and because of the chief use of a shale-like stone for objects such as the flaked stone bars and cleavers. This is doubtless due to the location of the site in an area of shale geology; where sandstone was used for flaked stone bars at Sumburgh beach cobbles were selected. The use of Skaill knives also continues at this site.

The fact that ard points and flaked stone bars tended to occur together in similar proportions was noted at Scord of Brouster (see 6.4). This pattern is also present during the different phases at Kebister and Tougs. Even between the different sites there is a similar proportion of ard points to flaked stone bars; at Kebister the greater proportion of ard points in relation to flaked stone bars

may be explained by the dominance of this form in certain contexts of phase 1.2 (fig 6.15).

6.6 Shetland Iron Age (fig 6.12)

6.6.1 Houses

Mavis Grind (Cracknell and Smith 1983)

The phase 1 occupation of this oval stone house is dated within the first three centuries CAL-AD although the excavators state that the finds, particularly the pottery in comparison to other sites, suggest that it dates earlier to a bronze age/ iron age transition. Phase 1 is the remains of the early house wall, phase 1/2 the midden deposits outside the structure, and phase 2 the partitioning of the interior. The abandonment of phase 3 consisted of rubble and dumps of peat-ash.

Kebister (Owen and Lowe forthcoming)

The iron age has four sub-phases: 2.1 has two oval stone house, 2.2 is cultivation; 2.3 is a multi-cellular structure; phase 2.4 abandonment.

Finds (Clarke forthcoming e, Cracknell and Smith 1983; Appendix B)

The assemblage from Kebister is dominated by flaked stone bars but cobble tools and stone discs are well represented (table 6.6. and fig 6.16). A few ard points and some chipped laminated pieces are also present. In contrast the finds from Mavis Grind were confined mainly to cobble tools and stone discs. Only one ard point was found here together with two shaped laminated pieces. The cobble tools from both assemblages were composed of faceted cobbles, pounder/ grinders and plain hammerstones.

Context

The stone assemblage from the iron age phases of Kebister has many artefact types in common with the earlier phases and there is almost certainly some redeposition of early material in this period; there are two re-fits of broken flaked stone bars between these and the earlier phases. It

is, however, difficult to determine the extent of redeposition and therefore just how many of the objects such as the flaked stone bars and ard points were actually in use during the iron age. The ard points, flaked stone bars and laminated material are most commonly found in rubble or structural contexts of phase 2.1 (fig 6.17) and suggests that the use of at least 40% of these pieces was prior to their redeposition at the beginning of this phase. Several are also associated with old ground surfaces of phases 2.1 and 2.2 but one broken flaked stone bar from such a context refits with a piece from an earlier phase suggesting that there is redeposited material on the old ground surfaces too. From figure 6.18 it can be seen that the numbers of flaked stone bars, ard points and chipped laminated objects drops markedly throughout the phases whilst the cobble tools are more evenly distributed and stone discs become the dominant type in the latter two phases. This pattern suggests that if mixing did take place then it did reduce considerably through time. Artefacts such as cobble tools and stone discs are more likely to be associated with occupation deposits (fig 6.17).

The largest proportion of the assemblage from Mavis Grind is associated with the walling of phase 1 or the abandonment phase. Although some rubble was present in this abandonment phase there was evidence for other activity in the form of ash dumps, pits and stake-holes which may suggest that some of the artefacts were more closely associated with this activity. The midden layers did not produce much in the way of stone artefacts at all.

Function

Since it is not clear to what extent flaked stone bars and ard points were in use at Kebister in this period it is difficult to determine their significance in terms of function. If they were used in this period then, according to the numbers found, they were in more common use in the earlier iron age phases though this was certainly to a lesser degree than during the bronze age. At Mavis Grind they are not present at all apart from a single ard point from the abandonment phase. This same pattern of reduced presence, or absence of flaked stone bars and ard points is seen in the iron age assemblages sites from Orkney (6.3).

As with the Orcadian iron age assemblages cobble tools are dominant and stone discs common throughout all the iron age phases. There are however no hollowed stones from the sites of Kebister and Mavis Grind.

6.6.2 Brochs

Upper Scalloway (Sharples forthcoming)

The broch period, phase 2, is followed by the post-broch occupation including external settlement of phase 3.

Finds (Clarke forthcoming f; Appendix B)

Cobble tools are the dominant artefact type (table 6.6 and fig 6.16), the most common and distinctive form of which is the Group A cobble. Several other cobble tools bear a similar glossy residue to these tools. Apart from pounder/ grinders and plain cobbles which are also numerous there are a few pestles; this distinctive form has not been noted at other sites. Stone discs are also well represented and they are made on a variety of materials and have a large size range. Some stone balls and handled objects were also recovered.

Context and function

No distinctive patterning of the finds was noted between the two phases except that the pestles are only to be found in phase 3 contexts. The most informative analysis comes from the comparison of the assemblages from the broch itself and its external settlement where there are some significant differences in the presence of certain artefacts. The stone discs found in the broch have a greater tendency to be made on schists, and they include all of the small discs made on mottled schist and the edge ground discs. In contrast, stone discs from the external contexts tend to be larger, and the use of sandstone was more common. The stratified stone balls are all from broch contexts as are a number of objects not discussed here such as the shaped hones, the probable gaming pebbles and the beads. Artefacts such as the cobble tools showed no such differentiation by context and no specific processing areas could be identified from the available

evidence. It would appear then that the more carefully shaped objects and those whose function was more decorative or less utilitarian were almost exclusive to the broch itself.

Chapter 7

FUNERARY CONTEXTS

The physical remains of prehistoric funerary practices are widespread in the Northern Isles. Seventy-eight neolithic chambered cairns have been identified in Orkney (Davidson and Henshall 1989) and 74 in Shetland (Henshall 1963), while cists with cremations or interments dating from the bronze age and later, either in mounds or else inserted straight into the ground, are also numerous. Other forms of burial are represented by only single examples.

A substantial number of these sites have been investigated though by far the greater number of excavations have taken place at Orcadian sites; in contrast to the richness of the Orkney data for funerary practices those from Shetland are poor so that comparison between the two island groups is almost impossible.

The actual archaeological evidence produced from the excavations is of relatively little value. Of the 31 excavated chambered cairns in Orkney only eight have been investigated, or reinvestigated, since the 1950s. In Shetland only eight cairns have been excavated, all prior to 1960. A similar pattern of excavation is seen for burial mounds and other cist types. Since archaeological investigation prior to the 1950s tended to concentrate on the contents of the chamber or the cist itself, scant attention was paid to activity external to the burials and, in general, the context of deposition was less well described than today. The consequences of earlier excavation have been that many of the contextual problems of interest here cannot be resolved.

Recorded finds of coarse stone from these sites are few given the number of excavations and, though this probably does represent the original nature of the material remains, factors such as post-depositional disturbance, incomplete excavation and lack of recognition of the artefacts may have played an important role in the formation of the assemblages.

Despite these problems with the available data certain patterns of artefact and context are seen on burial sites.

7.1 Chambered Cairns: Orkney

A particular problem when dealing with chambered cairns in Orkney is the sheer complexity and indeterminate time-scale of the use to which these monuments were put. Chambered cairns certainly started life as tombs for a form, or forms, of collective burial but there is also clear evidence for their reuse, in different ways, throughout the prehistoric period. Aside from the deliberate infilling or blocking which is present at many of the sites, 21 have evidence for secondary activity, for example as receptacles for cists or other forms of single burial, and internal and external activity which may sometimes include further construction. Other cairns have been redesigned as souterrains or else have formed the foundations for dwelling sites (table 7.1).

7.1.1 Finds and context (references given in table 7.2)

Of the 31 excavated chambered cairns in Orkney just twelve (three of the Maes Howe type and nine of the Orkney-Cromarty group) have recorded coarse stone artefacts (this excludes all finds of stone axes and beads) (table 7.2).

Only four cairns have finds which can be associated with activity inside the chamber itself. From Quoyness (Ork 44) two sculpted objects and a small ground stone disc are recorded as having been found in a cell and/ or chamber (figure 5.12), whilst at Quanterness (Ork 43) cobble tools, Skaill knives, stone discs and a quern rubber were recovered from the first three strata of the chamber deposit. Both of these monuments are of the Maes Howe type. At Corquoy Hill (Ork 34) a 'ball' of quartz (now lost) is recorded as being found with the skeletons and at Unstan (Ork 51) a possible quern rubber and a smoothed stone come from a cell, the former reportedly from under a skeleton.

The remainder of the coarse stone artefacts which have been found within cairns are not directly associated with the primary use of the tombs. At Cuween Hill (Ork 12) a sandstone ball was found in a high level in the W cell, and at Huntersquoy (Ork 23) a flaked stone bar came from the floor of the lower passage, in loose association with iron age pottery (Calder 1938, 204). From Midhowe (Ork 37) and Sandhill Smithy (Ork 47) the cobble tools, stone discs and flaked blanks, including ard points and flaked stone bars, are associated with later occupation (Davidson and Henshall 1989).

Finds from activity external to the cairns include the Skaill knives found in a Grooved Ware context outside the tomb of Holm of Papa Westray N (Ork 21), stone discs from the surface at Huntersquoy, and stone discs, Skaill knives and flaked stone bars from the platform at Quoyness. Two other assemblages are associated with external walls: at Taversoe Tuick (Ork 49) a lobate slate object, whetstones, hollowed stone and a possible stone disc were found at the foot of the wall revetting the cairn (the lobate piece may not have been found together with the rest of the stone) whilst the flaked blanks, handled club, cleaver and cobble tools from Isbister (Ork 25) all came from redeposited material behind the secondary wall.

7.1.2 Dating

It is likely that all of the artefacts which were found in the various chambers or cells were deposited during the time that the tomb was used as a receptacle for collective burial. At Quanterness the material is from securely stratified and radiocarbon dated neolithic deposits (Renfrew 1979). The two sculpted pieces from Quoyness have immediate and striking parallels with several objects recovered from the domestic Grooved Ware site at Pool (fig 5.12) (interestingly, both Quoyness and Pool are on the same island, Sanday) and a similar small ground stone disc was also found at Pool. The finds from the chambers and cells of Corquoy Hill and Unstan would not refute a neolithic date, being found at other neolithic sites.

Only Isbister has radiocarbon dates which may be linked with the secondary stone assemblage.

Here, the flaked stone bars, ard point, handled club, cleaver, and cobble tools were all found in a single layer (L10) comprising clayey earth and rubble dumped behind the later retaining wall. This wall had a constructed gap in which burials were inserted (Hedges 1983, 301) a date for which is 1675-1415 CAL BC (GU-1187). These stone tools which are associated with later activity at the tomb are most probably either contemporary, or later, than the date for the burials.

The rest of the assemblages from the cairns may be dated broadly by comparison with material from domestic sites (see chapter 8 for a full discussion). Certain artefacts such as the Skaill knives, stone discs and particular forms of cobble tools are known to have continued in use at domestic sites on Orkney from the neolithic through to the bronze age, and at some sites even later. It is thus relatively difficult to use such objects to date contexts except perhaps where the absence of known later objects may be observed unconditionally.

The presence of flaked blanks, handled clubs and cleavers can be used to determine a post-neolithic date whilst the lobate object from Taversoe Tuick has parallels with similar pieces from the Shetland bronze age sites of Sumburgh and Kebister although there are also two lobate pieces from Skara Brae. Other objects such as the whetstones and pounder/ grinders are also of a known post-neolithic date.

It is clear that very few of the artefacts are associated with the primary use of the tombs. Instead, many have been found at those chambered cairns which have evidence for secondary activity which is constructional in nature, such as in the building of a cist or walling. Of the six chambered cairns with secondary cists or inserted single burials, four have coarse stone tools found in secondary deposits and three of these have artefacts which are certainly post-neolithic in date: Quoyness; Midhowe; and Taversoe Tuick (table 7.1). Similarly at the four sites with external secondary walling, three have finds of coarse stone of which two: Midhowe; and Isbister have similarly later objects. Internal secondary walling was present at Sandhill Smithy which also had later artefacts (table 7.1). However, with the exception of Isbister where the objects were

found against a secondary wall, none of these later assemblages can be stratigraphically linked with the secondary constructional activity and none of the artefacts are directly associated with secondary burials. Therefore, it is not certain at what level these objects were involved in the continuing rituals of the site.

7.1.3 Function

The functioning of these artefacts is considered at a broader level in chapter 9. In brief it may be noted that most of the objects which are found inside the chambered cairns may be considered as utilitarian, that is, they are recognised tools from domestic sites. In many cases they may well have been used in a practical way, either directly in forming the deposits or as processing implements on site. None of the pieces examined from these internal contexts appear to have been burnt and this is in contrast to much of the flint which often exhibits heavy traces of heat damage (Davidson and Henshall 1989). It is possible then that the coarse stone objects were involved in rituals which were different to the other artefacts which were present in the chambers. In only two cases may the objects be regarded as non-utilitarian and these are the sculpted pieces from Quoyness. The precise use of these sculpted pieces may only be guessed at; such representational objects have been found at the settlement sites of Pool and Skara Brae and it is of interest that they appear, as do the tools, in both domestic and funerary contexts.

The later assemblages again appear utilitarian in aspect but since the original contexts of deposition cannot often be related to secondary features it is not certain how, or even whether, their deposition was involved with the secondary ritual activity.

7.2 Chambered Cairns: Shetland (references given in table 7.3)

Only three chambered cairns have coarse stone objects (table 7.3). These pieces are difficult to date because types such as the flaked blanks were in use in Shetland from the mid fourth millennium BC onward (see chapter 8). However, the ground edge discs from March Cairn (Zet 27) and the handled clubs, worked slate, and flat-topped cylinder from Punds Water (Zet 33) are

likely to be of a bronze age date by comparison with other Shetland material (see chapter 8). The objects from these two sites were found from disturbed higher levels and so are unlikely to be associated with the primary use of the tombs. At Isleburgh (Zet 21) the two flaked stone bars were found, one in front of each end of the facade (Calder 1963, 47). These were the only artefacts found at the site and their deposition, if intentional, is an interesting placement in association with the tomb.

7.3 Cist Burials: Orkney

7.3.1 Finds and context (references given in table 7.4)

No stone finds have been found associated with cists without mounds (though see 7.4). However, there are fifteen excavated burial mounds which have finds of coarse stone (table 7.4). The contextual information from many of the earlier excavations of these sites is relatively uninformative and it is not certain whether these artefacts are residual or not. From the descriptions in the reports it would appear that only a few of the finds were from the cists themselves; these include a stone disc from Queenafjold, and a cobble tool from Castle, while at Backakeldy the objects were described as lying on the lid of the cist. At several other sites some objects were observed as coming from the mound: ard points from Quandale, Whitehall, St Andrews, and Gyron Hill; a flaked sandstone bar from Bookan; and a grooved pebble from Knowes of Quoyscottie. Contexts were not given for the artefacts from Holland. At the more recent excavations of Knowes of Quoyscottie and Knowe of Cuean, ard points and flaked stone bars were observed to rest directly on the surrounding kerb of the mound. Similar contexts of deposition were observed at the recent excavation of Linga Fold where ard points and flaked stone bars were found in and on the kerbs as well as scattered around the later cist cemetery (Downes pers comm).

A brief survey of the excavated mounds shows that few have been excavated fully and that the lack of investigation or recognition of the kerbs is a major problem; in most cases the excavation of the cist was of primary interest and the activities on the edge or immediately beyond the

mound were not fully investigated. The rough construction of the kerbs at Quoyscottie was remarked on by the excavator and it was suggested that their purpose was one of definition rather than retention (Hedges 1977, 142). Of the ten excavated mounds at Quandale only one had a rough kerb and Hedges also comments that the other kerbs at this site may have been missed if they had been as roughly constructed (ibid, 142).

There is a recurring tendency for the presence of ard points and flaked stone bars at these sites and though the evidence is slight it would appear that these artefacts are most likely to be associated with the mounds which have kerbs (table 7.4). At the recent excavations of Knowes of Quoyscottie, Knowe of Cuean and Linga Fold the flaked stone bars and ard points were placed directly in and/ or on the kerb itself, while from earlier excavations they were described as being found about the mound. It is probable that, at least at Knowes of Quoyscottie, Knowe of Cuean and Linga Fold the deposition of the ard points and flaked stone bars was a deliberate act and that these tools were an integral part of the burial ritual.

7.3.2 Dating

The only radiocarbon dates available for burial mounds with finds are from the Knowes of Quoyscottie and Holland but at neither of these sites do they specifically date the primary use of the mounds. At Quoyscottie the dates are from the cremation pits over and around Knowe 1, not from the mound itself (Hedges 1977). One date (UB-2162), from a cremation cut into Knowe 1 gives a date of 1130-895 CAL-BC and presumably post-dates the finds from the kerb of this mound. The dates from Holland (GU-1373, GU-1374) have a similar range, 1265-930 CAL-BC, but are from a secondary burial in a short cist (Neil 1981).

7.3.3 Function

All of the coarse stone artefacts from the cists and mounds may be regarded as utilitarian in nature. They occur at domestic sites of this period; the ard points and flaked stone bars are particularly numerous and were most certainly used as arable tools.

7.4 Orkney: Sand Fiold

This site is different in nature from other cist and chamber burials in that a free-standing cist has been inserted into a rock-cut chamber with a passage (Dalland 1989). Dates from inhumed bone and some slag point to the construction and use of the chamber at about 2850-2500 CAL-BC whilst the cist was constructed and in use 2150-1750 CAL-BC (Dalland pers comm).

Nine objects of coarse stone were recovered, three of which were simple wedges apparently used in the construction of the cist. There were also four plain hammerstones, a Skaill knife (which was from under the cist) and a large stone disc, the latter was slotted down the outer side of the cist and was almost certainly used originally in association with the large ceramic vessel which contained a cremation.

This simple stone assemblage is not dateable and, as with most of the coarse stone from funerary deposits, it is uncertain as to how they functioned in the construction and use of the tomb and cist.

7.5 Cist Burials: Shetland

There are no records of stone finds from cist burials in Shetland.

7.6 Orkney: Flat Cremation Cemetery

One flat cremation cemetery has been excavated and this was discovered during investigations at the Knowes of Quoyscottie. It is represented by 33 burials clustering around the NE segment of Knowe 1 (Hedges 1977, 134). Several of the burials pre- or post-date the knowe.

Two stone artefacts were recovered; both are made on laminated material which has been chipped around the edge to form a handled implement. These tools were found together in the same burial and are the only instances of artefactual inclusions apart from some pottery sherds.

Radiocarbon dates from the cemetery place the use of the site from 1530-790 CAL-BC.

Chapter 8

TIME-SCALES OF USE

It is a problem for archaeologists working in the Northern Isles that many of the sites cannot be dated scientifically either because of the absence of organic remains or because the sites were excavated prior to the advance in radiocarbon dating. This leaves a large block of sites, particularly in Shetland, for which the material culture is the only means of dating. However, with the exception of the ceramic sequence for Orcadian Grooved Ware (MacSween 1992) there is no other detailed synthesis for the prehistoric pottery of the Northern Isles. Likewise, the coarse stone artefacts have not been studied in sufficient detail to allow chronological comparisons between sites.

There are several problems associated with the dating of coarse stone artefacts a major one being that several of the more common types such as the Skaill knives, cobble tools and the flaked stone bars and ard points have relatively long periods of use. Since this long time-scale tends to overlap the three-age system it has frustrated previous attempts to order the material culture.

Linked with the long time-scale of use is the apparent lack of stylistic development in the forms of the artefacts. Although this problem has not yet been a subject of detailed research, the evidence suggests that many of these artefact types remain unchanged throughout the period of their use. The ard points may be an exception; Rees noted that some of the ard points from Scord of Brouster were finer in workmanship than those present in the earlier contexts (Rees 1986a). The various forms of hafting on the ard points, such as pecking and notching may also be a chronological development, however, much of this is difficult to quantify. Unlike the ceramic record, the stone tools have no clear development or change in form which can be traced in time.

The context of deposition of these artefacts also poses problems for dating purposes. Large proportions of the assemblages have apparently been re-used as building material, particularly as

wall-core, and others have been found in rubble contexts which have uncertain associations to the rest of the site. This means that most of the artefacts are found in deposits divorced from their original context of use. With the exception of perhaps the site at Scord of Brouster, finds from these redeposited contexts have never been integrated successfully with the use of the site.

Yet another obstacle to interpretation of the chronological use of these artefacts has been the assumption that the prehistoric material culture, particularly with regard to the stone artefacts, was comparable throughout the Northern Isles and therefore that the assemblage chronologies of Orkney and Shetland are similar. However, it is apparent that what was in use in Shetland was not necessarily in use in Orkney at the same time and that there are quite discrete differences in the chronological presence of certain of these artefacts in the two main island groups.

There follows a review of the present state of knowledge for the chronology of many of these artefacts with reference to absolute dating (8.1). Not all of the artefact types can be included in this section; in particular, the various types of cobble tool have been difficult to quantify between sites as, given their widely differing catalogue descriptions, they are not immediately comparable. Also, several of the less common artefact types have been left out mainly because of their occurrence at only one or two sites. Section 8.2 discusses the composition of the assemblages as they relate to chronology and deals with the above discrepancies. Several other undated assemblages are then discussed and compared to the proposed chronology (8.3). It is not the purpose here to fossilise the artefacts in time but instead to lay down some parameters against which future assemblages can be compared.

8.1 Absolute Dating

This chronology is based on the available calibrated radiocarbon dates and in most cases the dates refer to a particular phase of the site rather than the specific context of the artefacts. The chronological ranges for each artefact type are given and the actual dates are listed in the appendix.

8.1.1 Skaill knives (fig 8.1)

Skaill knives have an almost continuous time-range of use in Orkney of 3730-385 CAL-BC. From 3730 CAL-BC to 1800 CAL-BC they occur in quantity, and as the dominant artefact type, in midden deposits where they comprise a very characteristic flake assemblage. From 1800 CAL-BC onward they are numerous only in the midden deposits as at Tofts Ness. In Shetland there are a few Skaill knives from Sumburgh with a date range of 2110-1665 CAL-BC. Here, it must be noted that these two dates from Sumburgh are from timber structures which preceded the stone houses (Lamb 1985, 30) and date the early use of the site only; there is as yet no correlation of finds and phasing for this site.

8.1.2 Flaked stone bars and ard points (fig 8.2)

Flaked stone bars and ard points are considered together as, with a few exceptions, both these types of artefact tend to occur together in the same contexts. In Shetland they appear as early as 3375 CAL-BC from Scord of Brouster and occur throughout all phases of occupation at this site until its end at 1520 CAL-BC. The other Shetland sites demonstrate the presence of these artefacts from 2110 CAL-BC to 670 CAL-AD, this latter date from Kebister. The dates from Kebister should be used with caution as it is not certain whether the flaked stone bars and ard points from phase 2 are residual from the bronze age (see chapter 6.6) and also because these dates show some mixing within sub-phases. There is however a single ard point from the primary fill of the broch ditch at Upper Scalloway with a date of 85 CAL-BC to 15 CAL-AD.

In Orkney the chronology for flaked stone bars and ard points is shorter. With the exception of the early date from Beaquoy, at which site only a single ard point was found, they range from 1775 CAL-BC to 125 CAL-AD. The early date from Beaquoy (SRR-1001) is questionable as it dates the rubble infill of the trough which presumably post-dates the occupation slightly and this is clearly later than SRR-999, which dates silt at the bottom of the well (Hedges 1977, 151). The dates from the Knowes of Quoyscottie are all from the cremation cemetery which appears to have been in use both before and after the construction of one of the mounds, Knowe 1 (Hedges 1977,

134-135). The mounds, from which the flaked stone bars and ard points were recovered, are not specifically dated. Three of the dates are from cremations cut into the old land surface or natural but UB-2162 1130-895 CAL-BC is from a cremation inserted into Knowe 1 and presumably post-dates the finds from the kerb of this mound. The latest date for the flaked stone bars is from Howe (GU-1759 CAL-BC 5-125 CAL-AD) which dates phase 5/6 but which is also within the range of dates associated with the later broch phases. The latest date for ard points is about 400 CAL-BC dating the single finds of these artefacts from Beaquoy and Bu.

8.1.3 Flaked cobbles (fig 8.2)

Although there are a few flaked cobbles from the neolithic of Orkney and possibly some from Scord of Brouster on Shetland, these do not compare with those from bronze age contexts as they have not been so carefully shaped nor do they appear to have been used to the same extent after manufacture. The only flaked cobbles that can be dated here are those that comprise the characteristic assemblage from Tofts Ness and these have dates of 1775-1510 CAL-BC from phase 3 of this site.

8.1.4 Stone discs (fig 8.3)

Stone discs are present throughout the prehistoric period in both Orkney and Shetland and their variation in size and manufacture point to different functions within this group of artefacts. At Pool it was demonstrated that there are clear differences in the size, manufacture and use of the discs between the neolithic and iron age (chapter 4.3.1). However, this pattern is not repeated at other sites; discs from the broch sites of Upper Scalloway and Howe have a similar size range to those from the neolithic at Pool so it is clear that size alone cannot be a criterion for dating. What is more chronologically diagnostic is the presence of ground stone discs in an assemblage. With the single exception of a very small and stubby ground disc from the neolithic phases at Pool (with no supporting radiocarbon date) the ground discs are found in iron age phases. The earliest date is from Bu for a single ground disc but they are most common at the broch sites of Howe and Upper Scalloway with dates of roughly 100 CAL-BC to 600 CAL-AD. The dates from Kebister

do not in fact date phase 2.4, from which a ground stone disc was recovered, as they are from the previous phase, 2.3.

8.1.5 Chipped laminated material (fig 8.4)

Rectangles made from chipped laminated material are present early on in Shetland at the site of Scord of Brouster with a broad date range from the middle of the fourth millennium to the middle of the second millennium CAL-BC. It was proposed in chapter 6.4 that stone assemblages from certain contexts of this site were of a different character to others and that this may be a chronological difference. The main differences noted were in the presence of laminated rectangles and handled clubs (see 8.1.6). The radiocarbon dates indicate that the rectangles are in fact present throughout the history of the site though they only occur in any quantity in the latest phases of Houses 1 and 2 and in House 3. Dates from Sumburgh and the phase 1 date from Tougs are contemporary with the latest occupation at Scord of Brouster. The dates from Kebister would suggest that the use of rectangles extended at least into the first millennium CAL-AD though as has been noted before (8.1.2) there may be a degree of mixing of earlier material in this phase.

In Orkney laminated rectangles are confined to the iron age from Bu and Howe. At Howe most of these rectangles were found in the floor deposits of the broch (Ballin-Smith 1994).

Laminated points are less common than rectangles and are dated in Shetland only from the earliest iron age phases at Kebister and phase 1, the burnt mound, at Tougs. There is also one probable point from Mavis Grind in the second century CAL-AD.

Dates of 2110-1665 CAL-BC from Sumburgh provide the only possible absolute chronology for the shaped laminated pieces from Shetland such as the lobate objects, 'heart-shaped' pieces, and cleavers. In Orkney, two 'cleavers', or handled objects were associated with a cremation from Quoyscottie whilst cleavers were also found in the broch deposits at Howe.

8.1.6 Handled clubs (fig 8.2)

Handled clubs are dated at two sites in Shetland. Those found at Scord of Brouster show a broad date range of c2900-1900 CAL-BC. All of these artefacts were found from just one of structures, House 1, in its last two phases and in the associated dump on the side of the house. The dates for these phases are in fact quite wide with the date for phase 2a (CAR-247) being some 500 years earlier than the date of around 2000 CAL-BC for phase 2b (CAR-248). It is possible that these early dates do not adequately date this phase, as they are similar to dates for the construction and phase 1 use of this house (CAR-243, CAR-246), and so they should be used with caution. This later date from Scord of Brouster is contemporary with the dates from the early phases of the site at Sumburgh which also has handled clubs. The only dated certain handled club in Orkney is the one from the chambered cairn of Isbister. This piece is associated with finds of flaked stone bars and an ard point from the W bank of the secondary wall. The date here relates to the cist burial in the wall. There is also an object which closely resembles a handled club from the large, black midden layer in T2 at Skara Brae. Dates from this context are wide but the upper date overlaps with the earlier, if questionable dates from Scord of Brouster for the presence of this form.

8.2 Chronology and Assemblage Composition

The above section presented the known chronological spans for several of the artefact types, however, due to their longevity of use this is not, in itself, of any great value in estimating the date of an assemblage. What is more useful for this purpose is an examination of the composition of the assemblage based on the major artefact types.

The simplest pattern is that which characterises the assemblage by the most common manufacturing technique. Figure 8.5 illustrates the varying proportions of the four main artefact types by period. A broad interpretation shows that in Orkney the common use of flakes during the neolithic, flaked blanks in the bronze age, and cobble tools in the iron age. In Shetland the pattern is slightly different with flaked blanks dominant in the neolithic and the bronze age, worked laminated material common in the bronze age and cobble tools dominant in the iron age.

This figure also illustrates the variation in composition of assemblages from sites within the main chronological period and points to differing site functions; this will be explored more fully in chapter 9.

The composition of the cobble tool types is also a characteristic of period. The evidence from chapter 6 shows that plain cobble tools are the most common type in the Orkney neolithic whilst a large proportion of the remainder are most probably associated with flint or quartz knapping; these latter being of a small size and made on a greater variety of raw materials than is seen in later periods. During the bronze age of Orkney and Shetland there is the introduction of pounder/ grinders as well as other faceted pieces. During the iron age pounder/ grinders are very common and all the cobble tool types tend to be of a larger size than those of earlier periods. Cobble tools with polish or a glossy residue are also characteristic of an iron age date.

The proportions of stone discs within an assemblage may also be indicative of period. Figure 8.5 shows that stone discs have a significant presence at some neolithic sites in Orkney whilst during the bronze age of Orkney and Shetland there are very few. Stone discs are most numerous in iron age assemblages of both island groups.

The inclusion of other artefact types allows a finer definition of period and many of the pieces discussed here are specific to the neolithic of Orkney: Knap of Howar borers and grinders; ground-end tools; multi-hollowed cobbles; and sculpted stones. Stone balls have been found on neolithic sites such as Rinyo and Skara Brae (see 8.3) but they are also found on iron age sites, such as Howe and Upper Scalloway. These latter objects often have flat areas on the surface of the ball. Hollowed stones are most common and numerous at iron age sites. On neolithic sites the hollowed stones are either counter-sunk pieces or else small mortar types. A number of artefacts which are not discussed here are also indicative of an iron age date such as whetstones, spindle whorls and stone weights.

8.3 Comparative Chronology

This section is concerned with stone artefacts from sites without radiocarbon dating or which have not been included in chapter 6. Since several of these sites are early excavations the assemblages which were retrieved probably form only a fraction of the original assemblages and any comparisons between sites must be treated with caution.

8.3.1 Orkney neolithic

The Grooved Ware site at Rinyo (Childe and Grant 1939, 1947) has an uncontexted date of 2465-2220 CAL-BC (Q-1226) and places the use of part of this settlement to around the same time as the later phases of the West Midden at Links of Noltland, phase 2 at Tofts Ness, and later use of the site at Skara Brae. Only a small portion of the stone assemblage from Rinyo was actually collected. In brief, Skaill knives were only numerous in the midden layers which filled the structure in area G (Childe and Grant 1947) and they were also present in the middens underlying this structure. They were not found at all in houses A, B, C or D none of which had associated red midden deposits. In contrast, stone discs were 'common all over the site' (Childe and Grant 1939, 29) with several of the larger ones incorporated in floors as paving slabs (ibid, 29). A few cobble tools were also found. The combination of several artefact types such as four stone balls, which were all of a volcanic rock similar to that used at Barnhouse, mortars, ground cobbles, and a ground-end tool has most similarities with the assemblage from Barnhouse. A sculpted object with a chisel-shaped stem and a rounded knobbed end, and a fragment of stone with grooves and ridges, the latter also of volcanic rock, were found prior to excavation.

The Links of Noltland has several excavated areas which investigate the use of the site up until at least the early bronze age (Sharples 1982). Detailed contextual information is lacking for most of the site apart from the sequence outlined for trench D of the West Midden (see 6.1.1). Within the West Midden, Trench E has some evidence for activity on the midden accumulations of phase 3 in the form of a clay oven and hearth and flint knapping debris close to the top of the midden. Grobust, which appears to be an isolated structure cut into the sand dune has a number of

deposits of animal remains and ceramics which appear to have been deliberately placed. The latest deposit in Trench C of the Central Midden was a thin midden layer with sherds from two Beakers.

The greater part of the assemblage from Links of Noltland comprised Skaill knives with the most finely retouched pieces from Grobust. Only a handful of stone discs and cobble tools were recovered from the whole of the site. In respect of the large assemblage of Skaill knives and the insignificant numbers of cobble tools this site is very similar to Skara Brae. Two or three borers and ground-end tools were recovered from trench E in the West Midden (Clarke forthcoming c).

The early excavations at Skara Brae produced evidence for activity on the site dating to later than the main Grooved Ware settlement. Reoccupation levels were noticed in H1 and H7, and the area S of the Market place had a sequence of loose middens and sand layers associated with a series of walling though it was not clear whether these could be associated with the reoccupation of the houses (Childe 1931b, 62-63). A group of stone objects were recovered from these later layers S of the Market place, amongst stones apparently fallen from the walls c and d, and in the loose midden flush with the top of wall d. (ibid, 109). They include one certain and two probable handled objects made on flat slabs of flagstone (ibid, plates 41.1, 39.2, 40.1); three carved objects, one a ball (ibid, plate 37.2) and two spiked objects (ibid, plate 41.3, 39.1); two objects with spikes and encircling grooves (ibid, plate 41. 4 and 5); and a pear-shaped stone which has been ground to shape (ibid, plate 36.5). Childe suggested that all may be considered as a single group perhaps derived from undiscovered activity associated with period 4 (ibid, 110).

8.3.2 Neolithic Orkney ceramic sequence

A pottery sequence has been developed for the ceramic assemblage from the Grooved ware contexts at Pool and from this Ann MacSween has formed a provisional general sequence for the Orcadian neolithic (MacSween 1992). In table 8.1 this is compared to the presence of the stone artefact types. For Rinyo and Skara Brae the information is unfortunately very sketchy as there is

little contextual information for these finds. There appears to be almost no correlation with ceramic style and stone artefact type; only the dominance of Skaill knives in the assemblages coincides with the use of plastic and grooved ornamentation on the ceramics. However, large numbers of Skaill knives are also closely associated with the development and use of midden deposits and these are dominant at Pool associated with the presence of incised ware. Although there are 'type-sites' such as Barnhouse and Knap of Howar for the rest of the less common stone artefact types the use of these pieces continues throughout the various phases of ceramic styles from their point of introduction. That specific artefacts of coarse stone cannot generally be associated with developments in Grooved Ware style is perhaps unsurprising: at the Orcadian neolithic site of Tofts Ness, which to all intents and purposes has a similar coarse stone assemblage to the other neolithic sites (table 8.1) the pottery is not Grooved Ware but instead more closely resembles ceramics from Shetland (MacSween pers comm).

8.3.3 Orkney bronze age and iron age

The site at Skaill has structures and activity which relate to the bronze age and iron age. The main structures of Site 5 have been tentatively dated, in the absence of radiocarbon dates, to the late bronze age on the basis of pottery and a bronze axe and there was also reoccupation during the iron age (Buteux 1992). The stone artefacts were not recognised or collected systematically from this part of the site so they cannot be considered here. Site 6 has been dated from the middle iron age, on the basis of unsatisfactory radiocarbon evidence (Porter 1992), and has a final Pictish level. The great majority of the stone assemblage from site 6 comprised flaked stone bars, ard points and edge-chipped 'flat' tools whilst flaked cobbles, stone discs, a handled club and cobble tools were there in smaller quantities (Porter 1992).

These artefacts occurred throughout all levels. A few spindle whorls, whetstones, lamps and moulds, all characteristic of an iron age assemblage, were also retrieved. The contexts of the finds have not been discussed in detail by Porter but she suggests that the majority of these artefacts in the Pictish level are residual and that there is certainly evidence for the incorporation of other tools into the walls of the round-house. Porter in fact uses the latest date for the

appearance of ard points in Orkney, the middle of the first millennium BC, to propose that the assemblage from Skaill may belong to the early iron age and thus rather earlier than the radiocarbon dates suggest. However, this is rather a weak argument and the dating is open to other interpretations. The assemblage from Skaill is in fact, both in terms of quantity and composition, most characteristic of an assemblage from the bronze age and this suggests that a large proportion of the assemblage may be redeposited in iron age contexts or that in fact the site dates from an earlier period.

The site at Calf of Eday has been dated to the early iron age on the basis of a large amount of pottery which was manufactured there (Calder 1939). At Calf of Eday the original use of the site was as a house prior to it being used as a pottery manufactory but all of the artefacts found were assumed to be derived from the later (iron age) use of this structure though the site was too disturbed to find definite levels (ibid, 167). The stone artefacts were found: under a later wall over the mound; just below the grassy surface; on top of the ruined walls; and found, with the pottery, among the infilling of stones and earth almost down to the original floor. The artefacts included flaked stone bars, ard points, cobble tools, Skaill knives, stone discs as well as some perforated cobbles.

It is uncertain just how much of this assemblage can be attributed to the iron age. Certainly there are Skaill knives from the iron age phases at Tofts Ness but tools which were common to the bronze age at Tofts Ness such as ard points, flaked cobbles and flaked stone bars have a clear fall-off in the later period and are from contexts may be regarded as residual. Flaked stone bars also occur in iron age contexts at Howe and Bu but they are not associated with ard points.

Two objects from Calf of Eday have comparisons with other bronze age sites: a phallic-type object (Calder 1939, plate 71.3) is similar in form to a less fragmented piece from Tougs (Hedges 1986, cat. no. 1705); and a cylindrical stone object with flattened ends which in form and also by size it is strikingly similar to single finds from Tofts Ness, phase 3, and in Shetland Punds Water

and the iron age site at Upper Scalloway (fig 8.6). A proportion of the Calf of Eday assemblage may therefore be regarded as bronze age in date.

8.3.4 Shetland neolithic and bronze age

In Shetland there are a large group of sites which are dated only broadly from the late neolithic through to the bronze age. If the site at Scord of Brouster is typical, then many of these settlements may have been occupied over a long period and span the neolithic and bronze age. Several of these sites also have evidence for activity into the iron age with the presence of objects such as whetstones, spindle whorls or iron age pottery. The problems with dating have stemmed mainly from the lack of a ceramic sequence from early prehistoric Shetland. Hedges has made some observations on the ceramics from these sites and has summarised it as such (Hedges 1986): at the beginning of the sequence there is Ness of Gruting and Stanydale Temple with 'Beaker influenced pottery' whilst the late bronze age is characterised by the flat rimmed ware at Jarlshof. Pottery from Tougs he places early in the series and there is comparison with some decorated sherds at Ness of Gruting. Pottery from Clickhimin and 'neolithic' Jarlshof is placed slightly later. Ceramic assemblages from Benie Hoose, Yoxie, Punds Water and Wiltrow do not fit into the scheme and this suggests a multi-stranded ceramic tradition in the bronze age of Shetland. Pottery from Scord of Brouster has closest parallels with that from Ness of Gruting and Stanydale (Whittle 1986, 63-64). The pottery from Kebister is mainly undecorated but a single decorated sherd and the large proportion of plain pottery in the assemblage has parallels with the material from the Benie Hoose whilst some rim forms at Kebister are similar to those from Jarlshof and Clickhimin (MacSween pers comm). Here it is interesting to note that the pottery from phase 3 at Tofts Ness with jabs and incised lines is similar to that from H2 Scord of Brouster and H1 Ness of Gruting and that from phase 4 like the decorated pottery from Kebister (MacSween pers comm).

Table 8.2 lists the presence of the stone artefacts from both dated and undated sites in Shetland. At all sites, with the exception of Clickhimin (Hamilton 1968), both flaked stone bars and ard

points are present whilst cobble tools and stone discs are also common. The broadest pattern is that which associates handled clubs with chipped laminated objects such as rectangles and the other types of shaped laminated pieces. Stone balls occur at the sites of Scord of Brouster (Rees 1986a), Stanydale Temple (Calder 1905) and Ness of Gruting (Calder 1956). Only at Scord of Brouster are these associated with handled clubs. At Benie Hoose (Calder 1961), Sumburgh and Jarlshof (Hamilton 1956) the handled clubs are also associated with the shaped laminated objects such as the lobate pieces and heart-shaped pieces (a heart-shaped piece and a lobate object from Kebister are unstratified). Cleavers or knives from Sumburgh, Catpund (Ballin-Smith nd), Kebister, Punds Water and Jarlshof are associated with handled clubs too. At Clickhimin heart-shaped objects were numerous. Also of note are two ground stone discs with bevelled edges from Benie Hoose which are similar to those from March Cairn (Zet 27) as well as the flattened cylinder from Punds Water which may have parallels with those from Upper Scalloway, Calf of Eday and Tofts Ness.

Comparison of the stone assemblages with the different ceramic assemblages suggests that the stone balls are of an early bronze age date whilst handled clubs and/ or shaped laminated material appear later in the bronze age. The stone assemblages which include handled clubs and shaped laminated materials are most numerous and strikingly similar in composition; this is in contrast to the ceramics which appear to vary in form from site to site.

8.3.5 Shetland iron age

At Wiltrow finds of flaked stone bars and ard points were associated with an iron smeltery (Curle 1936b). The smithy was in a very ruinous condition and the finds were mingled with slag. The excavator however asserts that the 'iron furnaces were not constructed in the ruins of a building from an earlier epoch ... The iron and the pottery were on the same floor level' (ibid, 167). This point may be disputed particularly as slag was also found in the nearby dwelling which was most certainly earlier and that in fact some of the pottery was similar between the two sites (ibid, 160). At Scord of Brouster it was noted that many artefacts were found from wall core or in rubble

filling the house interiors, or even appeared in mounds of stone piled up against the houses (Whittle 1986). Similar contexts of deposition have been noted at many other early house sites such as Ness of Gruting, and it would appear that the flaked blanks were particularly susceptible to this form of redeposition. It is most likely that the artefacts from Wiltrow were in fact related to earlier activity and that the later iron age industry was indeed imposed on earlier buildings, despite the assertion of the excavator, and were mixed with the finds from the earlier activity due to their contexts of deposition. Alternatively, since only flaked stone bars and ard points were recovered from the Smithy it is possible that the structure was built using material from a more ancient clearance cairn; at Scord of Brouster finds from the excavated clearance cairns comprised only flaked stone bars and ard points.

8.4 Summary and Conclusions

Using the available radiocarbon dates some broad observations regarding artefact chronology can be made. Firstly, ard points and flaked stone bars, as well as objects of chipped laminated material were all in use in Shetland long before their appearance in Orkney (fig 8.7). The first use for these artefacts in Orkney is around 1800-1500 CAL-BC. Secondly, the most numerous artefact types: Skaill knives, flaked stone bars, ard points and some of the chipped laminated objects continued in use over several millennia. Finally, the composition of the assemblages can be used with a degree of success to define the period but there are still differences between sites which are most certainly of a functional nature.

It has, however, proved very difficult to apply these observed chronological patterns to the undated sites. Since many of these sites have, or appear to have, been in use over a long period of time the probability of these assemblages being formed from multiple occupations must not be disregarded. There are also great problems in determining the level of artefact residuality in the multi-occupation sites and thus in refining the artefact chronology. The recently excavated site at Scord of Brouster which spans two millennia shows that with good excavation and interpretation differences in stone assemblage composition between contexts may be discerned. At other less

well excavated sites the final assemblage most probably does not reflect the original spatial and temporal variation.

Chapter 9

SITE ACTIVITY AND SOCIAL CHANGE

It is clear from the preceding discussions of context and chronology that there is much variability in the patterning of the coarse stone artefactual assemblages. The question remains as to how these patterns may have been produced. In a sense, all of the information which has been presented is inextricably linked, but in order to rationalise it the following sections take different approaches. The site activities are discussed first, followed by an examination of the extent of the links in prehistory between Orkney and Shetland. The final discussion explores aspects of social change in relation to the evidence from the coarse stone assemblages.

9.1 Site Activity

9.1.1 Neolithic

There is clearly a close association at Orcadian sites between middens and the presence of large quantities of artefacts and this raises questions about the development and use of the midden heaps themselves. Although many of the midden layers may be assumed to be secondary because of their relationship with structures and field-systems, there are large middens from several sites which appear to be relatively undisturbed by secondary use and it is these which have the largest numbers of artefacts. Some of the middens may indeed have functioned as simple rubbish dumps but in other cases there is evidence that the midden surfaces themselves were the location for specific activities.

Certainly at the Links of Noltland there is evidence for a flint knapping floor and a clay oven on the surface of the West Midden (Sharples 1982). There is also evidence for the manufacture and use of Skaill knives on the middens too. The large amounts of waste flakes in specific midden contexts at Links of Noltland and Skara Brae were most probably generated by the shattering of cobbles in situ in order to produce Skaill knives, whilst, at a very recent excavation of an eroding sea-section at Skara Brae a thin layer of midden was revealed over which were scattered Skaill

knives and butchered bone in close association, the likely function of which was a butchery site (Richards pers comm). It is likely then that in many cases Skaill knives were used and discarded close to the point of production and that the surface of the midden served as the base for processing activities.

Although the full functional repertoire of the Skaill knives has not been determined the evidence suggests that they were closely involved in butchery practices. The large assemblages of Skaill knives which are present in some of the middens may represent individual episodes of work such as butchering, and the numbers involved in such use would soon add up to the hundreds which are present at many sites. Alternatively, they may indicate a batching of processing activities: perhaps a large number of carcasses were butchered together. There is some evidence from Skara Brae for the management of cattle herds by slaughtering year-old animals (Clarke and Sharples 1990, 75); such activity may have been limited in time and space, thereby creating a concentration of tools and butchery waste.

Certain processes such as butchering may also have involved more complex discard practices. As only a small proportion of the Skaill knives from each assemblage have clear evidence for wear traces, the remainder appearing relatively fresh and unworn, they consistently appear to have been produced in quantities exceeding requirements. However, it seems unlikely that such a large number of tools should remain completely unused and it is possible that many of the Skaill knives with no immediate sign of edge damage were instead only briefly employed. That these were then discarded before they had reached the end of their functional life suggests that they were abandoned after a particular episode of butchering and they were not re-used later as they were considered unclean and therefore unfit for further use.

The presence of large numbers of stone discs compares with the dominance of Skaill knives at Skara Brae and Pool. Like the flakes, the stone discs are most numerous in the undisturbed middens. The stone discs from Pool suggested that they had been used on pots over a fire, and

their presence in middens may point to cooking activities on the midden surface. In other cases though, the stone discs may have been utilised in a different manner. At Skara Brae there are a large number of broken discs in the middens. These could reflect discard practices, but their presence may also be explained by the use of these pieces as a form of paving over the midden in order to consolidate the surface. This begs the question of whether the stone discs were redeposited after their initial use as pot lids, or whether they were shaped with the original intention of being paving slabs. Many of the discs from Skara Brae are very large and have a very angled outline, this is in contrast to those from Pool which are more circular in plan. It is possible that many of these stone discs from Skara Brae were not intended as pot lids at all.

Two artefact types; the Skaill knives and stone discs, are notable by their absence from Barnhouse. Although a few stone flakes are present, it is not certain whether they were produced intentionally, or whether some may be a by-product of heat damage or hammerstone use. It could be argued that Skaill knives were not present at Barnhouse because, being an inland site, the inhabitants did not have easy access to the extensive deposits of beach cobbles. However, it is unlikely that this is the immediate cause given also the distinct absence of stone discs. These two artefact types are most commonly associated with extensive midden deposits which are absent at Barnhouse. Although the middens may since have been destroyed, it is likely that the lack of middens and associated artefacts is linked and that at Barnhouse the activities which the Skaill knives and stone discs represent were either not carried out or else different raw materials were being used.

From the evidence it would appear that certain specific activities were being carried out at Barnhouse which are not common to other neolithic sites. A particular feature of the assemblage is the number of objects which bear traces of wear in the form of grinding, either produced intentionally in order to shape the piece, or as a by-product of use. Those which have been used as tools are varied in form and it is unlikely that they were all used in the same way; the smaller tools may have been used for sharpening or burnishing whilst the larger pieces may have been

used as grinders. These larger slabs may have been used in the production of artefacts such as the bifacially ground slabs or even the axes, but there is little evidence on site for the presence of partially worked objects with which to confirm this supposition. No bone survives from this site to show whether it, too, was being worked by grinding.

The only dated site from neolithic Shetland, Scord of Brouster, has a very different assemblage to the Orcadian sites comprising mainly flaked stone bars and ard points: the tools of cultivation. There is some evidence that the other artefact types in this assemblage appear later on in the settlement, these are not considered at present.

The evidence from Scord of Brouster shows that, whilst flaked blanks appear in almost every type of context, they occur together in similar proportions in each context. Not only does this strengthen the hypothesis that these tools were used together but it also suggests that a particular number of flaked stone bars were produced for every ard point and that this is a constant. This is further augmented by the evidence from some later sites that flaked stone bars and ard points are represented in similar proportions in each assemblage.

The proportional similarity of these tillage implements in contexts at Scord of Brouster also suggests that all of these tools, rather than just a fraction of them, were being taken from their original point of use and redeposited as building material in house construction. Others may represent stores of these artefacts, as for example those found internally or in stone accumulations around the house. Either way, they were clearly not left to lie around and they appear to have been quite carefully collected and re-used. Unlike the ard points there is little evidence for the curation of flaked stone bars and many of these tools appear to have been little or under-used prior to abandonment. As with the Skaill knives, the large quantities of flaked stone bars may have accumulated through particular episodes of work the completion of which, for whatever reason, did not allow for the further use of the tools.

Discussion of funerary and other rituals is more or less confined to the material from Orkney

because of the lack of data for Shetland. In Orkney there is a cross-over between funerary and domestic contexts, not only in the similarities of structural form between the houses and chambered cairns (Davidson and Henshall 1989, Richards 1990) but also in a small number of stone artefacts from the sites. The similarity of the sculpted objects found at Pool to those from the chambered cairn at Quoyness is of interest particularly when it is noted that a small, stubby ground disc was also found at each site, the only instances of these in neolithic Orkney. That these sites are both on the same island, Sanday, suggests that the sculpted objects are totemic or representational of place or kin. The few other artefacts which have been found within chambered cairns appear to be of a more domestic nature; at Quanterness, the artefacts are scattered throughout the various layers and they do not appear to have been deliberately deposited, rather they were abandoned at the point of use.

Several Grooved Ware sites: Pool; Barnhouse; Links of Noltland; and Rinyo, have later structures which are larger in size than the earlier houses and which appear to be more communal or monumental in design (Hunter et al forthcoming, Richards 1990, Sharples 1982). At Barnhouse there is a close association between artefact type and the larger structures. Here, certain objects such as the multi-hollowed cobbles, shaped stones, bifacially ground cobbles and stone balls were found in or around H2 and S8 in contrast to their relative absence from the rest of the site. At Links of Noltland there is little evidence that the stone assemblage from Grobust was different to that from the West Midden, but all of the most finely retouched Skaill knives were from this structure. At Pool none of the sculpted objects were directly associated with the later large structure though all came from the latest phase of the site.

At Skara Brae there is an instance of a decorated Skaill knife, incised with lozenges, being deposited with a distinctive assemblage of other finely made objects together in the final layers of an earlier house (Saville 1994). The excavator has suggested that this is a deliberate deposit marking the abandonment of the house (Clarke pers comm).

With the exception of two flaked stone bars placed at each end of the facade of Isleburgh chambered cairn there is no other evidence for the use of stone artefacts in use during funerary rituals in Shetland.

Summary

The evidence from the Orkney assemblages shows the use of stone tools for a wide range of activities including butchery practices, flint knapping, processing, and in their use for the manufacture of other artefacts. The assemblage from the site at Barnhouse appears functionally different from the midden sites, and the several borers and grinders from the Knap of Howar again suggest a use of differing processing activities at this site. Stone objects are also used in ritual activities at these sites, both within the settlements, and in forming links between funerary and domestic contexts.

In contrast the assemblage from Scord of Brouster shows a dominance of agricultural tools with only the cobble tools as evidence for the processing of other materials, for example in the manufacture of the flaked blanks themselves and quartz knapping. No decorative or finely-produced objects have been made in stone apart from a number of stone balls which appear rather rough in form.

9.1.2 Bronze age

The coarse stone assemblages from this period in the Northern Isles take quite a different form to those from the neolithic and clearly suggest a change in activities on the sites. Most notable is the appearance in Orkney of tillage implements such as flaked stone bars and ard points. New types of cobble tool such as the pounder/ grinders appear whilst faceted cobbles and flaked cobbles become more common to both Shetland and Orkney.

In Shetland the use of the tillage implements carries on from the earlier period but there is also the introduction of handled objects such as clubs and cleavers and also the first use of shaped

laminated materials from about 2100 CAL-BC. These latter objects also appear in Orkney but in smaller numbers and at a later date. The contextual information for the handled objects and shaped laminated pieces suggests that, in contrast to the tillage implements, they were used within the area of settlement rather than in the field systems.

There are some points of similarity from earlier assemblages and these are the continued use of some cobble tool types, which most probably reflect the continuation of flint and quartz knapping, as well as the use of Skaill knives. Here, the close association noted during the neolithic between middens and the occurrence of Skaill knives continues, as these artefacts are most numerous in the midden deposits at Tofts Ness and Jarlshof.

Contextual detail is lacking for many of these bronze age sites and so it is not understood how the assemblages formed. The only apparent difference between the Orcadian sites is in the contrast between assemblages from the burnt mounds and settlement sites. At Liddle and Beaquoy flaked blanks were lacking and most of the assemblage was formed by cobble tools. At Tofts Ness, however flaked blanks were particularly common. There was no such differentiation in assemblage composition between the burnt mound at Tougs and the other settlement sites in Shetland and this may in part be due to the presence of a settlement site in close proximity.

The bronze age assemblages from Shetland show quite a high degree of similarity in composition. The only observable differences are those assemblages which have handled clubs and chipped laminated material, and those which have not. As yet it is uncertain as to whether this is a chronological or functional difference. It should be noted that at Kebister, two different excavated areas in the same phase of the site exhibited assemblages with the above separating characteristics.

There are no recorded observations for the ritual deposition of stone artefacts in settlement sites of this period. Although many objects are found in wall-core or as drain-linings, their context of

use is so clearly practical that it is easier to consider no other reason for their occurrence. However, it is interesting to question why these objects, and these are mainly the ard points and flaked stone bars, should be collected at their point of abandonment and, presumably, brought back to the settlement for incorporation into structures. They may indeed have been useful because they were of a suitable size and shape for building purposes. Alternatively, the ard points and flaked stone bars may have had an invested meaning, a symbol of place, or of the past. Perhaps, like the midden makers of the Grooved Ware, they made a deliberate attempt to surround themselves with their own 'waste' (Sharples pers comm).

There is little evidence that stone was sculpted or decorated during the bronze age and, aside from the 'phallic' objects from Tougs and Calf of Eday, and the cylindrical stones from Tofts Ness, Punds Water, Calf of Eday and Upper Scalloway there are no other objects which appear to be anything other than tools.

Flaked stone bars and ard points are also part of the ritual at burial sites of this period. There is some evidence, which is considerably enhanced by the most recent excavations, that these artefacts were placed deliberately on the kerbs of burial mounds. At the chambered cairn of Isbister, a cache of tools including flaked stone bars, ard points, a handled club and cobble tools may be associated with the burials inserted into a cist in the later wall. It seems increasingly likely that, at least in Orkney, the inclusion of agricultural implements was an important aspect of the burial ritual. Instances of non-agricultural implements at funerary sites are the 'cleavers' from the flat cremation cemetery at Knowes of Quoyscottie. A lobate object from Taversoe Tuick is not directly associated with the later cists but it may derive from this period, though Clarke regards this as an earlier object by its similarity to those from Skara Brae (Clarke 1983). In Shetland there is no funerary evidence from this period.

9.1.3 Iron age

The iron age assemblages from both Orkney and Shetland fall into two separate groups: those

with flaked blanks and those without flaked blanks. With the single exception of Howe, all of the other sites which have flaked blanks in their assemblage have clear evidence for an earlier bronze age settlement (Tofts Ness, Skaill, Bu, and Kebister). Those sites without such objects appear, at least during excavation, to be spatially divorced from an earlier, bronze age settlement (Quanterness, Pool, Pierowall). That iron age sites with flaked blanks are closely associated with bronze age sites raises the question of whether these artefacts are residual, or whether they continued in use during the iron age. At Tofts Ness there is a rapid fall-off of these artefacts in the early part of the iron age and, by their contexts, many may be regarded as residual. At Kebister, too, by the end of the period they had been superseded by more classic iron age artefacts. The residuality of these forms at Skaill was also demonstrated in the late iron age/ Pictish period of area 6 but since this assemblage appears to be so classically bronze age, in terms of size and content, it is possible that most of it may be completely residual, or, indeed, that this site may actually date from the bronze age.

The evidence may suggest that flaked stone bars continued in use throughout the iron age, though in much smaller numbers, whilst the use of stone ard points ended earlier on. At Howe and, possibly, Bu the flaked stone bars are not associated with ard points although the contexts of the flaked stone bars indicates that they were certainly in use during this period. The continuing use of another artefact form from earlier periods is shown by the Skaill knives which were found in iron age contexts at Tofts Ness.

Aside from the flaked blanks, the iron age assemblages demonstrate quite a change, from the earlier periods, in activities which involve the use of stone. They are dominated by cobble tools, usually classic pounder/ grinder forms or else cobble tools of a larger size than previously. The lack of smaller cobble tools must, in part, reflect the cessation of flint or quartz knapping during this period. Also 'new' to this period are the Group A cobbles. The sizeable assemblage of these tools from Upper Scalloway certainly indicates that the activity with which they were involved, perhaps the crushing or pulping of vegetable or animal substances, was common at least at this

site. The occurrence of pebbles and cobbles with an incidental 'polish' on them also indicates different activities: as these tools are often small and of a hard-grained rock they must have been used with a similarly hard material to create the polish.

Stone discs are also most common in this period, particularly the smaller ones. If they were used as pot lids, then they may reflect an increasing use of storage throughout this period.

Stone was clearly worked into quite fine forms. Although none of the following artefacts have been discussed here, perforated stones such as spindle whorls, weights, whetstones and rotary querns, are common to many iron age sites, whilst pecking and grinding was also used to shape these artefacts as well as some of the stone discs. The use of sandstone for the hollowed stones also indicates that durable containers were required. A comparison of those hollowed stones with 'vessels' of steatite may help to elucidate their function.

There is so little comparative information from excavations of brochs and the later iron age settlements from both Orkney and Shetland that the activities on these sites cannot really be compared. Certainly, the evidence from Upper Scalloway suggests that there were different activities within the broch to those in the external settlement. This difference is mainly in relation to stone objects of finer workmanship and less practical function which are more or less exclusive to the broch itself.

9.2 Orkney and Shetland: Links in Prehistory

There is little similarity between the coarse stone assemblages from the neolithic sites in Orkney and that from the settlement of the same age at Scord of Brouster in Shetland. Apart from the presence of comparable cobble tools and stone discs, these assemblages diverge strikingly on the basis of the manufacturing techniques which were used for the rest of the artefact types. In Orkney, flakes made for use are very common, as are artefacts which have been formed by

grinding: Knap of Howar grinders; Knap of Howar borers; ground-end tools; the sculpted objects; and ground cobbles. There is some evidence for the flaking of cobble blanks in the neolithic but these pieces are neither very common nor so regularly produced as in the bronze age. In contrast, the assemblage from Scord of Brouster has none of these attributes, instead being composed of flaked blanks.

The divergence in the manufacturing techniques of coarse stone artefacts between neolithic Orkney and Shetland compares with the contrast in stone axe production between these island groups. In Orkney there is no evidence for the use of flaked blanks for axes. With the exception of two questionable objects from Pool, all of the axes appear in a completely finished state or else have been flaked through re-use. The axes are all small, especially in relation to those from the Shetland neolithic, and are more often than not made on a sedimentary or softer volcanic rock. It would appear likely that, rather than having been flaked to shape and then the blank ground or polished, they have been simply ground to shape from a suitable pebble or cobble. On Shetland the axes are larger (Ritchie 1992) and tend to be made on metamorphic rock. There is evidence that the blanks were quarried from outcrops (Scott and Calder 1952) before being flaked to shape and then polished.

It would seem then that flaking a blank to shape was not a manufacturing alternative for whatever reasons in neolithic Orkney and that instead selected cobbles and pebbles were being ground to shape. In Shetland, the blanks for pieces such as flaked stone bars and axes were quarried and these pieces were then shaped by flaking.

It is not until the bronze age that flaked blanks form a major constituent of the assemblages from Orkney and it is increasingly likely that the ard points and the associated artefact type, flaked stone bars, were introduced into Orkney from Shetland at some point in the second millennium CAL-BC. Dates from Tofts Ness and Isbister place the first use of these pieces at 1800 - 1600 CAL-BC. At Tofts Ness the flaked stone bars were made on cobble blanks rather than being

quarried from an outcrop and this would appear to be an adaption to the local raw material.

There is certainly evidence from other aspects of the Orcadian material culture at this time for a Shetland influence. The steatite for the vessels or, as in the case of Quandale, 'plugs,' which are included in Orcadian funerary rites from this period was most likely to have derived from its nearest source which is Shetland (Sharman 1990). Although flaked stone bars and ard points are also associated with burial mounds, only at one mound, Gyron Hill, have a steatite vessel and an ard point been found together (Watt 1885); at all other mounds, stone artefacts and steatite vessels appear to be mutually exclusive. Metal work also has Shetland connections (Ovrevik 1985, 43) whilst the ceramic assemblage from this period at Tofts Ness has similarities with several bronze age assemblages in Shetland (MacSween pers comm).

In Shetland, objects such as handled clubs and cleavers and those of chipped laminated material come into wide use during the bronze age but here the first certain dates for their use are some 300 years earlier than those found on Orkney. Such objects are less common on Orcadian sites of this period though not unknown. Here, it should be noted that at Skara Brae a broken object, closely resembling a simple handled club, and a lobate object have been found, the former from a large midden layer in T2 and the latter outside the main settlement. The lobate object, similar to those from Shetland, may indeed be of a bronze age date, but this is not yet certain. The handled club is a problem because it would appear very early for such an artefact type, even for Shetland, and must remain an enigma for the present. Another enigma from Skara Brae is the collection of artefacts from period 4 of the site. These do not resemble any objects found at any other site but the presence of handled forms suggests that they are later than the Grooved Ware settlement. Whether they indicate links with Shetland must remain a mystery for the present.

There is scant evidence from the coarse stone artefacts that the assemblages from Shetland were influenced by Orkney at this time. The production, by pecking and grinding, of the more complex forms such as handled clubs is certainly a new manufacturing technique, and the ard points may

also have been subject to finer manufacturing methods. It is of interest too, that during the bronze age in Shetland the Shetland knives: ground and polished flakes of similar material to that used for the axes, become prominent. All of these manufacturing strategies were employed during the neolithic in Orkney. However, the dates from Shetland suggest that these artefacts were in use several hundred years before the first dated appearance in Orkney of flaked blanks and, that if these manufacturing techniques were influenced by contact with Orkney, then it was a different form of contact to that which later caused the uptake of flaked blanks.

9.3 Aspects of Social Change

The interpretive sections of this work are hampered by the lack of information concerning other aspects of the prehistoric material culture from the Northern Isles. It is little understood, for example, how the coarse stone artefacts functioned in relation to the other objects or materials. Also, the survival of the coarse stone assemblages, at the expense of other, less durable, artefacts may have given these objects an importance and central role in interpretation which they do not merit. At a basic level the assemblages can be interpreted as reflecting the 'economic' activities with which the various tools were associated. However, any discussion of social change is limited by a strict functional approach; using such reductionist principles the normal conclusions are that when a tool ceased to be used it was because the activity was not carried out any more or that other materials superseded the use of stone. Although there are most certainly elements of the discontinuation of practices and materials in the coarse stone assemblages, the view is taken here that the changes in the composition of the coarse stone assemblages throughout prehistory must reflect, to a degree, the broader aspects of social change during this period and this is what is discussed below.

The neolithic of Orkney is dominated by sites with Grooved Ware ceramic assemblages. Only two sites, Knap of Howar and Tofts Ness, have different ceramic assemblages, the former with round-based 'Unstan' bowls and the latter having a pottery assemblage, which at least in the latest

neolithic phases, is most similar to material from Shetland (MacSween pers comm). Much discussion has centred on the ceramic assemblages of Unstan and Grooved Ware and whether they represent a chronological division with the Unstan Ware preceding the Grooved Ware, or whether they were in contemporary use (Clarke 1983). MacSween has demonstrated that a tradition of round-based, shell-tempered pottery pre-dated and overlapped with the early Grooved Ware style at Pool (MacSween 1992) and the available radiocarbon dates do suggest a chronological overlap of Unstan and Grooved Ware between sites (Clarke 1983).

The perceived problem of the Unstan and Grooved Ware is that it is assumed that these ceramics represent two differing communities and, as Clarke has pointed out, it is the nature of their interaction which is of most interest (Clarke 1983, 53). Clarke noted that the assemblages from Skara Brae and Knap of Howar shared no tools except for the most common ones (ibid 53) but more recent excavations have demonstrated the presence of two specific stone artefact forms from Knap of Howar, the Knap of Howar borer and the Knap of Howar grinder, at other sites: single finds of borers have been found at Links of Noltland and Pool, and grinders at Pool and Tofts Ness, all in contexts from later phases of the sites. Although there are round-based bowls at Pool, these are from the earliest phase. It seems likely that whilst these borers and grinders are not as common at these sites as they are at Knap of Howar, they cannot be regarded as indicative of an early assemblage because they are certainly from later contexts.

Despite its proportional dissimilarity of artefact types to other sites, the stone assemblage from Knap of Howar does not necessarily reflect a specific 'cultural' or chronological group as all the artefact forms are present in later Grooved Ware assemblages. Similarly at Tofts Ness the neolithic stone assemblage, though lacking any decorative element, is to all intents and purposes the same in composition as those from the later Grooved Ware sites. Alternatively, the stone assemblage from Barnhouse is so different from the other Grooved Ware assemblages that without the ceramic evidence it could easily be suggested that this was a product of a different culture or society. All the evidence shows that in comparison to the ceramics, there is a degree of

contrast and overlap between the various neolithic stone assemblages which is not the product of chronology. Although these in part reflect functional differences on sites, as say between Barnhouse and Skara Brae, they also indicate common ground between groups which have previously been defined solely on the basis of different ceramic styles.

The Grooved Ware period in Orkney is rich in material culture remains, and decorative elements are common to almost every type of raw material which was used: ceramics; bone; shell; and stone. The scant evidence from the stone objects suggests that the complex, three-dimensional, sculpted objects coincided with the final phase of ceramics; that with decorative rims and applied ornamentation. This would imply that these populations had by this time developed very skilled and complex levels of self expression or interpretation in all of the available materials.

There is no denying that at its very height, the Grooved Ware material culture seem to have disappeared. There is certainly evidence for the re-use of some of these sites but these are rather ephemeral remains. At Links of Noltland there is a 'Beaker' midden lying over a socketed wall outside the West Midden (Sharples 1982), at Pool the final phases of the neolithic settlement are indicated by rough walling outwith the main site (Hunter et al forthcoming), and at Skara Brae there is also a series of walling external to the main settlement (Shepherd 1993) as well as later walls over the Market Place (Childe 1931b). Stone artefacts are few in these contexts and only at Skara Brae are there artefacts which appear to be of a post-neolithic date. Where there is evidence at these sites for later settlement proper it is not until the iron age, as at Pool.

The only neolithic site on Orkney with a certain bronze age settlement is that at Tofts Ness. It is of interest then that this site, which does not have Grooved Ware pottery and instead shows some similarity in ceramics with Shetland during the later neolithic phases, should also have a fully developed bronze age assemblage which includes stone artefact types in common use during the neolithic of Shetland. This suggests that there was some neolithic settlement in Orkney which was more readily open to subsequent social change or development because their contacts were

more widespread in this period. In contrast, the Grooved Ware material culture shows no clear evidence for such links with Shetland though Clarke noted parallels in the bone-work between Skara Brae and possible neolithic deposits at Jarlshof (Clarke 1983, 55). The conclusion reached is that the neolithic society of Orkney was one in which separate 'cultures' as represented by differing ceramic styles had, to all intents and purposes, a similar set of site activities as represented by the stone assemblages. At the end of this period the sites with Grooved Ware ceased to be settled whilst that at Tofts Ness continued into the bronze age and later.

The nature of the change from neolithic to bronze age in Orkney may be explored by examining the reasons for the uptake of stone cultivating implements. In contrast to neolithic Shetland there is no evidence for the use of stone agricultural tools during this early period in Orkney. Nevertheless, there is certainly evidence for cultivation during the neolithic with ard marks from Pool (Hunter et al forthcoming), Skara Brae (Shepherd 1993) and Links of Noltland (Clarke and Sharples 1990, 73). However, no stone tools have been recovered which could remotely be assigned a tilling function. It is probable that bone was used for ard points as a bone 'point' was found in one of the ard marks at Links of Noltland (N Sharples pers comm). The ard marks have been found in soil which is light and sandy (ibid, 75) and to which has been applied midden, not only to fertilise it, but presumably to provide stability and structure. Bone would be a suitable material for ard points, being easily shaped and tractable in the light soil. In contrast the soils being cultivated at the neolithic Scord of Brouster were heavier and more stony (Romans 1986, 130) and would have been more easily cultivated with stone ard points. The uptake of stone for ard points and flaked stone bars in the Orkney bronze age may therefore have been a reaction to the cultivation of heavier soils with the gradual incursion of settlements into more upland areas. However, at Tofts Ness where the settlement, on sandy soil, continues from the neolithic this is not necessarily the case. The use of stone for the tillage implements at this period may reflect a change in animal husbandry. Perhaps, during the neolithic in Orkney, emphasis was placed on the butchery of animals, freeing the bone for use in tool manufacture whilst during the bronze age the animals may have been kept, either to a less intensive degree, or for their secondary products

which would have meant less reliance on their meat, hide and bone.

The use of stone rather than bone for tillage implements may also have had more complex social reasons and may reflect the wholesale acceptance of external influence and the social attitudes and structure that went along with it. That tillage implements were thought of as more than purely functional items to the bronze age society of Orkney is seen by their use in funerary rites at burial mounds where they associated their dead with agrarian tools. Further messages of the importance of agrarian tools could be interpreted from their inclusion within structures in settlement contexts. Here, the caches of carbonised grain found in the walls at the Shetland house site at Ness of Gruting (Calder 1956, 353) may further emphasise the subliminal importance of agrarian practices to the society. The occasional use of chambered cairns for later burial rites is indicated by the presence of inserted cists and at Isbister the cache of bronze age stone tools may be associated with the burials. Although it is not known whether the population of neolithic Tofts Ness buried their dead in chambered cairns this re-use of funerary sites into the bronze age may indicate social links between the earlier populations and those of the bronze age.

In Shetland there is less information available with which to investigate social change. At Scord of Brouster, the only neolithic site to have been certainly identified, the settlement from the bronze age developed on that of the neolithic with only the radiocarbon dates to identify it. The use of dating pointed out differences in the stone assemblages from these later phases which may otherwise have been missed. This later assemblage differs from the earlier one by the addition of several other artefact types to none of which can be assigned a specific function at present.

Unlike the ceramics from this period in Shetland which vary widely in style and assemblage composition from site to site, the bronze age stone assemblages are very similar and suggest that some practices were in widespread use throughout Shetland in this period. The relative uniformity of the stone assemblages may even point to a society which at this time was stable; one which was formed of small groups identifying themselves through the ceramics but one

which formed itself into a larger whole through the common use and deposition of stone artefacts.

The coarse stone artefacts which have been selected for study here comprise all those which occur during the neolithic and bronze age whilst including only a few of the stone artefact types which were in use during the iron age. It is therefore difficult to assess the social implications of the developments in the iron age stone assemblages on the basis of only partial evidence. Indeed, the examination of the use of stone for tools during this period is a work in itself. With this in mind aspects of social change in the iron age are not discussed here and the matter rests on the remarks made in the discussion of site activity in this period.

This work has been concerned with just one part of the prehistoric artefactual remains: the coarse stone tools. It is clear that the lack of reference to the other material culture remains is a limiting factor to any conclusions reached regarding the wider implications of social change. It is hoped that it does, at the very least, provide a basis for future work on other aspects of the prehistoric material culture from the Northern Isles.

REFERENCES

Ballin-Smith, B. (ed) 1994. **Howe: Four Millennia of Orkney Prehistory**, Soc. Antiq. Scotl. Monog. 9, Edinburgh

Ballin-Smith, B. nd. **The finds from Catpund, Shetland**, Unpublished MS.

Bruce, J. 1907. 'Notice of the excavation of a broch at Jarlshof, Sumburgh, Shetland', **Proc Soc Antiq Scotl** 41 (1906-7), 11-33.

Buteux, S. 1992. **The Excavations at Skaill, Deerness**, Unpublished MS.

Calder, C.S.T. 1937. 'A Neolithic double-chambered cairn of the stalled type and later structures on the Calf of Eday, Orkney', **Proc Soc Antiq Scotl** 71 (1936-7), 115-154.

Calder, C.S.T. 1938. 'Excavations of three Neolithic chambered cairns - one with a lower chamber - on the islands of Eday and the Calf of Eday in Orkney', **Proc Soc Antiq Scotl**, 72 (1937-38), 193-216.

Calder, C.S.T. 1939. 'Excavations of Iron Age dwellings on the Calf of Eday in Orkney', **Proc Soc Antiq Scotl** 73 (1938-39), 167-185.

Calder, C.S.T. 1950. 'Report on the excavation of a Neolithic temple at Stanydale in the parish of Sandsting, Shetland', **Proc Soc Antiq Scotl** 84 (1949-50), 185-205.

Calder, C.S.T. 1955. 'Excavations in Whalsay, Shetland', **Proc Soc Antiq Scotl** 88 (1953-55), 28-45.

Calder, C.S.T. 1956. 'Report on the discovery of numerous Stone Age house-sites in Shetland', **Proc Soc Antiq Scotl** 89 (1955-56), 340-397.

Calder, C.S.T. 1961. 'Excavations in Whalsay, Shetland 1954-55', **Proc Soc Antiq Scotl** 94 (1960-61), 28-45.

Calder, C.S.T. 1963. 'Cairns, Neolithic houses and Burnt mounds in Shetland', **Proc Soc Antiq Scotl** 96 (1962-63), 37-86.

Callahan, E. 1987. **An Evaluation of the Lithic Technology in Middle Sweden during the Mesolithic and Neolithic**, Uppsala. (=Aun 8).

Callander, J.G. and Grant, W.G. 1934. 'The Broch of Midhowe, Rousay, Orkney', **Proc Soc Antiq Scotl** 68 (1933-34), 320-350.

Carter, S.P., Haigh, D., Neil, N.J.R., Smith, B. 1984. 'Interim report on the structures at Howe, Stromness, Orkney', **Glasgow Archaeol J** 11, 61-73.

Childe, V.G. 1930. 'Operations at Skara Brae during 1929', **Proc Soc Antiq Scotl** 64 (1929-30), 158-191.

Childe, V.G. 1931a. 'Final report on the operations at Skara Brae', **Proc Soc Antiq Scotl** 65 (1930-31), 27-77.

Childe, V.G. 1931b. **Skara Brae: A Pictish Village in Orkney**, London.

Childe, V.G. 1938. 'Excavations carried out by HM Office of Works in the Bronze Age levels at Jarlshof in 1937', **Proc Soc Antiq Scotl** 72 (1937-38), 348-365.

Childe, V.G. and Grant, W.G. 1939. ' A Stone Age settlement at the Braes of Rinyo, Rousay, Orkney', **Proc Soc Antiq Scotl** 73 (1938-39), 6-31.

Childe, V.G. and Grant W.G. 1947. 'A Stone Age settlement at the Braes of Rinyo, Rousay, Orkney (second report)', **Proc Soc Antiq Scotl** 81 (1946-47), 16-42.

Childe, V.G. and Paterson, J.W. 1929. 'Provisional report on the excavations at Skara Brae, and on the finds from the 1927 and 1928 campaigns', **Proc Soc Antiq Scotl** 63 (1928-29), 225-280.

Clarke, A. 1984. 'Stone tools', **in** N. Sharples 1984, 101-102.

Clarke, A. 1989. 'The Skaill knife as a butchering tool', **Lithics** 10, 16-27.

Clarke, A. forthcoming a. 'The coarse stone assemblages from Pool and Tofts Ness', **in** J.R. Hunter et al.

Clarke, A. forthcoming b. 'The coarse stone assemblage', **in** D.V.Clarke and A. Shepherd, **Skara Brae**.

Clarke, A. forthcoming c. 'The coarse stone assemblage', **in** D.V.Clarke and A.Shepherd **Links of Noltland**.

Clarke, A. forthcoming d. 'The coarse stone assemblage from Barnhouse', in C.C.Richards (ed.) **The Late Neolithic Settlement Complex of Barnhouse**.

Clarke, A. forthcoming e. 'The coarse stone assemblage', **in** O.A Owen and C.E Lowe (eds).

Clarke, A. forthcoming f. 'The coarse stone assemblage from Upper Scalloway', **in** N.Sharples, forthcoming.

Clarke, D.V. 1983. 'Rinyo and the Orcadian Neolithic', **in** A.O'Connor and D.V.Clarke (eds) **From the Stone Age to the 'Forty-Five. Studies presented to R.B.K. Stevenson**, 45-56, Edinburgh.

Clarke, D.V. nd. **The Neolithic Village at Skara Brae, Orkney 1972-73 excavations: an Interim Report**, Edinburgh.

Clarke, D.V., Cowie, T.G., Foxon, A. 1985. **Symbols of Power at the Time of Stonehenge**, Edinburgh.

Clarke, D.V. and Sharples, N. 1990. 'Settlement and subsistence in the third millennium BC', **in** C.Renfrew (ed.), 54-82.

Clouston, R.S. 1885. 'Notice of the excavation of a chambered cairn of the Stone Age at Unstan, in the Loch of Stennis, Orkney', **Proc Soc Antiq Scotl** 19 (1884-85), 341-51.

Cracknell, S. and Smith, B. 1983. 'Archaeological investigations at Mavis Grind, Shetland', **Glasgow Archaeol J** 10, 13-39.

Curle, A.O. 1932. Interim report on the excavation of a Bronze Age dwelling at Jarlshof, Shetland, in 1931', **Proc Soc Antiq Scotl** 66 (1931-32), 113-128.

Curle, A.O. 1933. 'Account of further excavation in 1932 of the prehistoric township at Jarlshof, Shetland, on behalf of HM Office of Works', **Proc Soc Antiq Scotl** 67 (1932-3), 82-136.

Curle, A.O. 1934. 'An account of further excavation at Jarlshof, Sumburgh, Shetland, in 1932 and 1933, on behalf of HM Office of Works', **Proc Soc Antiq Scotl** 68 (1933-4), 224-319.

Curle, A.O. 1935. 'An account of the excavation, on behalf of the HM Office of Works, of another prehistoric dwelling (No. 5), at Jarlshof, Sumburgh, Shetland in the summer of 1934', **Proc Soc Antiq Scotl** 69 (1934-5), 87-107.

Curle, A.O. 1936a. 'Account of the excavation of a hut-circle with an associated earth-house at Jarlshof, Sumburgh, Shetland, conducted on behalf of HM Office of Works in 1935', **Proc Soc Antiq Scotl** 70 (1935-6), 237-51.

Curle, A.O. 1936b. 'Account of the excavation of an Iron Age smeltery, and of associated dwelling and tumuli at Wiltrow in the parish of Dunrossness, Shetland', **Proc Soc Antiq Scotl** 70 (1935-6), 153-169.

Dalland, M. 1989. 'A rock-cut tomb at Sand Fiold, Orkney', **Annual Report 1989**, 4-6, Historic Scotland (AOC).

Davidson, D.A. and Jones, R.L 1990. 'The environment of Orkney', **in** C. Renfrew (ed) 1990, 10-35.

Davidson, J.L. and Henshall, A.S. 1989. **The Chambered Cairns of Orkney**, Edinburgh.

Edmonds, M. 1992. 'Their use is wholly unknown', **in** N. Sharples and A. Sheridan (eds), 1992, 179-93.

Fleming, A. 1995. 'St Kilda: stone tools, dolerite quarries and long-term survival', **Antiquity** 69, 25-35.

Fojut, N. 1983. 'Towards a geography of Shetland brochs', **Glasgow Archaeol J**, 9.

Fraser, D. 1983. **Land and Society in Neolithic Orkney**, Brit. Archaeol. Rep. 117, Oxford.

Goodier, R. (ed) 1975. **The Natural Environment of Orkney**, NCC.

Grant, W.G. 1937. 'Excavation of Bronze Age burial mounds at Quandale, Rousay, Orkney', **Proc Soc Antiq Scotl** 71 (1936-7), 72-84.

Hamilton, J.R.C. 1956. **Excavations at Jarlshof, Shetland**, Edinburgh.

Hamilton, J.R.C. 1968. **Excavations at Clickhimin, Shetland**, Edinburgh.

Hedges, J. 1975. 'Excavation of two Orcadian burnt mounds at Liddle and Beaquoy', **Proc Soc Antiq Scotl** 106 (1974-5), 33-98.

Hedges, J.W. 1983. **Isbister: a Chambered Tomb in Orkney**, Brit. Archaeol. Rep. 69, Oxford.

Hedges, J.W. 1986. 'Structures at Tougs, Burra Isle, Shetland', **Glasgow Archaeol J** 13, 1-43.

Hedges, J.W. 1987. **Bu, Gurness and the Brochs of Orkney**, Brit. Archaeol. Rep. 163, Oxford.

Hedges, M.E. 1977. 'The excavation of the Knowes of Quoyscottie, Orkney: a cemetery of the first millennium BC', **Proc Soc Antiq Scotl** 108 (1976-7), 133-155.

Henshall, A.S. 1963. **The Chambered Tombs of Scotland**, Edinburgh.

Hewat-Craw, J. 1934. 'a mound containing short cists at Trumland, Rousay, Orkney', **Proc Soc Antiq Scotl** 68 (1933-34), 68-70.

Hunter, J.R., Dockrill, S., Bond, J.M. and Smith, A.N. (eds) forthcoming. **Archaeological Investigations on Sanday, Orkney**, Edinburgh, Soc. Antiq. Scotl. Monog.

Kirkness, W. 1925. 'The discovery of a short cist at Rendall, Orkney', **Proc Soc Antiq Scotl** 59 (1924-25), 236-37.

Lamb, R.G. 1985. 'Sumburgh: prehistory under sand', **in** B.Smith (ed), **Shetland Archaeology**, Lerwick.

MacSween. A. 1992. 'Orcadian Grooved Ware', **in** N.Sharples and A.Sheridan (eds), 259-71.

Marshall, D.N. 1977. 'Carved stone balls', **Proc Soc Antiq Scotl** 108 (1976-7), 40-72.

Marwick, H. 1929. 'Some cist burials in Orkney', **Proc Soc Antiq Scotl** 63 (1928-9), 377-383.

Mather, A.S., Ritchie, W. and Smith, J.S. 1975. 'An introduction to the morphology of the Orkney coastline', **in** R.Goodier (ed), 10-18.

Mitchell, A. 1868. 'On some remarkable discoveries of rude stone implements in Shetland', **Proc Soc Antiq Scotl** 7 (1866-8), 118-134.

Mykura, W. 1976. **British Regional Geology: Orkney and Shetland**, Edinburgh.

Neil, N.R. 1981. 'A Bronze Age burial mound at Holland, St Ola, Orkney', **Glasgow Archaeol J** 8, 32-45.

Ovrevik, S. 1990. 'The second millennium and after', **in** C.Renfrew (ed) 1990, 131-49.

Owen, O.A. and Lowe, C.E. (eds) forthcoming. **Kebister, Shetland: the Archaeology of a Prehistoric and Medieval Farmstead**.

Petrie, G. 1868a. 'Notice of ruins of ancient dwellings at Skara, Bay of Skaill, in the parish of Sandwick, Orkney, recently excavated', **Proc Soc Antiq Scotl** 7 (1866-8), 201-19.

Petrie, G. 1868b. 'Notice of some rude stone implements found in Orkney', **Proc Soc Antiq Scotl** 7 (1866-8), 135-6.

Porter, D. 1992. 'Rough stone tools', **in** S.Buteux (ed) 1992).

Rees, S.E. 1979. **Agricultural Implements in Prehistoric and Roman Britain**, Brit. Archaeol. Rep. 69, Oxford.

Rees, S. 1986a. 'Stone Implements and Artefacts', **in** A.W.R. Whittle (ed.), 75-91.

Rees, S. 1986b. 'The rude stone implements', **in** J.Hedges 1986, 17-18.

Renfrew, A.C. (ed.) 1979. **Investigations in Orkney**, London.

Renfrew, C. (ed.) 1990. **The Prehistory of Orkney**, 2nd edn, Edinburgh.

Richards, C.C. 1990. 'Postscript: the Late Neolithic settlement complex at Barnhouse Farm, Stenness', **in** C.Renfrew (ed.), 305-16.

Ritchie, A. 1983. 'Excavation of a Neolithic farmstead at Knap of Howar, Papa Westray, Orkney', **Proc Soc Antiq Scotl** 113, 40-121.

Ritchie, G. and Ritchie, A. 1974. 'Excavation of a barrow at Queenafjold, Twatt, Orkney', **Proc Soc Antiq Scotl** 105 (1972-4), 33-40.

Ritchie, R. 1992. 'Stone axeheads and Cushion maceheads from Orkney and Shetland: some similarities and contrasts', **in** N.Sharples and A. Sheridan (eds), 213-220.

Romans, J.C.C. 1986. 'Soils', **in** A.W.R. Whittle (ed.), 125-131.

Scott, L.G. and Calder, C.S.T. 1952. 'Notes on a chambered cairn, and a working gallery, on the Beorgs of Uyea, Northmaven, Shetland', **Proc Soc Antiq Scotl** 86 (1951-2), 171-77.

Saville, A. 1994. 'A decorated Skaill knife from Skara Brae, Orkney', **Proc Soc Antiq Scotl** 124 (1994), 103-11.

Sharman, P. 1990. **Tuquoy Steatite Report**, unpublished MS, HM(AOC), Edinburgh.

Sharples, N. 1982. **Links of Noltland**, unpublished MS.

Sharples, N.M. 1984. 'Excavations at Pierowall Quarry, Westray, Orkney', **Proc Soc Antiq Scotl** 115 (1983-4), 75-125.

Sharples, N. forthcoming. **Upper Scalloway: Excavations 1989-90**.

Sharples, N. and Sheridan, A. (eds) 1992. **Vessels for the Ancestors: Essays on the Neolithic of Britain and Ireland in Honour of Audrey Henshall**, Edinburgh.

Shepherd, A. 1993. **Skara Brae 1972-3 and 1977: Contextual Information for Specialists**, MS.

Simpson, D. and Ransom, R. 1992. 'Maceheads and the Orcadian Neolithic', **in** N. Sharples and A. Sheridan (eds), 221-243.

Traill, W. and Kirkness, W. 1937. 'Hower, prehistoric structure on Papa Westray, Orkney', **Proc Soc Antiq Scotl** 61 (1936-7), 309-321.

Watt, W.G.T. 1885. 'Notice of the discovery of two cists with urns of steatite in the parish of Sandwick, Orkney', **Proc Soc Antiq Scotl** 19 (1884-5), 160-61.

Whittle, A.W.R. (ed.) 1986. **Scord of Brouster: an Early Agricultural Settlement on Shetland. Excavations 1977-9**, Oxford, Oxford Univ. Cttee Archaeol. Monog. 9.

APPENDIX : RADIOCARBON DATES

Calculation of calibrated ranges:
The calibrated dates are produced as histograms along the calendar year axis at five calendar year intervals. Each bar shows the probability for the date to fall within the five calendar year intervals. The Short Continuous Range (SCR) is the shortest continuous sequence of histograms that add up to >/= 68.26%. This figure is almost the same as the probability of a normal distribution for the one sigma range. The probability for the date to fall within the range is indicated (Prob.)

	Lab no.	Date	SCR	Prob.
Barnhouse:	1 OXA-3499	4590+/-75 BP	BC 3515 - BC 3270	68.38
	2 OXA-3763	4360+/-60 BP	BC 3025 - BC 2905	69.46
Beaquoy:	3 SRR-999	2461+/-80 BP	BC 715 - BC 390	68.89
	4 SRR-1001	3627 +/-65 BP	BC 2125 - BC 1935	69.02
Bu:	5 GU-1152	2440+/-65 BP	BC 655 - BC 390	68.89
	6 GU-1153	2545+/-65 BP	BC 845 - BC 660	68.47
Holland:	7 GU-1373	2945+/-60 BP	BC 1395 - BC 995	69.33
	8 GU-1374	2880+/-60 BP	BC 1260 - BC 905	68.61
Howe:	9 GU-1789	2405+/-70 BP	BC 550 - BC 380	68.71
	10 GU-1758	2255+/-95 BP	BC 405 - BC 200	68.55
	11 GU-1759	1940+/-60 BP	BC 5 - AD 125	68.64
	12 GU-1750	2070+/-50 BP	BC 155 - BC 15	69.59
	13 GU-1786	1975+/-55 BP	BC 20 - AD 110	68.71
	14 GU-1788	1935+/-55 BP	AD 5 - AD 125	68.99
	15 GU-1787	1670+/-65 BP	AD 285 - AD 445	68.31
Isbister:	16 GU-1187	3250+/-55 BP	BC 1610 - BC 1460	70.22
Kebister:	17 UtC-1149	2920+/-70 BP	BC 1265 - BC 1025	68.97

	18	UtC-1146	2200+/-100 BP	BC 400 - BC 160	68.83
	19	GU-2613	1730+/-90 BP	AD 210 - AD 430	68.47
	20	GU-2617	1680+/-50 BP	AD 310- AD 440	68.89
	21	GU-2620	1960+/-60 BP	BC 15 - AD 120	69.81
	22	UtC-1151	1910+/-110 BP	BC 5 - AD 235	69.23
	23	GU-2609	1400+/-50 BP	AD 615 - AD 670	70.95
Knap of Howar:	24	Birm-816	4770+/-180 BP	BC 3730 - BC 3340	68.62
	25	Birm-815	4520+/-130 BP	BC 3015 - BC 2710	68.87
Knowes of Quoyscottie:	26	UB-2158	2850+/-40 BP	BC 1060 - BC 920	68.29
	27	UB-2162	2850+/-85 BP	BC 1130 - BC 895	68.96
	28	UB-2161	3145+/-120 BP	BC 1530 - 1280	68.63
	29	UB-2163	2660+/-85 BP	BC 885 - BC 790	69.93
Liddle:	30	SRR-701	2826+/-75 BP	BC 1060 - BC 860	68.47
	31	SRR-525	2908+/-45 BP	BC 1200 - BC 1025	68.7
Links of Noltland:	32	GU-1429	4215+/-65 BP	BC 2920 - BC 2775	69.44
	33	GU-1430	3860+/-60 BP	BC 2480 - BC 2275	69.05
Mavis Grind:	34	GU-1508	1850+/-65 BP	AD 90 - AD 225	69.46
Pierowall Quarry:	35	GU-1580	2510+/-80 BP	BC 820 - BC 570	68.77
	36	GU-1581	2425+/-60 BP	BC 605 - BC 385	68.74
Rinyo:	37	Q-1226	3850+/-70 BP	BC 2465 - BC 2220	68.69
Scord of Brouster:	38	CAR-251	4540+/-65 BP	BC 3375 - BC 3165	68.42
	39	CAR-243	4095+/-70 BP	BC 2855 - BC 2575	69.02
	40	CAR-248	3665+/-75 BP	BC 2145 - BC 1945	68.89
	41	CAR-479	3420+/-70 BP	BC 1850 - BC 1670	68.53
	42	CAR-477	3310+/-60 BP	BC 1680 - BC 1520	68.38
	43	CAR-247	4130+/-80 BP	BC 2915 - BC 2645	68.59

	44 CAR-246	4145+/-70 BP	BC 2915 - BC 2680	68.88
	45 CAR-245	4345+/-85 BP	BC 3040 - BC 2885	69.16
Skara Brae:	46 Birm-795	4470+/-120 BP	BC 3375 - BC 2985	68.98
	47 Birm-437	3780+/-110 BP	BC 2385 - BC 2040	68.44
	48 Birm-478	3850+/-140 BP	BC 2550 - BC 2135	68.73
	49 Birm-793	4060+/-130 BP	BC 2855 - BC 2460	68.55
Sumburgh:	50 GU-1006	3629+/-53 BP	BC 2110 - BC 1945	68.93
	51 GU-1015	3500+/-153 BP	BC 2040 - BC 1665	68.4
Tofts Ness:	52 GU-2210	4480+/-70 BP	BC 3365 - BC 3075	69.03
	53 GU-2544	2470+/-50 BP	BC 805 - BC 540	69.13
	54 GU-2361	3390+/-60 BP	BC 1775 - BC 1625	69
	55 GU-2104	3270+/-50 BP	BC 1640 - BC 1510	68.31
Tougs:	56 GU-1111	3610+/-60 BP	BC 2055 - BC 1885	68.31
	57 GU-1112	2970+/-275	BC 1430 - BC 790	68.45
Upper Scalloway:	58 UT-1655	2030+/-40 BP	BC 85 - AD 15	68.81
	59 GU-2926	1330+/-70 BP	AD 615 - AD 710	68.94

APPENDIX B: DRAFT COARSE STONE REPORTS AND CATALOGUES

UPPER SCALLOWAY, SHETLAND: COARSE STONE REPORT

ANN CLARKE, JANUARY 1994

Chapter 2 Phase 1 activity

Pre-broch activity is represented by the sandstone slab associated with the cremation (4203, B.8.1). This slab is very fragmented and no indication of its original shape remains although it has been included in the stone disc category. It has the largest dimension of all the stone discs at 320mm.

There are also a few objects, recovered from later broch deposits, which may be derived from earlier contexts: the axes; the ard point; and the handled clubs.

Both of the axes are made of quartz porphry (4519, 4789). They are incomplete with one butt end and one blade end surviving. Both pieces have been heavily reflaked over the original polished surface and one is pecked on the face. Stone axes such as these are normally dated to the neolithic but in Shetland the vast majority have been found as stray finds (Ritchie 1992, 214). The axes from Scalloway must remain undated by context as one is unstratified and the other axe comes from the lower midden of B.9.2 in which a few stone artefacts, probably dateable to the iron age, were also found.

There are 2 handled clubs (one complete 4277and one handle

4077) and there is one larger piece which is a putative handled club (4809) These pieces are distinguished by the presence of a handle-type end which splays out to form shallow, often asymmetrical shoulders to a sub-rectangular head. On the former two pieces this shouldering is seen in plan whilst on the latter piece it is seen in cross-section. Two other pieces (4392 and 4408) are fragments and it is not clear whether they are actual parts of a handled club.

Handled clubs are normally dated to the Bronze Age and they have been found in contexts of this date at the recently excavated sites of Sumburgh, Scord of Brouster and Kebister. It is uncertain, as yet, just how late into the Iron Age such tools were used. Most of the tools from Scalloway were either unstratified or else were recovered from redeposited rubble contexts.

The putative handled club (4809), found in soil at the base of the hollow B.6.7, is different from the rest being larger and shouldered in profile rather than in plan. It was associated with large sandstone discs and a group of seven pounder/ grinders. This collection may represent a group of earlier Bronze Age artefacts which were incorporated into later material but since pounder/ grinders and larger stone discs also feature commonly in Iron Age deposits it is possible that all of these artefacts are contemporary with the broch occupation.

Ard points, of which one example has been found at Scalloway (4577) are found in earlier contexts than handled clubs eg. at Scord of Brouster (Whittle 1986) but they were also in use during the bronze age. Interestingly, single finds of ard points have been recorded from the iron age sites of the Broch of Burrian and St Boniface (MacGregor 1974, Clarke nd) and although both of these objects are actually unstratified there were no objects of coarse stone from either of these sites which suggested an occupation contemporary with the normal use of these ard points. The ard point from Scalloway was recovered from a rubble dump in the large ditch B.5.4.

Chapter 4

Recovery techniques and methodologies

A total of 302 artefacts, comprising 82% of the total coarse stone assemblage, were recovered from the phase 2 and 3 deposits. The bulk of the later and unstratified pieces are assumed to derive from these phases and are therefore included in the discussion below. A variety of object types are represented which are detailed fully in the catalogue and summarised in tables 1 and 2. Each of the main artefact groups is discussed in more detail below with reference to resource exploitation, production processes, morphological classification, site activity and deposition, and external comparanda.

At Scalloway the finds-collection strategy, of the second season only, involved the recovery and detailed 3-D recording of large numbers of stones. Only after these were brought back to the laboratory and cleaned was the artefactual element then selected by the specialist. Finds from the first season of excavation were more selectively retrieved. Consequently, the coarse stone assemblage, particularly that found during the second season, is highly representative of the artefacts in use during the prehistoric period and it is probably almost complete in numerical terms. Comparison of this assemblage with those from other broch excavations, particularly in Shetland, is made difficult because earlier excavations did not aim for such complete recovery nor were the finds recorded in such detail.

Resource exploitation (with D Dixon)

A great number of different raw materials were utilised for the stone tools (tables 3 and 4). Most of the assemblage is composed of modified beach cobbles of a sedimentary or metamorphic character and the latter are most likely to have been derived from beaches nearby the site. The origin of the sedimentary rocks is less clear; the sandstones and siltstones used for the hones and large flat slabs could have originated in two possible nearest localities. The 'red' sandstones probably came from the Mainland east coastal areas where deposits of purple micaceous flaggy sandstones occur

east of the basal breccias and conglomerates. The grey, muddy sadstones and siltstones could also have come from the east coast deposits, but may have originated across 'The Deeps' on the SE coast of the Walls Peninsula, between the Ayre of Deepdale and Rea Wick. It is probable then that the 'red' sandstones were imported to the site from the east coast although there is no evidence to clarify whether the objects were brought to the site ready-made or else manufactured on site from imported raw material. The most likely derivation for the majority of the sandstone cobble tools would be from the Middle Red Sandstone of the SE Walls Peninsula. It is not known, however, whether beach deposits of these sedimentary cobbles occurred close to the site or whether their collection involved a journey of some distance.

The schists for the stone discs and the quernstones may have been quarried from local exposed bedrock. Most of the area has bedrock at or near the surface, without a blanket of glacial till or post-glacial peat. Outcrops of particularly easily split pelitic schist may have been worth exploiting.

Quartz porphryr, utilised for the polished stone axes and a few examples of semi-polished stones outcrops at a few localities in the area, one on the west side of the bay.

The variety seen in the raw materials is in part a reflection

of the geology of the Scalloway area but, as is normally seen in coarse stone assemblages, the particular types of stone have been carefully selected from the available supply according to the tool requirements. The grain and the structure of the rock necessarily determines the types of use to which it can be put thus a large number of the pounder/ grinders are made on metamorphic rocks especially schists, or else close-grained sandstone, both of which provide a durable material which is not too friable but which is coarse enough to grind successfully. The group A cobble tools are all made on sandstone which again is a durable material but the cobbles may have been chosen in particular for their original shape: a flat oval, the micaceous sandstones weather readily to this form. Amongst the other cobble tools sedimentary rocks are used but quartz and metamorphic rocks are more often selected. Sandstones were chosen for all of the pestles, ard points and handled clubs most probably because this is a material which can be more readily shaped. The more finer grained sedimentary rocks were used for the whetstones and hones as these provide a suitable hard, but smooth face against which to sharpen metal.

Production processes

The majority of the pieces in this assemblage, (67%) have not been modified prior to use and these include all of the cobble tools, except for the pestles, the small, rounded pebbles

which appear to have been collected for their original size and shape, as well as some of the pebble whetstones, the strike-a-lights and the quern rubbers. The remainder of the assemblage exhibits various types of manufacturing processes with perhaps the most simple being the production of the stone discs and slabs by chipping the edge of a thin slab to the required shape. Pieces such as the handled objects and the ard point were almost certainly flaked to shape with the handled pieces then being pecked and ground to a smoother finish. Pecking and/ or grinding to shape is also evident on the pestles, the stone balls, some of the whetstones, and the vessels. Several of the pieces such as the rotary querns and some of the weights have been perforated, usually by pecking from both faces to form a bi-conical perforation.

There is no evidence for the on-site manufacture of any of these pieces. However, this is not to say that at least some of the objects were not made at the site; the major manufacturing processes which were involved such as the chipping of laminated stone, and grinding and pecking, are unlikely to produce any manufacturing debris which would be recognisable in an archaeological context.

Morphological classification

Cobble tools T= 176

Apart from the pestles, which appear to have been deliberately

shaped for use, the rest of the cobble tools are unmodified prior to use and are distinguished by the presence of damage to the piece which was formed through the working of the tool. It is the type and location of these wear traces which defines the types below. Specific tool types are often formed on cobbles of similar sizes, shapes and raw material. Figure 1 gives the L and W dimensions of the three most distinctive types: pounder/ grinders; pestles; and group A cobbles. Each of these show a tendency to cluster within given size ranges. The thickness of the tools is not shown here but those group A cobbles tend to cluster between 20mm-40mm in thicknes giving a flat cross section whilst the pounder/ grinders are thicker and have a rounder cross-section. The remaining cobble tools have a more scattered size and shape distribution and this is not illustrated. The geological identifications for each type is given in table 4.

Pounder/ grinders T= 22

The pounders/ grinders are distinguished by broad bands of faceting on one or both ends of the stone. They can be divided into those of a cylindrical shape with discrete end facets (4776B) and those of a rounder shape which often exhibit a continuous broad facet around the edge with only a small part of the cortex remaining (4630). The faces of the pounders/ grinders, in particular the rounder type are often worn to a smooth finish.

Pestles T= 7

These pieces are distinguished by a regular tapering shape, and are often deliberately shaped by pecking. All are made on sandstone which is often quite pale in colour. Both ends of each piece exhibits ground facets and there are discrete pecked areas made at the cardinal points about 30mm from the broad end (4418, 4723, 4066). One piece is slightly larger than the rest (4466) and may be of a different type; it is more cylindrical in form and the faces are very worn and glossy with light pecked areas in the centre of the piece. Both ends have been worn very flat and smooth.

The pecked indentations on these pieces may have been formed to facilitate gripping or it may be for a type of hafting. Although these are not ard points a similar form of discrete pecking has been noted on ard points from Sumburgh and Catpund, both Bronze Age sites in Shetland. The function of these pieces is not known.

Group A cobbles T= 60

The following cobble tools are considered as one group; between them they have a set of similar characteristics, but these are represented on different tools in varying combinations. They all show a tendency to be made on sandstone cobbles which are a flat oval in shape, and with a discrete size range (table 4 and fig. 1).

Half of these pieces have bands of faceted wear located on either end and this is most often in combination with the faceting of one or both sides. In some cases the wear on the sides is very heavy and indented (4065, 4648), on other pieces the sides are worn to a regular flat face (4401), whilst a few cobbles have just been pecked down the sides (4206). A further third of these tools do not have facets but instead exhibit simple pecked areas around parts of the perimeter (4034) or else a smoothing over one of the faces (4487). Light striations and pecking on the faces of the cobble and some flaking or faceting of the ends are also present on many of the tools.

A prominent feature of this group is a gloss residue which is present on 73% of the tools; this is most often located on one face or down one side. It is uncertain as to what has produced this effect but it looks like some form of residue from the substances worked rather than an alteration to the surface of the stone.

It is not possible at present to determine the function of these tools. The faceting would suggest that they had been used against a hard surface and the heavy indenting down some of the sides indicates that forceful blows were often used. The faces of some of these tools have been smoothed in a fashion similar to those which appear on pounder/ grinders and

it is probable that the broader faces of the cobbles were used to spread out, collect, or further process the material. The gloss residue may have come from a sticky or glutinous substance and it would seem from the present evidence that whatever the material was that was being processed it was ground or pounded to a pulp. It is probable that an analysis of the gloss residue would elucidate what type of materials, whether meat or vegetable matters, were being processed using these tools.

Faceted miscellaneous T= 13

All of the cobbles in this group bear facets formed by pecking and/ or grinding (4109). Occassionally other types of wear such as pecking on the face or flaking may occur on the same cobble (4686D). They are easily distinguished from the pounder/ grinders and group A cobble tools because the size and location of their facets have no distinctive patterning. They are varied in size, shape and raw material.

Other cobble tools T= 74

The remaining cobble tools are varied in form; many are broken tools which cannot be assigned a particular grouping on the basis of the surviving fragment. Over a third of the cobbles are classed as plain cobbles tools; these exhibit areas of simple pecking or flaking which are located randomnly over the cobble. The plain cobble tools include a wide variety of raw

materials of different shapes and sizes. The rest of the cobble tools have either a polish or a gloss on the surface of the stone with or without the addition of other wear traces. Some of these could be considered as polishers particularly where the face is worn (4007, 4448). Others have a form of gloss over the surface of the piece which may be a residue; these, however, are quite distinct from the group A cobbles.

Cobble tool distribution

The cobble tools are distributed throughout the site but the majority (60%) are found in phase 3. There are certain distributional patterns to be noted according to type.

Five of the pestles are stratified and, of these, three are from layers associated with the hollow in B.6.1; together these form a remarkably homogenous group as regards shape and size. One other pestle comes from a layer in the wall chamber B.7.7 whilst the larger cylindrical piece comes from the final clay layers of B.7.2.

The pounder/ grinders occur from phase 1 through to phase 3 although they are a proportionately a larger component of the whole cobble tool assemblage prior to phase 3. There are no distributional differences between the rounded and parallel types. Of particular note is a group of seven pounder/

grinders from the fill of the hollow in B.6.7.

The group A cobbles are concentrated in phase 3 with only a few present in earlier contexts. Within phase 3 there is no distinct context of use for these tools as they occur proportionately in Blocks 6 and 7. This same pattern is seen for the remaining cobble tool types.

Small rounded pebbles ?gaming pieces T= 55

These pebbles were distinguished from the rest of the many small pebbles recovered during excavation by their size, shape, raw material and their tendency to occur in quantity in single contexts. They are spherical to ovoid in shape and all are of a fine-grained micaceous sandstone. They do not appear to have been fashioned deliberately and it is likely that they were selected for their original shape with the probability that the micaceous sandstone weathers readily into this form. Their maximum dimensions range from 17mm to 55mm but within the separate groups of pebbles there is a marked tendency for more discrete size ranges. This is most apparent between blocks as all the pebbles from B.7.2 are 20mm to 29mm in size whilst most of those from B.7.1 have maximum dimensions larger than 35mm.(suggest draw a selection of pebbles from both blocks)

Objects such as these are commonly referred to as slingstones.

However, it has been noted by Sharples (pers comm) that a comparison of the Scalloway pebbles with those slingstones from iron age southern English sites indicates that the Scalloway pieces are rounder and lighter. This suggests that their use was not as slingstones but as gaming counters. Their gaming function is the preferred interpretation here, particularly as these stones were found in relatively homogenous groups as regards size.

These pebbles are located quite discretely; all but one come from the rubble of blocks 7.1 and 7.2 and these are represented by five main contexts with five to nineteen pebbles in each.

Stone discs T= 59

The discs are commonly made on schists, with a marked preference for pelitic schists. Six of the discs which are made from this material have a distinctive mottled surface and they may have been deliberately selected for their appearance. The diameters of all the discs range from 45mm to 240mm although half of the pieces cluster between 50mm and 90mm (fig 2). Most of the discs have been roughly chipped to shape and seven pieces have additional edge grinding to form a more regular shape (4488,4647). These ground discs and also those with a mottled appearance all fall within the size range of 50mm to 90mm in diameter (fig 2). Two of the discs have

additional perforations made towards the centre of the piece (4009, 4306). These holes are small and oval in plan and are produced by pecking from both faces of the disc.

Just a quarter of the discs are made on sandstones or siltstones and these contrast with those made on schists in that none have additional grinding to shape and that these are amongst the discs (fig 2).

The functions of these objects is of interest and, given that there are differences in the form, size and material of these discs, it is likely that they were used in several different ways. A comparison by disc size with the large assemblage of stone discs from the multi-period site of Pool, Orkney is informative. At Pool, the discs from the neolithic phases have a very similar size range to those from Scalloway, although the greater proportion from Pool are larger than those from Scalloway (fig 2). In contrast the discs from the iron age phases at Pool have a more restricted size range and the majority are smaller than those from Scalloway (the numbers from Pool include gaming counters; for Scalloway these are dealt with elsewhere in the report) (fig 2).

It is highly likely that many of the larger stone discs functioned as pot lids. At Pool a number of discs had areas of heat damage which were located discretely around the edge

of the pieces (fig 2); this suggests that they were used as overhanging lids for a pot on a fire. The unburnt discs, which tended to be smaller, may have been used for storage in pots or other containers with the disc lying in the neck of the vessel to form a closer seal. At Scalloway the larger discs would probably have served as potlids, although with the absence of heat damage on these pieces it seem more likely for them to have been used in storage. It is possible too, although unproven, that several of the smaller discs may have served as lids for storage. However, several of the smallest discs from Scalloway have been finely shaped by grinding and smoothing whilst a few have been made on an attractive mottled schist. The further shaping and the selection of an attractive raw material suggests that these discs were used for roles other than storage although it is not certain as to what these functions would be.

The discs occur throughout the site but most were recovered from blocks 6 (T=15) and 7 (T=27). Block 7 includes all the stratified mottled discs as well as five of the edge ground pieces and one of the perforated discs. Discs with diameters of <100mm were also much more common in the broch deposits and only two sandstone discs are present. In contrast the discs from block 6 are evenly split between larger and smaller and two thirds were made on sandstones.

Whetstones, hones and other sharpening stones T= 21

Most of these pieces are of fine-grained sandstones or siltstones and it has been suggested by the geologist that the raw materials for many of the more finely fashioned hones have been imported. (table 3). Seven are made on simple pebbles and these exhibit single worn faces which are either flat or slightly sinuous (4417). Deep V-shaped grooves made by a metal blade are present on two of these pebble whetstones (4785).

Eight of the pieces are hones which have been carefully shaped prior to use by grinding and these have converging or parallel sides with flat faces and a characteristic rectangular cross-section (4018, 4465, 4483). Most are of a similar length (circa 90mm) and only one has been perforated for suspension (4433). piece has been heavily re-used after breakage as seen by the V-shaped score marks on one face and over the broken end (4625).

The rest of the pieces have been worn quite heavily all over the piece. 4520 is the most finely shaped and one (4763) has a series of deep, V-shaped groove on one face.

Only one whetstone was recovered from phase 2 and this was associated with the primary occupation of the broch. The rest are found in phase 3 contexts. The five pieces from B.6 comprise four pebble whetstones and the perforated hone. In

contrast, only one pebble whetstone occurs in B.7 with the rest being hones which were either deliberately shaped or else worn to shape.

Stone weights T= 6

Four of the stone weights are perforated, three of which are elongated cobbles with the perforation made at the narrow end (4725). Another piece (4042) has an unfinished perforation as well as a notch made at one end of the cobble. The other perforated weight is made from a flat cobble with a central perforation. All of these perforations are biconical in section, having been worked from both faces of the cobble.

Two other weights have been shaped by flaking and pecking to form a rest for the rope or twine; one piece, 4133, has been notched in this fashion on both sides whilst the largest piece, 4388, is a boulder with an encircling groove formed around its middle.

Piece 4042, the unfinished weight, was recovered from the interior of the broch and another perforated piece (4366) from the rubble layer in B.7.5. The remainder were either unstratified or from phase 5 contexts.

Perforated objects T= 3

Two of the perforated pieces are small bead-like objects. One

(4825) has a diameter of 29mm and has rounded sides with a straight-sided hole. The other (4084) is a dome-shaped piece with a diameter of 40mm and straight-sided perforation, this may possibly have functioned as a spindle whorl. The final piece (4083) has an irregular wide perforation made in the centre of a fragment of laminated material.

All three pieces are from rubble layers associated with the broch.

Stone balls T= 7

The stone balls vary between 45mm and 85mm in diameter and all have been pecked and/or ground all over to form a spherical shape often with discrete areas of flattening on the face (44078, 4295, 4478). It is uncertain as to whether piece 4823 has actually been worked or whether the surface is natural. A variety of materials have been used; one piece (4078) is a quartz-felspar-muscovite schist which glistens as it is held. Two pieces are slightly different from the rest: 4823 may be a natural limestone or chalk object but it has a very smooth finish and is of similar size to 4606 ,a pegmatite in quartz-felspar-muscovite schist. The latter is smoothly ground all over and both sides are indented and highly polished as if from hafting. One of the ends of this piece is slightly damaged.

The function of the stone balls is not known. The deliberate flattening on some of the pieces suggests that they were intended to sit in place, whilst the choice of an attractive material, particularly 4078, suggests a more decorative role. Piece 4606 may have functioned differently from the rest of the stone balls as there is evidence that it may have been hafted. This latter piece is from the primary occupation of the broch whilst another (4078) was recovered from the silt over the slabs in the wall chamber. Two other stone balls are from later broch contexts, one of which was found in the clay sealing the interior of the final structure. The remaining stratified piece was found in the lower midden of B.9.3.

Saddle querns T= 2 and rubbers T= 4

Only two possible saddle querns were recovered and these are rather small fragments of coarse-grained sandstone with one shallow worn dished face. The unstratified piece is the most convincing with a shallow concave face worn right out to the edges in classic Iron Age style.

Four large quern rubbers were also present. All are large (>300mm long) and with a classic D-shaped section (4623). Three are of granite and one is a quartz-feldspar-biotite schist. There is no distinct period of use of these pieces as three of the rubbers and one saddle quern appear to have been re-used structurally in the earlier phase 3 contexts. One

rubber, however, was found in the lower midden layer in B.9.3.

Rotary querns T= 11

The rotary querns are mainly made on coarse-grained or pebbly sandstones and various types of schist. Several are fragmented and it is impossible to discern their main features. The diameters range from 380mm - 710mm although measurements of around 400mm are most common. Only one (4094) has evidence for a stick hole and this is formed at an angle and worn through to the base. Two of the querns (4089, 4092) have three pecked grooves c. 20mm apart, encircling the central perforation which have a decorative effect. The latter quern also has a deep U-shaped notch with a raised rim worn out of one side. Quern 4091 also has a U-shaped slot worked on one side, about half the size of the former piece, and the depression is made only on the base. The final quern 4490 has a narrow channel, U-shaped in section, made at a tangent to the central perforation on the upper face. On the base a dish c. 170mm in diameter has been worn around the central perforation.

The rotary querns are all associated with phase 3 deposits. One is certainly associated with the secondary occupation of the broch whilst another comes from the N cell in B.6.2. The rest of the querns come from rubble contexts.

Handled objects T= 6

Five of these pieces have been discussed in chater 2. The remaining piece (4241) resembles a stone disc which has been chipped around the circumference with the formation of a small, tapering 'handle'. The shouldering is asymmetrical at the junction of disc and handle. Some residue gloss, possibly similar to that occurring on several of the cobble tools, is present on one face whilst the opposite face appears to have been smoothed. This piece was recovered from B.1.

Strike-a-lights T= 4

These pieces are all small, flat pebbles of sandstone, quartz or schist and they have narrow striations formed on one face. A further four pebbles, which are included in the cobble tool category, exhibit no wear as such but have a discrete mesh of fine brown lines on the faces. It is uncertain as to whether these latter pieces should be assigned as strike-a-lights as such marks were noticed on other pebbles but placed in a more random manner and, as such, may be a natural formation.

Vessels T= 3

Two of the vessels are fragments of small, shaped bowls with round-based dishes of over 100mm deep. Both have shaped rims; one rounded in section (4643) and the other slightly flattened (4645). The third piece is a large boulder on which a steep-sided, rectangular trough of 80mm depth with a roughly-pecked

interior has been worked (4090). This piece was found incorporated as an upright in the revetment wall of the broch, B.7.3. One of the stone bowls was found as part of the stone lining of a pit in B.7.2, whilst the other was recovered from a rubble layer in B.6.7.

Site activities and deposition

No distinctive chronological patterning of the artefacts was observed between phases 2 and 3. Phase 3 has by far the greater number of objects (84%) and this in itself makes it difficult to compare with the smaller assemblage from the earlier phase (table 5). The pounder/ grinders form a proportionately larger component of the cobble tool assemblage prior to phase 3 although most of this number is made by the group of seven such pieces which were found together from the fill of the hollow in B.6.7. In phase 2 types such as the pestles, the small, rounded pebbles, the querns and the strike-a-lights are not present at all, and only one hone was recovered. This may mean that artefacts such as these were not in common use during phase 2. However, it is not known to what extent there was redeposition or incorporation of phase 2 material within phase 3 contexts; one saddle quern and three rubbers have certainly been re-used structurally in earlier phase 3 deposits and may be more closely related to phase 2 activity. Even within the broad grouping of phase 3 it has been difficult to detect any significant chronological change.

The most informative investigation of site activity comes from a comparison of assemblages from the broch itself (B.7) and its external contexts (B.6). Here, there are significant differences between certain artefact types and context (table 2).

The stone discs from B.7 tend to be small, have a greater tendency to be made on schists, and they include all of the discs made on the mottled schist as well as the edge ground discs. In contrast, the discs from B.6 tend to be larger and the use of sandstone was more common.

The whetstones and hones also show contextual distinctions by type. Those from B.6 were all simple pebble whetstones except for one perforated hone, whilst those from the broch deposits tended to be deliberately shaped hones or else more heavily worn.

Four of the stratified stone balls are exclusive to the broch (the other stratified ball is from B.9.3 and may possibly be natural). Piece 4606, which may originally have been hafted is from the primary occupation of the broch whilst the rest are associated with late iron age activity.

The small rounded pebbles are also exclusive to the late iron age and have a very discrete distribution by size amongst the

rubbles of B.7.1 and B.7.2.

There are therefore certain artefact types: the ground and mottled discs; the hones; the stone balls; the small rounded pebbles; as well as the two bead-like objects, which are specific to the broch. All of these, apart from the naturally rounded pebbles, can perhaps be regarded as pieces which have quite a high degree of workmanship involved in their manufacture. And all, with the exception of the hones, are likely to have been involved in activities other than the processing of raw materials.

Also within the broch deposits are artefacts which can be regarded as tools or other proccessing objects and in contrast to the artefact types mentioned in the preceding paragraphs, the remainder of the coarse stone objects, including all of the different cobble tool types, show no tendency to occur specifically inside or outside the broch.

Evidence from the coarse stone assemblage points to particular processing activities on site. The rotary querns, saddle querns and rubbers certainly indicate that grain was ground, whilst the pounder/ grinders may also have been used in a similar activity. Here, it is interesting to note the group of seven pounder/ grinders which were retrieved together from B.6.7 and which can probably be regarded as a cache. At

Jarlshof the excavator noted that groups of six to eight of such tools were occassionally found together (Curle 1933, 299).

The group A cobbles form the largest proportion of the whole cobble tool assemblage. The function of these pieces is uncertain and analysis of the residues would be necessary in order to determine the kinds of raw materials which were processed by these tools. Their quantity in relation to the other cobble tools suggest that they were of some importance in the site economy, particularly in phase 3. However, there is no contextual evidence for specific processing areas for the use of these tools and they occur in deposits both within and outside the broch in relatively similar quantities.

Another tool cache of note is the group of three pestles which, together, form a remarkably homogenous group with regard to shape and size. These were recovered from the hollow fill of B.6.1.

External Comparanda

Comparison of the Scalloway material with other iron age assemblages is not too informative; with the exception of the Howe, in Orkney, other broch excavations (Clickhimmin, Jalsof, Bu and Gurness) have not recovered, or else recorded in detail, such a large coarse stone assemblage as that found at

Scalloway whilst non-broch iron age sites (Mavis Grind, Kebister, Pool and Tofts Ness) tend to have assemblages of a different character to broch sites. Differences in artefact descriptions between site reports, particularly for the cobble tools, also make it difficult to compare assemblages. For these reasons it is not possible within this report to produce a detailed synthesis of iron age coarse stone assemblages in which to place the Scalloway material. This discussion will therefore only concentrate on specific differences or similarities of artefact types between assemblages.

General similarities between iron age assemblages, including Scalloway, are a high proportion of cobble tools to other artefact types, stone discs of varying sizes, and saddle and/ or rotary querns. Pounder/ grinders are often well represented in these assemblages as well as other cobble tools such as those with miscellaneous faceting, polishers and many of the plain cobble tool category.

Group A cobbles may be present at other broch sites; Hedges (1987, 24) notes the presence of a small number of flat cobbles which have smoothed areas with or without the presence of brown gloss from Bu, Gurness and Midhowe whilst they may also appear in small numbers from Howe and possibly Clickhimmin. At none of these sites, however, do they form a

large component of the cobble tool assemblage as is characteristic of the Scalloway material.

Other types of cobble tools which exhibit gloss or polish are a common feature on broch sites and Iron Age sites in general and Scalloway is no exception.

The pestles are unusual in that they do not appear to have been noted as a separate tool form from other sites. Certainly, their distinctive, deliberately tapered shape, the presence of discretely pecked areas and the ground ends make them worthy of special mention and it is uncertain as to why they have not been noted from other sites, unless, of course they do not appear.

The pecked stone balls are another artefact which appear to have no immediate comparison at other sites. Some are mentioned in the Howe catalogue and there is one from Gurness (Hedges 1987) but these are smaller than those from Scalloway and the ones from Howe tend to be polished. Stone balls are known to occur in early Iron Age contexts from SE Scotland (Cool 1982) although they are smaller and more finely finished. The stratified stone balls from Scalloway are associated with the broch deposits from Middle Iron Age through to the Late Iron Age/ Pictish rubble.

The small, naturally rounded pebbles are often referred to as slingstones in the literature and at Clickhimmin the excavator notes that slingstones were an innovation during the Iron age fort period (Hamilton 1968). Unfortunately no quantities or measurements are given for these pieces. Elsewhere there is scant reference to slingstones from Scotland in general and certainly Hedges has no mention of such pieces from the brochs of Orkney. It has been noted by Sharples (pers comm) that a comparison of the Scalloway pebbles with those slingstones from Iron Age southern English sites indicates that the Scalloway pieces are rounder and lighter. This suggests that their use may not be as slingstones but as gaming counters, particularly as they are found in relatively homogenous groups as regards size.

Single examples of handled discs are present at the brochs of Gurness, Howe and Jarlshof.

Conclusion

In conclusion, the Scalloway assemblage represents an important addition to the present artefactual knowledge of the Iron Age in Shetland. Not only is it well-contexted but it is probably also highly representative of the artefacts which were in use throughout the whole period of site occupation. Certain elements such as the group A cobbles, pestles, stone balls and gaming pebbles are not present, or at least so

numerous at other broch sites in Shetland and Orkney. There is little evidence for any chronological patterning of artefacts throughout the Iron Age phases of the site but there do appear to be some differences in the use or deposition of particular objects between the broch itself and its external contexts.

TABLE 1: SCALLOWAY COARSE STONE

COBBLE TOOLS	176
Pounder/ grinders	22
Pestles	7
Group A	60
Faceted, miscellaneous	13
Plain cobbles	25
Wear + gloss/ polish	16
Gloss/ polish	11
Broken cobbles	22
ROUNDED PEBBLES/	
?gaming pieces	55
STONE DISCS	59
WHETSTONES	21
WEIGHTS	6
PERFORATED PIECES	3
STONE BALLS	7
ROTARY QUERNS	11
SADDLE QUERNS	2
QUERN RUBBERS	4

STONE SLABS	5
AXES	2
HANDLED OBJECTS	6
STRIKE-A-LIGHTS	4
DECORATED SLABS	3
VESSELS	3
PIVOT STONE	1
SMOOTHED STONE	1
ARD POINT	1

Table 3: artefact type by raw material (excluding cobble tools)

Artefact /Material	1	2	3	4	5	6	7	8	9	10	11	12
pelitic schist	37					1				1		1
mica schist	3	1	2									
phyllitic schist	1											
QFMS					2							
QFBS							1					
migmatised schist						1						
garnet-muscovite schist						2						
semi-pelite	2											
psammite	2			1	1							
granite							3					
biotitic granite					1							
fine-grained sandstone		10	1	1	2						2	2
coarse-grained sandstone		3				4	2				2	2
laminated sandstone	14											
flagstone								8				
siltstone		7	1	1							1	
pebbly arkose						1						
conglomerate						2						
?limestone/ chalk					1							
quartz porphryr									2			
quartz												1

QFBS quartz-feldspar-biotite-schist
QFMS quartz-feldspar-muscovite-schist
1 Stone discs, 2 whetstones etc, 3 weights, 4 perforated objects, 5 stone balls, 6 rotary querns, 7 saddle querns and rubbers, 8 plain and decorated slabs, 9 axes, 10 handled objects, 11 strike-a-lights, 12 vessels

Table 4: cobble tools by raw material

CT/Material	1	2	3	4	5	6	7
medium-grained sandstone	6	7	54	3	6	4	11
coarse-grained sandstone	2		1			1	1
siltstone			1			2	
QFMS	4		3	1	5		3
QFBS	1						
amphibole schist	3					1	
calcareous schist					1		
biotite schist						1	
granite	3			1			1
biotitic granite	1						
gneiss	1						
amphibolite				2	2	2	1
psammite				1	1		1
breccia					1	1	
pegmatite					1		1
serpentine						1	
ultra-basic	1						
quartz				3	6	6	2
quartzite			1	2	1	1	
quartz porphyryr						2	

Key: 1 pounder/ grinder, 2 pestles, 3 group A cobbles, 4 miscellaneous faceted, 5 other cobble tools with worn faces and/or polish/ gloss residue, 7 broken worn cobbles.

Table 5: Artefact type by phase

Phase/Type	1	2	3	5
Cobble tools total	3	27	110	14
pounder/ grinders	2	8	6	
pestles			6	1
group A cobbles		9	43	4
faceted miscellaneous	1	1	6	
gloss plus other wear			15	1
gloss/ polish only		2	7	
plain cobbles		4	14	5
broken cobbles		3	13	3
Small rounded pebbles			55	
?gaming pieces				
Stone discs	1	14	35	4
Whetstones etc		1	16	3
Weights		1	1	3
Perforated pieces			3	
Stone balls		1	3	2
Rotary querns			10	
Saddle querns			1	
Quern rubbers			3	
Stone slabs			5	
Axes				
Handled objects		2	3	2
Strike-a-lights			2	
Decorated slabs			2	
Vessels		1	2	
Pivot stone			1	
Ard point		1		
Smoothed block			1	

UPPER SCALLOWAY, SHETLAND: COARSE STONE CATALOGUE
Final draft

COBBLE TOOLS
Pounder/ grinders

4003, 150, 12.4
Coarse-grained grey sandstone. Sub-oval. Broad, slightly ridged facets on both ends. Pecked on one side.
L 93mm; W 98mm; T 69mm; Wt 976g.

4014, 96, 6.1
Banded quartz-feldspar-muscovite schist. Oval. Two ridged facets on one end and light facet on opposite end.
L 120mm; W 73mm; T 57mm; Wt 763g.

4068, 13, 7.7
Biotitic granite. Abraded. Sub-oval. Broad, rounded facet around most of the perimeter.
L 97mm; W 91mm; T 78mm; Wt 895g.

4069, 13, 7.7
Gneiss. Fragment. Broad facet around most of the perimeter.
L 91mm; W 88mm.

4085, 89, 8.2
Coarse quartz-feldspar-biotite schist/ granite. Abrading. Sub-cylindrical. Both ends have a single broad, rounded facet.
L 103mm; W 79mm; T 60mm; Wt 767g.

4088, 89, 8.2
Granite. Fragment. Broad facet round most of surviving face.
Not measured.

4098B, US
Sandstone. Ovoid. One end with three ridged facets. Opposite end faceted and heavily flaked. One face worn.
L 103mm; W 64mm; T 50mm; 514g.

4110, US
Sandstone. Fragment. Sub-cylindrical. Three facets forming ridges on unbroken end. One face worn.
Not measured.

4223, 263, 7.1
Amphibole schist. Fragment. Broad rounded facet around most of perimeter. Both faces very worn and smooth.
L 100mm; W 98mm; T 46mm.

4328, 284, 7.1
Ultrabasic. Fragment. Areas of broad pecking on surviving faces.
Not measured.

4492, 616, 7.3
Coarse-grained sandstone. Sub-oval. Broad facets around perimeter which form a ridge. Both faces worn, one flat.
L 80mm; W 78mm; T 60mm; Wt 583g.

4528, 421, 9.2
Amphibole schist. Fragment. Both ends heavily worn with rounded facets.
Not measured.

4564, 628, 6.2
Granite. Elongated oval. Both ends heavily faceted and flaked and one worn face.
L 144mm; W 83mm; T 64mm; Wt 1270g.

4565, US
Sandstone. Fragment, burnt. Unbroken end has broad rounded facet and one worn face.
Not measured.

4629 & 4776, 708, 6.7
Sandstone. Fragments, burnt. Both ends roughly faceted and flaked. Surviving face flat and smooth with unidirectional striations.
Not measured.

4630, 708, 6.7
Quartz-feldspar-muscovite schist. Continuous broad ridged facets around one side and both ends. One face worn flat.
L 96mm; W 100mm; T 72mm; Wt 982g.

4631, 723, 6.7
Foliated granite. Broad, rounded facet around complete perimeter. Both faces worn flat and smooth.
L 82mm; W 82mm; T 54mm; Wt 639g.

4659A, 708, 6.7
Quartz-feldspar-muscovite schist. Heavily pecked rounded facet with flaking at one end. On opposite end a facet with heavy bashing and flaking.
L 115mm; W 107mm; T 72mm; Wt 1087g.

4659B, 708, 6.7
Grey sandstone. Sub-oval. Two facets on one end forming ridge. Opposite end very heavily flaked, possibly in order to thin it. One face worn to a concave section with light pecking.
L 180mm; W 122mm; T 98mm; Wt 2568g.

4672A, 708, 6.7
Laminated amphibole schist. Fragment. Broad rounded facets on both ends.
Not measured.

4673, 778, 7.5
Quartz-feldspar-muscovite schist. Oval. Two rough ridged facets on one end. One light facet on opposite end and a bit of pecking down one face. One face worn smooth.
L 165mm; W 103mm; T 65mm; Wt 1650g.

4776B, 708, 6.7
Sandstone. Fragment. Heavy rounded facets on both ends. Worn smooth on unbroken face.
Not measured.

Pestles

4011, 2, 1
Made on natural tapering cobble of red sandstone. Narrow end has rounded facet and broad end a flat facet with flaking. Shallow hollows pecked at cardinal points just towards broad end. Two areas of residue gloss on one face.
L 135mm; W 57mm; T 40mm; Wt 464g.

4066, 13, 7.7
Very finely shaped, tapering piece of pale sandstone. Pecked to shape. Broad end flat and pecked. Narrow end shaped to a point. Pecked hollows at cardinal points towards broad end.
L 151mm; w 60mm; T 37mm; Wt 458g.

4362, US
Made on natural tapering red sandstone cobble. Flat facet on narrow end. Opposite end is heavily flaked with band of faceting. One hollow worked on opposite faces. Sides are pecked and exhibit residue gloss.
L 158mm; W 78mm; T 50mm; Wt 981g.

4418, 239, 6.1
Finely shaped tapering piece of buff sandstone. Pecked all over to shape. Broad end has a rounded heavy facet. Narrow end with rounded facet. Pecked hollows at cardinal points towards broad end.
L 140mm; W 65mm; T 50mm; Wt 682g.

4431, 533, 6.1
Made on sub-cylindrical cobble of buff sandstone, abraded. Both ends have single rounded facets with flaking. Light pecked areas at cardinal points.
L 125mm; W 65mm; T 55mm; Wt 677g.

4466, 557, 7.2
Fine-grained sandstone. Cylindrical. Both ends worn flat and smooth. Some light flaking from one end. Single area of deep pecking on both faces. Faces are very shiny and sides slightly indented.
L 180mm; W 86mm; T 82mm; Wt 2392g.

4723, 534, 6.1 check find number
Shaped piece of tapering sandstone, pecked to shape. Both ends very heavily ground with flaking from the facets. Hollows pecked at cardinal points towards the broad end.
L 124mm; W 65mm; T 62mm; Wt 666g.

Group A cobble tools

4016, 44, 11.1
Sandstone. Elongated oval. Single smooth, rounded facet on both ends. Possible area of smoothing down one side with patch of residue gloss.
L 140mm; W 47mm; T 36mm; Wt 368g.

4023, 44, 11.1
Sandstone. Flat oval. Both ends with single small pecked facet. Small area of grinding on one side causing facet and opposite side smoothed. Possible smoothing on one face.
L 119mm; W 54mm; T 28mm; Wt 284g.

4034, 34, 7.5
Sandstone, burnt. Flat oval. Light pecking around parts of perimeter and side also rounded. One face has residue gloss to one side.
L 111mm; W 57mm; T 22mm; Wt 234g.

4037, 34, 7.5
Broken. Quartz-feldspar-muscovite schist. Pecked with residue gloss.

4038, 34, 7.5
Sandstone, burnt. Elongated oval. Single light facet on both ends. Some light pecking down sides and on one face. Small patch of residue gloss on one face.
L 124mm; W 46mm; T 27mm; Wt 229g.

4044, 34, 7.5
Sandstone. Flat oval. Single small flat facet both ends. Slight faceting down sides. Light pecking on one face. Residue gloss over one face and side.
L 116mm; W 70mm; T 30mm; Wt 430g.

4052, 130, 9.3
Sandstone. Flat oval. Both ends faceted and one side with heavily worn facet . Opposite side worn with residue gloss at one end.
L 130mm; W 62mm; T 32mm; Wt 433g.

4061, 10, 7.1
Sandstone, burnt. Flat oval. One face worn smooth and one side with residue gloss.
L 107mm; W 63mm; T 22mm; Wt 233g.

4065, 10, 7.1
Sandstone. Flat oval. Single, small, light facet on both ends. Both sides are heavily pecked and ground forming indented facets. Both faces with residue gloss and some striations.
L 134mm; W 75mm; T 38mm; Wt 603g.

4074, 15, 7.2
Broken. Sandstone. Faceted and pecked heavily on the faces.

4075, 15, 7.2
Broken. Sandstone. Pecked.

4098D, US
Sandstone, abraded. Flat oval. Faceted on both ends and some bands of pecking down sides. Both faces possibly smoothed.
L 134mm; W 65mm; T 35mm; Wt 511g.

4098E, US
Broken. Sandstone. Faceted.

4101, 201, 1
Sandstone, abraded. Elongated oval. Faceted and flaked on both ends and pecked facets down sides.
L 111mm; W 44mm; T 29mm; Wt 209g.

4122, US
Sandstone. Flat oval. Some light pecking on ends and sides. Residue gloss on both faces and down one side. Light pecking on one face.
L 80mm; W 54mm; T 27mm; Wt 172g.

4183, 301, 10.1
Broken. Sandstone. Pecked with residue gloss.

4206, 266, 2.1
Sandstone. Oval. Single smooth, flat facets ground on both ends. Some light pecking down sides. Light residue gloss particularly on one face.
L 120mm; W 62mm; T 46mm; Wt 560g.

4238, 276, 7.1
Flaggy siltstone. Elongated oval. Single flat facets on both ends. Part of one side faceted by grinding and some light residue gloss on one face.
L 97mm; W 45mm; T 27mm; Wt 190g.

4270, 201, 1
Sandstone. Flat oval. Single small smooth flat facet on each end. Narrow band of faceting down one side and light pecking on other. Towards broad end both faces have expansive areas of pecking and one has striations superimposed. Residue gloss towards narrower end.
L 138mm; W 67mm; T 39mm; Wt 613g.

4293, 239, 6.1
Sandstone. Flat oval. Single rounded facets on both ends. Parts of sides with narrow faceting. One area of localised pecking on one face and two on opposite. Patches of residue gloss on faces.
L 145mm; W 58mm; T 31mm; Wt 413g.

4294, 283, 7.1
Sandstone. Flat oval. One side worn smooth with residue gloss on this side and over one face.
L 117mm; W 78mm; T 25mm; Wt 355g.

4343, 282, 7.1
Broken. ?. Worn face with residue gloss.

4356, 207, 7.1
Broken. Sandstone. Faceted with residue gloss.

4364, 507, 7.1
Schist. Elongated oval. Light pecking on one end. One face worn smooth with residue gloss on this face and also down one side.
L 123mm; W 52mm; T 48mm; Wt 497g.

4370, 239, 6.1
Broken. Sandstone. Worn face with residue gloss.

4397, 507, 7.1
Sandstone. Flat oval. Single tiny ground facet on one end and side. One face worn with residue gloss.
L 97mm; W 42mm; T 21mm; Wt 139g.

4401, 211, 6.6
Sandstone. Flat oval. Single flat facets on both ends and sides. Some localised pecking in centre of faces.
L 167mm; W 80mm; T 40mm; Wt 851g.

4402, 239, 6.1
Siltstone. Flat oval. Light pecking on one end. Residue gloss on both faces and sides.
L 98mm; W 58mm; T 30mm; Wt 271g.

4413, 533, 6.1
Sandstone. Rectangular. One smooth rounded facet on one end and heavy faceting and flaking on opposite end. Sides are indented and faceted in places. One side and part of face smoothed with residue gloss.
L 152mm; W 69mm; T 37mm; Wt 660g.

4432, 533, 6.1
Sandstone, abraded. Oval. Single roughly pecked facets on both ends and sides. Both faces pecked and smoothed.
L 230mm; W 129mm; T 68mm; Wt 3408g.

4435, 515, 4.1
Sandstone. Flat oval. Single areas of ground facets form indentations on sides. Residue gloss on both ends and one face.
L 95mm; W 56mm; T 23mm; Wt 207g.

4456, 239, 6.1
Coarse-grained sandstone. Flat oval. Some light pecking on ends and sides. Possible gloss residue down one side.
L 109mm; W 69mm; T 31mm; Wt 366g.

4459, 549, 7.3
Sandstone, burnt. Sub-rectangular. One side faceted by grinding and pecking and some pecking on one face. Residue gloss on one face and side.
L 105mm; W 55mm; T 25mm; Wt 217g.

4486A, 612, 6.2
Sandstone, burnt. Flat oval. Rough band of faceting and flaking on both ends. Indented pecked areas on sides. Pecking on both faces and residue gloss on one face and side.
L 126mm; W 89mm; T 34mm; Wt 628g.

4486B, 612, 6.2
Impure quartzite. Flat oval. Rounded facet on both ends one with some flaking. Smooth rounded facets ground down both sides. Both faces pecked and worn smooth with partial residue gloss to one side.
L 141mm; W 57mm; T 31mm; Wt 425g.

4487, 539,7.2
Sandstone, burnt. Flat oval. One face worn smooth. Distinct patch of residue gloss on this face and one side. Opposite face with small patch of residue gloss and light striations.
L 130mm; W 76mm; T 25mm; Wt 373g.

4491, 616, 7.3
Sandstone. Flat oval. Some pecking on ends and sides. One face is worn with some residue gloss. Opposite face with patchy residue gloss.
L 137mm; W 89mm; T 36mm; Wt 757g.

4494, 539, 7.2
Sandstone. Flat oval. Small area of pecking on one side. One face worn smooth with residue gloss.
L 88mm; W 58mm; T 25mm; Wt 194g.

4510, 631, 6.2
Sandstone. Elongated oval. Small single pecked and ground facet on both ends. Some pecking down sides. Faces smoothed with some light pecking.
L 119mm; W 55mm; T 36mm; Wt 389g.

4513, 635, 7.3
Sandstone, abraded. Flat oval. Both sides have single flat facet, one side is smoother with residue gloss. Some residue gloss also on one face. Light pecking on one end.
L 128mm; W 74mm; T 32mm; Wt 496g.

4543A, 637, 5.3
Sandstone. Flat oval. Both ends heavily bifacially flaked. Heavily worked flat facet on one side. Opposite side is damaged. Both faces are very smooth with localised areas of pecking.
L 153mm; W 103mm; T 31mm; Wt 776g.

4552, 549, 7.3
Sandstone. Elongated oval. One face worn smooth. One side worn smooth with residue gloss.
L 117mm; W 36mm; T 19mm; Wt 139g.

4557, 571, 2.1
Broken. Sandstone. Faceted with worn face.

4562, 654, 7.4
Sandstone, burnt. Flat oval. Both ends and part of one side are pecked and smoothed with residue gloss. Streak of residue gloss on one face.
L 101mm; W 61mm; T 26mm; Wt 254g.

4563, 654, 7.4
Sandstone, burnt. Flat oval. Narrow bands of faceting on ends and sides. Both faces slightly worn.
L 91mm; W 50mm; T 24mm; Wt 178g.

4573A, 647, 6.2
Sandstone. Elongated oval. Narrow bands of faceting with some flaking on both ends. Some pecking down sides.
L 120mm; W 51mm; T 32mm; Wt 252g.

4614, 680, 7.5
Sandstone. Flat oval. Residue gloss and mesh of brown lines on one face.
L 73mm; W 46mm; T 22mm; Wt 108g.

4626A, 261, 7.5
Schist. Flat oval. Residue gloss on both faces towards one side.
L 60mm; W 48mm; T 18mm; Wt 79g.

4633, 680, 7.5
Sandstone. Elongated oval. Band of faceting and flaking on broad end. Small rounded facet on narrow end. One face worn smooth with gloss residue on one side.
L 170mm; W 87mm; T 49mm; Wt 1045g.

4640, 738, 7.5
Sandstone. Elongated oval. Residue gloss over one face, side and end.
L 91mm; W 40mm; T 24mm; Wt 131g.

4641, 732, 7.3
Sandstone. Flat oval. Both ends pecked and faceted. Localised areas of pecking down sides. One face worn smooth and this face and a side have residue gloss.
L 107mm; W 49mm; T 24mm; Wt 212g.

4648, 745, 7.2
Sandstone, abraded. Flat oval. Single rounded facets on both ends. Indented facets, pecked and ground, down both sides. Residue gloss down one side and part of one face.
L 113mm; W 53mm; T 34mm; Wt 361g.

4661, 708, 6.7
Broken. Sandstone. Pecked with residue gloss.

4691, 248, 6.2
Sandstone, abraded. Flat oval. Some light pecked facets on ends and sides. These are also rounded and polished. Multi-directional striations on both faces one face is also pecked and has residue gloss.
L 130mm; W 63mm; T 28mm; Wt 376g.

4697, 248, 6.2
Sandstone. Elongated oval. Some light pecking around parts of perimeter. The sides are worn smooth and bear a light residue gloss.
L 130mm; W 64mm; T 25mm; Wt 304g.

4718, 556, 6.2
Sandstone. Faceted with residue gloss.

4742, 314, 10.1
Broken. Sandstone. One face worn smooth and flat.

4787, 670, 7.3
Sandstone, abraded. Flat oval. Faceted on one end and indented facets down both sides.
L 94mm; W 53mm; T 23mm; Wt 185g.

4797, 539, 7.2
?. Elongated oval. Light pecking on both ends. Residue gloss on sides and on one face towards broad end. Striations on opposite face towards broad end.
L 97mm; W 44mm; T 36mm; Wt 265g.

4800, 614, 6.2
Sandstone. Flat oval. Light faceting on ends and sides. Residue gloss and light striations on one face.
L 83mm; W 58mm; T 21mm; Wt 171g.

Faceted miscellaneous

4019, 44, 11.1
Sandstone, abraded. Elongated oval. Rounded facet and flaking on narrow end and heavy bifacial flaking with band of faceting on opposite end.
L 165mm; W 77mm; T 46mm; Wt 774g.

4087, 89, 8.2
Quartzite. Ovoid. Heavy pecking on one end. Two facets forming ridge on opposite end.
L 85mm; W 55mm; T 48mm; Wt 348g.

4106, US
Quartz. Flat irregular shape. One rounded facet at one end and two ridged facets on opposite end.
L 70mm; W 58mm; T 25mm; Wt 155g.

4108, US
Sandstone. Narrow oval. Heavy pecking on parts of ends and sides. Two areas of localised pecking on one face. Opposite face worn with light striations.
L 108mm; W 40mm; T 26mm; Wt 171g.

4109, US
Amphibolite. Oval. Flat smooth facet worn on narrow end.
L 105mm; W 72mm; T 42mm; Wt 505g.

4205A, 260, 6.1
Amphibolite. Flat oval. Smooth flat facet ground on both sides.
L 67mm; W 57mm; T 27mm; Wt 177g.

4216, US
Quartz. Sub-oval. One small rounded facet on one end and pecking on opposite end.
L 67mm; W 36mm; T 25mm; Wt 82g.

4486D, 612, 6.2
Laminated psammite. Elongated oval. One end with rounded facet and opposite end pecked. Narrow band of faceting down one side. Light pecking on one face. Other face is very smooth with a heavily pecked oval hollow off-centre.
L 202mm; W 84mm; T 54mm; Wt 1391g.

4514, 612, 6.2
Quartzite. Sub-oval. Rough flat facet at narrow end. Light polish over rest of piece.
L 72mm; W 49mm; T 37mm; Wt 169g.

4572, 634 & 4749, 544, 6.6 & 5.1
Granite. Sub-oval. Small area of rough faceting and flaking on narrow end. Opposite end too fragmented to identify.
L 140mm; W 97mm; T 75mm.

4686D, 740, 7.5
Quartz. Flat round. Narrow band of faceted wear around perimeter. Light patch of pecking in centre of one face.
L 73mm; W 66mm; T 31mm; Wt 216g.

4735A, US
Sandstone. Elongated oval. One end with rounded facet and opposite end is pecked.
L 80mm; W 30mm; T 23mm; Wt 78g.

4767, 577, 7.2
Quartz-feldspar-muscovite schist, abraded. Oval. Both ends with light facets.
L 111mm; W 64mm; T 45mm; Wt 476g.

Plain cobble tools

4010, 2, 1
Banded amphibolite. Elongated oval. Pecked on one end and pecked and flaked on opposite end.
L 115mm; W 37mm; T 22mm; Wt 185g.

4012, 2, 1
Sandstone, abraded. Sub-rectangular. Heavy pecking down both sides forms slight notching/ indentations. Both ends lightly flaked.
L 180mm; W 63mm; T 37mm; Wt 700g.

4036, 34, 7.5
Quartzite. Elongated oval. Pecked on both ends. Covered in unidentified red substance.
L 93mm; W 47mm; T 35mm; Wt 222g.

4076, 15, 7.2
Amphibolite. Oval. One end lightly pecked an opposite end pecked and flaked.
L 98mm; W 53mm; T 40mm; Wt 329g.

4235, 236, 1
Quartz. Irregular. Some pecking and flaking from ends.
L 73mm; W 42mm; T 34mm; Wt 126g.

4296, 232, 5.1
Quartz-feldspar-muscovite schist. Flat oval. Pecking around perimeter and in centre of one face.
L 102mm; W 100mm; T 43mm; Wt 630g,

4297, 232, 5.1
Quartz-feldspar-muscovite schist. Sub-oval. Light pecking on one end.
L 110mm; W 72mm; T 57mm; Wt 601g.

4344, 287, 7.1
Quartz. Sub-oval. Some pecking on one end.
L 98mm; W 66mm; T 58mm; Wt 504g.

4398E, 507, 7.1
Quartz. Sub-oval. Some pecking on ends.
L 74mm; W 59mm; T 42mm; Wt 270g.

4398D, 507, 7.1
Quartz. Oval. Small amount of pecking on both ends.
L 49mm; W 34mm; T 27mm; Wt 67g.

4403, 539, 7.2
Quartz. Elongated oval. Pecking on ends and parts of sides.
L 107mm; W 52mm; T 31mm; Wt 260g.

4425, 211, 6.6
Quartz. Oval. Light pecking on both ends.
L 55mm; W 33mm; T 25mm; Wt 68g.

4476A, 311, 10.3
Quartz-feldspar-muscovite schist. Sub-oval. Small areas of pecking on both ends.
L 110mm; W 73mm; T 63mm; Wt 722g.

4476B, 311, 10.3
Annealed breccia, ?calcsilicate, abraded/ burnt. Oval. Pecked on one end.
L 117mm; W 108mm; T 61mm; Wt 1066g.

4486C, 612, 6.2
Psammite. Sub-rectangular. Pecked and flaked from one end. Possible residue gloss on one face.
L 197mm; W 58mm; T 49mm; Wt 1072g.

4500, 621, 5.4
Quartz-feldspar-muscovite schist. Sub-oval. Some pecking on one end.
L 77mm; W 58mm; T 32mm; Wt 211g.

4501, 621, 5.4
Calcareous schist. Flake from hammerstone with some pecking on proximal end.
L 61mm; W 76mm; T 20mm.

4540, 273, 7.4
Sandstone. Sub-oval. Rough area of pecking on one end.
L 115; W 78mm; T 34mm; Wt 426g.

4582, 588, 6.2
Sandstone. Flake from hammerstone with some pecking and flaking from proximal end.
L 55mm; W 51mm; T 7mm.

4639, 680, 7.5
Sandstone, burnt. Oval. Light pecking in small patches on ends and sides. Patch of high gloss towards one end.
L 89mm; W 53mm; T 29mm; Wt 185g.

4698, 249, 5.2
Quartz-feldspar-muscovite schist. Flat oval. Pecking around most of perimeter.
L 108mm; W 89mm; T 45mm; Wt 616g.

4699, US
?. Flat oval. Both ends pecked and flaked. Pecking on one side and in the centre of both faces.
L 100mm; W 58mm; T 21mm; Wt 191g.

4796, 610, 6.2
Pegmatite. Sub-oval. Ends and sides pecked/ bashed.
L 220mm; W 132mm; T 81mm; Wt 2770g.

4804, 252, 5.2
Sandstone. Elongated oval. Pecking and possible partial grinding on one end.
L 122mm; W 39mm; T 25mm; Wt 185g.

4817, 203, 1
Sandstone, abraded. Irregular. Some random pecking .
L 180mm; W 81mm; T 53mm; Wt 1032g.

Other cobble tools with worn faces and/ or polish/ residue gloss

4007, 50, 12.2
Rubbing stone. Brecciated pelite. Sub-oval. One face worn smooth and flat with light gloss. Upper face discoloured. cf. 4498.
L 50mm; W 46mm; T 27mm; Wt 96g.

4212, 246, 1
Sandstone. Elongated oval. One face worn smooth with area of polish towards one end.
L 122mm; W 42mm; T 39mm; Wt 304g.

4220, 260, 6.1
Sandstone. Flat oval. Light pecking around perimeter and both faces worn smooth.
L 116mm; W 85mm; T 39mm; Wt 571g.

4289, 207, 7.1
Rubbing stone. ?. Sub-oval. One face very worn with high polish and polish also on upper face. Cf 4007.
L 60mm; W 51mm; T 39mm; Wt 171g.

4311B, 297, 7.1
Quartz. Oval. Light pecking on one end and one face worn smooth with residue gloss.
L 56mm; W 45mm; T 26mm; 98g.

4421, 239, 6.1
Coarse-grained sandstone. Flat oval. Light pecking around most of perimeter. Both faces possibly worn smooth.
L 92mm; W 69mm; T 22mm; Wt 191g.

4448, 248, 6.2
Amphibolite. Flat oval. One face worn flat. Areas of high polish around sides and on one flat face.
L 92mm; W 61mm; T 24mm; Wt 200g.

4498A, 616, 7.3
Metabasic- ?serpentine. Sub-oval. One face worn smooth with light gloss. Cf 4007.
L 61mm; W 55mm; T 23mm; Wt 108g.

4498B, 616, 7.3
Sandstone. Flat oval. Both faces worn smooth and flat.
L 67mm; W 48mm; T 16mm; Wt 80g.

4543B, 637, 5.3
Sandstone. Flat oval. One face worn smooth with sinuous profile.
L 88mm; W 77mm; T 19mm; Wt 193g.

4689, 539, 7.2
Biotite schist. Elongated oval. One face worn smooth with residue gloss here and on one side.
L 102mm; W 44mm; T 24mm; Wt 189g.

4693, 248, 6.2
?- obscured. Elongated oval. One face worn smooth with a concave profile and polished.
L 112mm; W 50mm; T 42mm; Wt 360g.

4730, 593, 6.2
Micaceous siltstone. Flat. Base has been worn very flat and it and the edges are shiny. Striations also on base.
L 52mm; W 27mm; T 7mm; Wt 14g.

4760A, 543, 7.2
Quartz/ feldspar. Flat oval. One face worn flat with polish. Cf 4007.
L 33mm; W 32mm; T 12mm; Wt 19mm.

4770, 224, 5.2
?. Flat oval. Perimeter worn smooth with light polish. Possibly worn smooth on both faces.
L 73mm; W 69mm; T 23mm; Wt 200g.

4791, 567, 6.3
Siltstone. Flat. High polish all over from rubbing?
L 46mm; W 38mm; T 6mm; Wt 18g.

Cobbles with no wear but polish or residue gloss.

4115, US
Quartz. Sub-oval. Residue gloss and mesh of brown lines on one face.
L 86mm; W 73mm; T 46mm; Wt 415g.

4166, 219, 6.7
Quartz porphyry. Sub-rectangular. Like axe material. Quite a high polish over much of the piece.
L 82mm; W 70mm; T 38mm; Wt 311g.

4346, 288, 4.1
Quartz. Sub-rectangular. Residue gloss on one face and side.
L 100mm; W 59mm; T 30mm; Wt 272g.

4458, 549, 7.3
Impure quartzite, burnt. Oval. Areas of residue gloss on parts of faces.
L 70mm; W 32mm; T 32mm; Wt 108g.

4481, 539, 7.2
?. Elongated oval. Very high residue gloss on both ends and one face.
L 93mm; W 29mm; T 17mm; Wt 70g.

4549D, 635, 7.3
Quartz. Mesh of brown lines on one face.
L 60mm; W 44mm; T 27mm; Wt 100g.

4581, 654, 7.4
Amphibolite. Polished pebble.
L 63mm; W 43mm; T 17mm.

4649, 744, 7.5
Amphibole schist, abraded. Residue gloss on both faces and on one end.
L 105mm; W 77mm; T 46mm; Wt 522g.

4674, US
Quartz. Flat oval. Residue gloss around ends.
L 101mm; W 77mm; T 35mm; Wt 378g.

4711, 563, 7.2
Quartz. Mesh of brown lines in centre of one face.
L 59mm; W 52mm; T 23mm; Wt 105g.

4768, 598, 4.2
Quartz porphyry. Flat oval. Polished over most of the surface.
L 55mm; W 44mm; T 12mm; Wt 59g.

Broken worn cobbles

4071, 13, 7.7
Sandstone. Pecked.

4082, 6, 7.1
Quartz. Faceted.

4098C, US
Coarse grit. Fragment of a rubber?

4107, US
Sandstone, abraded. Pecked.

4299, 232, 5.1
Sandstone. Faceted.

4301, 282, 7.1
Sandstone. Pecked.

4380, 527, 5.1
Sandstone. Faceted on end with deep, pecked, circular hollow on one face.

4543C, 637, 5.3
Quartz. Pecked.

4544, US
Amphibolite. Small facet with worn face.

4546, 641, 6.6
Sandstone. Band of pecking down one side.

4573B, 647, 6.2
Quartz-feldspar-muscovite schist, abraded. Pecked.

4600, 630, 6.6
Sandstone. Pecked.

4605, 261, 7.5
Psammite, burnt. Rounded facet on unbroken end. worn circular depression in centre of one face.

4624, 711, 6.4
Sandstone. Pecked

4636, 549, 7.3
Sandstone. Small facet with one worn face.

4637, 738, 7.5
Granite, abraded. Possibly large rubber?

4638, 680, 7.5
?. Pecked.

4665, 549, 7.3
Quartz-feldspar-muscovite schist. Large cobble fragment.

4704A, 248, 6.2
Sandstone. Heavily faceted down sides. Both faces smoothed, one with striations.

4720, 536, 5.1
Quartz-feldspar-muscovite schist. Pecked and smoothed.

4731, 599, 6.5
Sandstone. Pecked.

4738, 224, 5.2
?granite pegmatite. Pecked.

Small rounded pebbles- ? gaming pieces
These are all of fine-grained sandstone. They are round to sub-angular in shape but none appear to have been deliberately shaped. They are distinctly different in shape and material to the other small pebbles which occur naturally.

4308, 287, 7.1
L 46mm; W 35mm; T 28mm

4310A-H, 282, 7.1
L 27mm; W 23mm; T 18mm
L 25mm; W 18mm; T 16mm
L 41mm; W 32mm; T 26mm
L 36mm; W 31mm; T 23mm
L 38mm; W 35mm; T 27mm
L 36mm; W 35mm; T 30mm
L 38mm; W 29mm; T 22mm
L 33mm; W 32mm; T 24mm

4334A-I, 278, 7.1
L 41mm; W 34mm; T 27mm
L 38mm; W 28mm; T 23mm
L 38mm; W 37mm; T 30mm
L 35mm; W 34mm; T 30mm
L 37mm; W 31mm; T 27mm
L 37mm; W 30mm; T 25mm
L 37mm; W 25mm; T 25mm
L 25mm; W 15mm; T 12mm
L 55mm; W 42mm; T 28mm

4335A-C, 507, 7.1
L 39mm; W 31mm; T 25mm
L 41mm; W 38mm; T 28mm
L 38mm; W 37mm; T 28mm

4355A-S, 207, 7.1
L 42mm; W 36mm; T 34mm

1 40mm; W 32mm; T 28mm
L 36mm; W 30mm; T 29mm
L 40mm; W 33mm; T 24mm
L 31mm; W 30mm; T 25mm
L 37mm; W 30mm; T 22mm
L 40mm; W 36mm; T 25mm
L 36mm; W 32mm; T 25mm
L 38mm; W 32mm; T 27mm
L 38mm; W 36mm; T 32mm
L 38mm; W 35mm; T 29mm
L 40mm; W 35mm; T 33mm
L 33mm; W 30mm; T 27mm
L 40mm; W 33mm; T 25mm
L 37mm; W 29mm; T 27mm
L 34mm; W 28mm; T 26mm
L 41mm; W 34mm; T 27mm
L 39mm; W 35mm; T 27mm
L 41mm; W 29mm; T 25mm

4399A-B, 507, 7.1
L 27mm; W 23mm; T 21mm
L 20mm; W 19mm; T 14mm

4436A-B, 539, 7.2
L 24mm; W 22mm; T 20mm
L 24mm; W 19mm; T 18mm

4480A-J, 539, 7.2
L 29mm; W 22mm; T 19mm
L 24mm; W 19mm; T 15mm
L 22mm; W 17mm; T 15mm
L 22mm; W 18mm; T 15mm
L 24mm; W 20mm; T 17mm
L 22mm; W 16mm; T 15mm
L 26mm; W 22mm; T 17mm
L 27mm; W 20mm; T 18mm
L 17mm; W 13mm; T 12mm
L 20mm; W 19mm; T 18mm

4799B, 610, 6.2
L 24mm; W 23mm; T 15mm

Stone Discs
RC= roughly chipped
BC= bifacially chipped

4002, 44, 11.1
RC, pelitic schist.
T 8mm; Dia 92mm.

4004, 57, 11.1 check finds number
RC, pelitic schist, fragment.
T 7mm; Dia 63mm.

4005, 57, 11.1
RC, slatey pelite.
T 10mm; Dia 46mm.

4009, 59, 12.3
Perforated stone disc. Pelitic schist. Bifacially chipped around the perimeter to form a regular circular shape. The hole, which is oval in plan, has been made in the centre and is formed by pecking from both faces.
L 108mm; W 103mm; T 12mm; Wt 204g.

4021, 96, 6.1
RC, pelitic schist, fragment.
T 9mm; Dia 160mm.

4026, 96, 6.1
BC, flaggy siltstone, fragment.
T 10mm; Dia 240mm.
4040, 15, 7.2
RC, sandstone, fragment. Burnt in centre of both faces.
T 28mm; Dia 240mm.

4055, 16, 7.5
Edge ground, semi-pelite, fragment. Burnt.
T 10mm; Dia 160mm.

4103, US
RC, pelitic schist (spotted), fragment.
T 7mm; Dia 75mm.

4142, US
Schist, abraded, fragment.
T 15mm; Dia 165mm.

4155, 202, 1
Edge ground, pelitic schist.
L 82mm; W 68mm; T 9mm.

4164, 219, 6.7
RC, red sandstone.
T 7mm; Dia 84mm.

4167A, 226, 6.7
RC, sandstone, fragment.
T 11mm; Dia 240mm.

4167B, 226, 6.7
RC, pelitic schist, fragment.
T 11mm; Dia 240mm.

4181, 301, 10.1
RC, laminated pelitic schist, fragment, burnt.
T 11mm.

4185, 301, 10.1
RC, psammite, fragment.
T 8mm; Dia 100mm.

4203, 257, 8.1
Fragment of red sandstone slab from cremation. No worked edges. Angular oval in plan.
T 20mm; Dia 320mm.

4208, 207, 7.1
RC, pelitic schist, fragment.
T 11mm; Dia 120mm.

4239, 275, 7.1
Partially ground edges, phyllitic schist.
T 8mm; Dia 58mm.
4263, 278, 7.1
Edge ground, pelitic schist.
L 54mm; W 47mm; T 7mm.

4264, 280, 7.1
RC, schist, burnt.
T 15mm; Dia 97mm.

4274, 279, 7.1
Partially flaked flat circular pebble of red sandstone.
L 78mm; W 76mm; T 16mm.

4283, 201, 1
BC, pelitic schist.
T 10mm; Dia 76mm.

4306, 287, 7.1
Perforated stone disc. Micaceous schist. Bifacially chipped around perimeter to form a circular shape. The hole has been made off-centre, worked from both faces. Hole is oval in plan.
L 84mm; W 81mm; T 10mm; Wt 95g; Dia of hole 8mm.

4309, 275, 7.1
RC, pelitic schist (spotted).
T 9mm; Dia 65mm.

4312, 282, 7.1
BC, pelitic schist.
T 8mm; Dia 71mm.

4315, 279, 7.1
BC, pelitic schist.
T 11mm; Dia 67mm.

4382, 239, 6.1
BC, sandstone, fragment.
T 9mm; Dia 190mm.

4384, 528, 7.6
RC, pelitic schist.
T 7mm; Dia 55mm.

4391, 539, 7.2
RC, pelitic schist.
T 5mm; Dia 56mm.

4393, 239, 6.1
Edges partially ground, pelitic schist.
L 84mm; W 79mm; T 15mm.

4412, 211, 6.3
RC, pelitic schist.
L 72mm; W 67mm; T 9mm.

4430, 265, 2.1
RC, pelitic schist, fragment.
T 9mm; Dia 100mm.

4442, 543, 7.2
RC, pelitic schist.
L 75mm; W 71mm; T 10mm.

4449, 248, 6.2
Natural flat pebble, pelitic schist.
L 101mm; W 84mm; T 11mm.

4474C, 571, 2.1
BC, pelitic schist, fragment.
T 8mm; Dia 58mm.

4475A, 248, 6.2
RC, micaceous schist.
L 52mm; W 48mm; T 10mm.

4488, 539, 7.2
Ground all over, pelitic schist.
T 7mm; Dia 55mm.

4515, 401D, 9.1
RC, slatey pelite, fragment, burnt.
T 11mm; Dia 110mm.

4516, 421, 9.2
Pelitic schist, abraded, fragment.
T 9mm; Dia 110mm.

4534, 635, 7.3
BC, ?psammite.
T 8mm; Dia 81mm.

4566, 654, 7.4
BC, pelite with felspathic layers, ?migmatised.
L 137mm; W 130mm; T 18mm.

4567, 661, 7.5
RC, pelitic schist.
L 87mm; W 84mm; T 7mm.

4593, 668, 6.4
RC, pelitic schist.
L 76mm; W 71mm; T 12mm.

4597, 433, 9.3
RC, pelitic schist.
L120mm; W 106mm; T 8mm.

4601, 704, 7.5
RC, pelitic schist (spotted).
T 14mm; Dia 86mm.

4607, 261, 7.5
BC, pelitic schist.
T 15mm; Dia 175mm.

4615, 680, 7.5
BC, sandstone.
T 18mm; Dia 115mm.

4620, 687, 7.5
RC, pelitic schist, fragment, burnt.
T 6mm; Dia 90mm.

4634; 726, 7.3
RC, pelitic schist, abraded, fragment.
T 22mm; Dia 180mm.

4647; 740, 7.5
Edge ground, pelitic schist.
L 80mm; W 78mm; T 9mm.

4652; 730, 6.7
BC, flaggy sandstone.
T 4mm; Dia 160mm.

4653, 549, 7.3
RC, pelitic schist, fragment.
T 10mm; Dia 125mm

4667, 229, 6.7
BC, flaggy siltstone, fragment.
T 8mm; Dia 170mm.

4671, 734, 6.5
BC, red sandstone, fragment.
T 17mm; Dia 90mm.

4740, 564, 5.2
RC, red flaggy sandstone, fragment.
T 8mm; Dia 140mm.

4788, 669, 6.4
BC, sandstone, burnt around the edges on one face.
T 20mm; Dia 234mm.

4802, 252, 5.2
RC, red sandstone.
T 11mm; Dia 76mm.

4822, 16, 7.5
RC, pelitic schist (spotted), flaked from a cobble.
L 85mm; W 79mm; T 13mm.

Whetstones, hones and other sharpening stones

4018, 44, 11.1
Hone. Red sandstone. Shaped to a tapering rectangle with curved ends. Rectangular cross-section. Finely ground all over. One face is worn flatter than the other and exhibits gloss.
L 170mm; W 56mm; T 37mm; Wt 630g.

4059, 29, 7.4
Probable whetstone. Micaceous red sandstone. Shaped to a tapering rectangle with slightly faceted ends. Oval cross-section. Both faces and sides have been ground.
L 58mm; W 23mm; T 9mm; Wt 20g.

4102, 201, 1
Hone. Broken laterally. Patchy red siltstone. Ground all over to shape with a rectangular cross-section. Both faces and sides very flat.

Broken L 103mm; W 37mm; T 14mm.

4160, 201, 1
Hone, made on a pebble. Broken laterally. Reddish siltstone. Unbroken end lightly pecked. One face has a finely worn sinuous profile with light striations visible. The opposite face has been worn down one side only.
Broken L 92mm; W 51mm; T 28mm.

4285, 279, 7.1
Hone. Pink sandstone, burnt. Shaped to a rectangle with curved ends. Rectangular cross-section. Both faces worn smooth with striations.
L 94mm; W 50mm; T 18mm; Wt 159g.

4322, 301, 10.1
Hone. Sandstone, very badly burnt/ abraded. Ground all over to form a regular shape with converging sides. Rectangular cross-section. Light striations visible on surviving face.
L 105mm; W 55mm; T 28mm; Wt 238g.

4348, 249, 5.2
Pebble whetstone. Grey siltstone. Elongated oval in shape with an oval cross-section. One face and side worn smooth.
L 82mm; W 26mm; T 15mm; Wt 53g.

4386, 239, 6.1
Hone, made on a pebble. Broken laterally. Grey sandstone. One face is worn flat with four distinct V-shaped grooves. The opposite face is slightly worn down one side.
Broken L 110mm; W 73mm; T 44mm.

4417, 239, 6.1
Pebble whetsone. Dark banded siltstone. Elongated oval with oval cross-section. One face worn to a sinuous profile with a light gloss.
L 96mm; W 21mm; T 16mm; Wt 58g.

4422, 239, 6.1
Possible pebble hone. Natural shaped piece of siltstone. One face with a slight sinuous profile and one side rounded.
L 165mm; W 43mm; T 15mm; Wt 160g.

4433, 533, 6.1
Perforated hone. Buff sandstone. Rectangular in plan and cross-section. Both faces are worn to a sinuous profile. The sides are quite damaged, possibly pecked over original smoothing. The perforation has been worked from both faces at one end.
L 121mm; W 42mm; T 20mm; Wt 185g.

4437, 539, 7.2
Hone, fragment. Sandstone. Both faces have sinuous profiles and the sides have been worn very flat with distinct edges.
T 21mm.

4465, 570, 2.1
Hone. Fine-grained red sandstone, burnt. Shaped to a rectangle with rounded ends. Rectangular cross-section. Both faces worn to a slightly sinuous profile. Some light striations on the surface, particularly on one side. Some gloss also on part of one side.
L 95mm; W 31mm; T 18mm; Wt 118g.

4483, 616, 7.3
Hone. Dark red siltstone. Ground all over to a regular shape with converging sides. Rectangular cross-section. Both faces are slightly sinuous in profile and exhibit some gloss.
L 83mm; W 30mm; T 13mm; Wt 63g.

4520, 421B, 9.2
Hone, broken laterally. Micaceous schist. Sub-rectangular in plan and cross-section. Both faces and sides are heavily worn with sinuous profiles and distinct corners. One face has two light striations.
Broken L 126mm; W 38mm; T 15mm.

4618, 625, 6.4
Fragment of ?. Both faces are very worn and smooth one being concave and the other sinuous. ?Sharpening stone.
Broken L 240mm; Broken W 81mm; T 34mm.

4625, 261, 7.5
Hone. Red sandstone, burnt. Appears to have been broken laterally then re-used as there are striations over the break. Ground all over to shape with rectangular cross-section. Both faces are worn and one exhibits striations. Unbroken end is particularly sinuous and worn.
L 35mm; W 35mm; T 12mm; Wt 20g.

4642, 732, 7.3
Possible hone, made on a pebble of pinkish sandstone, abraded. Pecked in broad bands down the sides to shape. One face is worn flat and smooth with some gloss present.
L 103mm, W 44mm, T 30mm; Wt 234g.

4763, 564, 5.2
Fragment of grinding/ sharpening stone. Coarse-grained flaggy sandstone. Both faces smoothly worn, one face is concave in section and opposite face is flat with a series of V-shaped grooves.
T 33mm.

4773, 577, 7.2
Whetstone. Siltstone. Elongated oval in plan with sub-oval cross-section. All faces are worn and the ends are rounded and smoothed.
L 101mm; W 21mm; T 15mm; Wt 48g.

4785, 642, 6.2
Pebble whetstone. Fine-grained grey sandstone. Oval in plan and cross-section. The faces are smoothed down one side and a deep V-shaped groove is present.
L 96mm; W 43mm; T 23mm; Wt 141g.

Weights

4042, 34, 7.5
Possible weight, unfinished. Oval cobble of fine-grained red sandstone, burnt. A notch has been formed at one end and there is possibly the beginning of a perforation made on one face at the same end. Some pecking down one side.
L 170mm; W 70mm; T 38mm; Wt 722g.

4133, US
Probable notched weight. Flat, oval cobble of ?, abraded. One distinct notch flaked and pecked on both sides towards one end. One end is pecked and the opposite end is flaked and pecked.
L 130mm; W 101mm; T 29mm; Wt 695g.

4196, 236, 1
Weight. Flat oval pebble of siltstone. A hole has been made at the narrow end by pecking from both faces. Hole is circular in plan.
L 122mm; W 72mm; T 23mm; Wt 343g; Dia of hole 11mm.

4366, 207, 7.1
Weight, fragment. Cobble of micaceous schist. Small hole has been made in probable centre of the piece, formed by pecking from both faces.
Broken L 107mm; T 29mm; Dia of hole 7mm.

4388, 527, 5.1
Very large boulder of ?. Encircling groove made round middle. Some kind of weight/ anchor.
L 600mm; W 380mm; T 220mm; Groove W 35mm; D 10mm.

4725, 314, 10.1
Weight, fragment missing. Flat oval cobble of micaceous schist. Hole has been made at narrow end and formed by pecking from both faces.
L 138mm; W 80mm; T 27mm; Wt 421g; Dia of hole 10mm.

Perforated Objects

4083, 6, 7.1
Perforated object, fragment. ?psammite. The unbroken side is sub-circular in plan and the edges may originally have been ground. The perforation is large and sub-circular and its inner edges have been ground to a smooth finish.
L 51mm; T 8mm; Dia of hole 18mm.

4084, 6, 7.1
Possible spindle whorl. Siltstone, burnt. The base is flat and the upper face has a domed profile. The perforation is central and straight-sided.
L 41mm; W 39mm; T 11mm; Wt 17g; Dia of hole 10mm.

4815, 635, 7.3
Possible bead or spindle whorl. Fine-grained red sandstone, abraded. The faces are flat and the sides rounded. Hole made in centre with slightly curving sides.
Dia 29mm, T 11mm; Wt 12g; Dia of hole 8mm.

Stone balls

4078, 17, 7.7
Quartz-feldspar-muscovite schist. Pecked and ground all over to shape with a small area which has been ground flat.
L 68mm; W 65mm; T 65mm; Wt 415g.

4136, 203, 1
Fragment. Grey sandstone. Finely ground all over with one slight ridge present. One small area has been ground flat and is quite polished. Rather squat in shape.
L at least 80mm; T 66mm.

4282, 220, 5.1
Fragment. Psammite, abraded. Pecked all over to shape.
Dia circa 85mm.

4295, 279, 7.1
Biotitic granite. Ground to a smooth finish all over. No sign of flattened area.
L 48mm; W 45mm; T 43mm; Wt 133g.

4478, 543, 7.2
Pale sandstone. Ground to shape all over. There are three small, flat areas and these are slightly polished.
L 78mm; W 77mm; T 75mm; Wt 630g.

4606, 261, 7.5
Pegmatite in quartz-feldspar-muscovite schist. Ground all over to shape. Both sides are slightly indented and highly

polished, possibly from some form of hafting. One end is very smooth and rounded and the opposite end lightly pecked.
L 55mm; W 53mm; T 47mm; Wt 205g.

4823, 422, 9.3
?stone ball or natural limestone/ chalk object? Ground smooth all over.
L 55mm; W 52mm; T 43mm; Wt 162g.

Rotary Querns

4015, 96, 6.1
?Migmatised schist. Edge fragment surviving. Base flat and upper face slightly curved.
T 52mm.

4051, 6, 7.1
Pelitic schist. Probable fragment from top of a rotary quern, includes part of central hole.
No measurements.

4089, 28, 7.3
Coarse-grained sandstone. Fragment. Base very worn, pecked and smoothed with a slight collar formed by wear around middle. On upper face there are three grooves which encircle the central perforation causing undulating profile.
Dia 440mm; T 80mm; Dia perforation 45mm; grooves 24mm apart.

4091, 15, 7.2
Pebbly arkose. Oval in plan with perforation made off-centre. Base pecked and smoothed with small U-shaped depression made on part of edge. Upper face is irregular in section.
L 390mm; W 350mm; T 75mm; Dia perforation 50mm; U-shaped depression 40mm wide and 27mm deep.

4092, 1051, 11.1
Coarse-grained sandstone. Circular in plan. Base very worn, pecked and smoothed with slight collar formed by wear around middle. Three pecked grooves around central perforation on upper face. On one side a deep U-shaped notch with surrounding raised rim has been worked.
Dia 410mm; T 50mm; Dia perforation 61mm; grooves 20mm apart; width of notch 81mm and 46mm.

4094, 96, 6.1
Garnet-muscovite schist. Sub-circular in plan with fragment missing. Base very worn, pecked and smoothed and concave in section. Stick-hole made at an angle and worn through to base. Central perforation slightly bi-conical.
L 410mm; W 360mm; T 70mm; Dia perforation 45mm; Dia stickhole 27mm.

4096, 44, 11.1
Conglomerate. Base almost entirely removed by abrasion. Sub-circular in plan with an irregular upper face. Central perforation.
Dia 380mm; T 77mm; Dia perforation 50mm.

4490, 259, 7.3
Garnet-muscovite schist. Fragmented. The upper face is flattish with a U-shaped channel pecked from the hopper. The base is worn and concave with a shallow dish worked around the hopper.
Dia 710mm; T 110mm; Dia dish 170mm; Dia perforation 80mm.

4539, 610, 6.2
Coarse-grained sandstone. Sub-circular in plan. Base pecked and worn to a concave section. Central perforation is bi-conical.
Dia 445mm; T 75mm; Dia perforation 30mm.

4644, 566, 6.6
Coarse-grained sandstone. Fragment. Sub-circular in plan. Base concave and worn smooth. Only part of central perforation surviving.
Dia 640mm; T 85mm.

4811, US
Conglomerate. Fragment. Only one face surviving and no central perforation, but probable part of rotary quern.
Broken T 55mm.

Saddle querns

4503, US
Coarse-grained sandstone. Fragment of shallow saddle quern. Slightly rounded base and shallow, concave upper face worn out to edges.
T 65mm.

4810, 706, 6.4
Very abraded fragment of coarse-grained sandstone. One face appears quite flat and worn. Possible quern fragment.
Broken L 170mm; Broken W 120mm; T 73mm.

Quern rubbers

4619, 503, 5.5
Granite. The base has been worn completely flat and is pecked and ground out to edges. Possible kind of rubber or quern base.
L 330mm; W 235mm; T 90mm.

4622, 434, 9.3
Coarse quartz-felspar-biotite schist. Worn base and D-shaped section. Probable rubber fragment.
Broken L 170mm; Broken W 150mm; T 120mm.

4623, 630, 6.6
Granite. Broken across width. Typical asymmetrical D-shaped section. Base heavily worn and convex in section.
Broken L 250mm; W 245mm; T 150mm.

4646, 745, 7.2
Granite. Typical asymmetrical D-shaped section with worn and slightly convex base. Part of edge faceted along base.
L 310mm; W 215mm; T 105mm.

Rectangular stone slabs

4232 & 4233, 266, 2.1
Flagstone. Both ends curved and sides flaked and pecked to shape. One face very abraded and some striations on opposite face.
L 1550mm; W 450mm; T 50mm.

4479, 540, 7.2
Flagstone. Fragmented. Roughly bifacially flaked down sides to shape. Both ends missing. One face quite weatherd and opposite face has possibly been pecked.
Broken L 550; W 350mm; T 57mm.

4484, 540, 7.2
Flagstone. Fragmented. Bifacially flaked on ends and down one side to shape. One face abraded. Linear scratches on opposite face and down unworked side. These may be natural or unintentionally formed.
L 820mm; W 215mm; T 38mm.

4583, 259, 7.3
Flagstone. abraded on one face. Possibly broken down length. Sides and ends are right-angled.
L 640mm; Broken W 290mm; T 38mm.

4586, 259, 7.3
Three pieces flagstone, one complete and two fragments. Complete piece is bifacially flaked to shape and has a wide, shallow rectangular notch worked on one side.
L 750mm; W 585mm; T 35mm
The fragments have also been bifacially chipped to shape.
Broken L 220mm and 180mm; Broken W 200mm and 150mm; T 30mm and 31mm.

Polished Stone Axes

4519, US
Quartz porphyry. Butt end surviving. Sides converge to butt. Both sides and butt have been heavily reflaked over original polished surface. One face is flatter than the other.
Broken L 121mm; W at break 67mm; W at butt 40mm; T 31mm.

4789, 421, 9.2
Quartz porphyry, abraded. Blade end surviving. Parallel sides. The blade has been heavily bifacially flaked over the original polished surface. The sides are pecked and one is slightly faceted.
Broken L 80mm; W 53mm; T 31mm.

Handled Objects

4077, 1, 1
Grey sandstone, abraded. Tapering handle surviving. Oval section. Distinct asymmetry visible at shoulder break. End of handle pecked and worn and some pecking still visible down sides.
Broken L 114; Broken W 62; T 32mm.

4241, 236, 1 check find number
'Handled' object. Pelitic schist. Bifacially chipped around edge to shape. Stone disc with tapering handle. Slightly asymmetrical at handle join. One face appears to have been smoothed whilst opposite face has residue gloss in parts.
L 164mm; W 109mm; T 12mm.

4277, 279, 7.1
Coarse-grained grey sandstone. Quite damaged both ends. Oval in section. Pecked and ground to shape with asymmetrical shallow shoulders. Most heavily pecked on faces and sides of head. Bifacially flaked on ends.
L 154mm; W 66mm; T 47mm.

4392, 539, 7.2
Sandstone. Handle surviving. Oval section. Asymmetry visible at shoulder break. End heavily flaked. Surface very smooth with possible residue down one side.
Broken L 84mm; Broken W 50mm; T 24mm.

4408, 515, 4.1
Fragment of quartz-feldspar-muscovite schist which has been shaped to a cylinder. Areas of pecking down length form slight facets. Possible handle for something.
Broken L 77mm; W 31mm; T 31mm.

4809, 723, 6.7
Possible blank for handled club. Rough piece of dark sandstone, broken down length and across width. Pecked over the surface and it looks as though there is a small shoulder formed in profile just before the break. Heavily flaked from end.
L 210mm; W 64mm

Strike-a-lights

4379, 509, 7.1
Flat pebble of pelitic schist. Striations on one face.
L 79mm; W 64mm; T 19mm.

4686C, 740, 7.5
Quartz pebble with small shallow striations on both faces.
L 65mm; W 58mm; T 33mm.

4744, US
Fragment of micaceous sandstone pebble. Multi-directional striations on both faces. Part of one end has been smoothed possibly from being held.
L 67mm; W 57mm; T 11mm.

4799C, 610, 6.2
Flat oval sandstone pebble with fine striations on one face.
L 56mm; W 49mm; T 20mm.

Decorated slabs

4096, no Feature no.
Large rectangular stone slab. Bifacially flaked and pecked to shape. On one face there are three small areas of incised design towards one end. These consist mainly of uneven criss-cross patterns and have been executed with a needle-type point.
L960mm; W 395mm; T 40mm.

4394, 231, 6.1
Incised stone. Pelitic schist, fragment. Bifacially chipped to a curve. Two deep slightly curved grooves forming 't' or cross shape made on one face.
Broken L 108mm; Broken W 59mm; T 7mm.

4429, 248, 6.2
Laminated slab which looks as though it has been shaped by bifacial flaking. One end is curved and worn smooth with striations, like a flaked sandstone bar. Random scratches on one face; multi-directional and localised, as if for a pin sharpener. Rough chequerboard pattern scratched on opposite

face. Re-used flaked sandstone bar?
L 210mm; W 115mm; T 31mm.

Vessels

4090, 1010, 7.3
Large boulder of conglomerate/ coarse grit with trough worked into one face. The trough is steep-sided and has a slightly concave base and the interior is roughly pecked.
L 710mm; W 460mm; T 230mm; Trough L 430mm; W 195mm; D 80mm.

4643, 727, 6.7
Fragment of stone 'bowl'. Coarse grit. Base slightly rounded. Rim is rounded and the dish is concave with a smooth interior and worn up to top of rim.
Broken L 165mm; T at bowl 60mm and rim 111mm.

4645, 745, 7.2
Fragment of stone 'bowl'. Sandstone. Flat base. Rim slightly flattened on top. The dish is concave and the whole interior has been roughly pecked.
Broken L 220mm; T at bowl 55mm and rim 97mm.

Miscellaneous

4058, 11, 7.1
Fragment of pivot stone. Sandstone block. Rough on base and flat and smooth on top. Large perforation truncated by breakage.
T 55m.
4329, 286, 7.1
Fragment of psammite. Blocky shape. Both faces are flat, smooth and worn.
T 71mm.

4577, 663, 5.4
Ard point. Buff sandstone. Shaped to a point with a flaked butt. One face is pecked and opposite face exhibits characteristic U-shaped wear at tip. On both faces towards the butt end there are discrete areas of pecking probably to facilitate hafting.
L 175mm; W 83mm; T 51mm; Wt 1022g.

KEBISTER, SHETLAND: COARSE STONE REPORT

The assemblage comprises 914 objects of coarse stone and in addition there are over 1100 sandstone flakes (table 1). A great variety of artefact types and raw materials are represented and each is discussed separately below with reference to its physical characteristics, function and distribution on site. The final discussion incorporates the conclusions reached from the analysis and examines the chronological framework.

Raw Materials

Sixteen material types are represented in the assemblage. At a broad level they include the fine-grained sedimentary rocks (argillaceous) such as shales and siltstones and the coarse-grained sedimentary rocks (aranaceous) of sandstones and grits as well as their metamorphosed equivalents: semi-pellite; phyllite; and psammite. Granites and horneblendes have also been used. Both rounded cobbles and fresher outcrop material (particularly sandstone) have been exploited according to requirements and there is strong evidence for the careful selection of the raw materials for specific tasks (see final discussion).

All of the above rock types are common to Shetland and many are present in the metamorphic geological sequences immediately around Dales Voe: the Clift Hills Division (Mykura 1976) eg. the phyllites and semi-pellites of the Clift Hills Phyllite group and the quartzite and coarse quartz grits of the Dales Voe Grit. Just to the south, the Rova Head Conglomerate has well bedded sandstones which can be split easily into flags of 50mm or more in thickness and it also contains cobbles of quartzite and granite (Collins pers comm).

The Artefacts

<u>Flaked Sandstone Bars and Associated Working Debris</u>
T= 262, 67 are complete.
L= 104mm to 312mm
W= 60mm to 130mm
There are two main clusters at:
130mm to 170mm long and 60mm to 90mm wide
190mm to 235mm long and 62mm to 102mm wide
78% red sandstone, 22% grey sandstone

The majority of the bars (61%) have been flaked over the entire surface including ends, sides and faces and these are oval in cross-section. The rest of the pieces have been shaped only around the ends and sides and the unworked faces are formed by cleavage along the bedding planes which gives these pieces a flat cross-section. In plan the bars are either a fine, tapering rectangle or are sub-rectangular. The long section is generally straight although in a few cases it forms a distinct shallow curve. The morphology of the ends of the bars is varied and curved, squared and pointed ends are present although it is most common for the ends to be gently curved or asymmetrically curved in plan.

Wear traces are present on 44% of the bars and these take the form of edge rounding and areas of smoothing and striations on the faces. Some flaking was no doubt as a result of use wear but this was often indistinguishable from that used to shape the bar.The most

common form of wear is edge rounding and this is normally present on the broadest end and continues down one or both sides, often for the whole of the length. Where two sides are rounded one side is often more extensively worn than the other. Areas of smoothing are present on some of the pieces and in most cases it is present on one face only and at the end which has been rounded. Associated striations are visible on only a few pieces. The wear traces were examined together with the end morphologies but there appeared to be no correlation between the types of wear and shape of the end, although most of the wear traces were concentrated at the broadest end.

Flakes from the manufacture of the bars are present on the site.All of these flakes are inner ie. there is no cortical material present and are of red sandstone. In shape they are squat with the width being about twice the length; the thinner flakes tend to be most squat whilst the thicker flakes are rounder in shape.In size they range from 20mm to 180mm wide and 15mm to 110mm inlength but most cluster in the lower half half of the range. The evidence suggests that the sandstone was quarried directly from outcrops as there is no cortical material present on either the bars or the knapping debris to point to the use of cobbles. No experimental replicative work has been carried out on such material but it is likely that these flakes represent the final stage in the shaping of a roughout and it is probable that blanks were roughly shaped at the source of the outcrop and then brought on to site for the final shaping. There are a few possible blanks present on the site ie. those pieces of a large size and which are crudely flaked, but none of these are immediately associated with the knapping debris. There are over 1100 flakes from the site, 87% of which are samples from two concentrations: B.218; and B.1 F523 a layer just below the turf and associated with these flakes are many of the bars. It is likely that both concentrations represent knapping floors.

Discussion

The function of these flaked sandstone bars has not been determined by any use wear experiments however they are normally associated with the presence of ard points and Rees has suggested that they would be useful in breaking up soils prior to cultivation with an ard (Rees 1986). They most certainly would have been hafted in some way and at Sumburgh there are similar bars which have been made on a softer material and which have discrete areas of rounding and polish on both sides to suggest that they have been hafted. At Kebister there is little evidence for such hafting traces most probably because the sandstones which were used are harder and therefore do not show much friction wear. A few of the sandstone bars exhibit areas of pecking on the faces which may have been to facilitate hafting.

There is some variation within the morphological characteristics of the flaked sandstone bars, but this has been difficult to quantify. Rees (1986) has attempted a classification based particularly on shape but this was not felt suitable for use on the Kebister assemblage particularly as the scheme appears quite subjective and was based on a larger percentage of complete pieces. In this assemblage end morphology and cross-section appear to be most variable but given the rather standard wear patterns which are present, it is not certain whether the different shapes were intended for specific functions or whether all the bars had a similar type of use.

The bars appear to have been in use from phases 1.1 through to 2.2, that is if their presence in occupation , old ground surface and soil contexts can be construed as contemporary use.

There is however evidence from the refitting of some broken fragments to suggest that some of the bars which occur in the later phases are actually derived from phase 2.1 and earlier. The most secure evidence for contemporary use comes from the area of flaked sandstone bar production (B.218, phase 1.2). Here 11 bars were found with a large amount of sandstone knapping debris and it is likely that this represents an *in situ* knapping floor. Some bars and a smaller amount of knapping debris were also recovered from feature fills of B.220 and it is possible that these were derived from the main knapping area. Another possible knapping floor may be present in F523, a layer immediately below the turf which also had large amounts of flaked sandstone bars and debris.

In the four earliest phases the sandstone bars are also present in structural contexts such as drains and wall core which indicates their re-use as constructional material and this factor is common to other artefact types such as the ard points and worked shale. The rest of the bars occur throughout the site in rubble, mixed field soils and redeposited material although nine pieces were found in a possible old ground surface contexts of B.614, phase 3.2.

Ard Points
T= 73, 28 complete.
L= 133mm to 267mm
W= 56mm to 98mm
Grey sandstone 86% < 70mm in width.
Red sandstone 23% < 70mm in width.
Thickness 31mm to 66mm.
Grey sandstone 13% <45mm in thickness
Red sandstone 46% <45mm in thickness
W:Th (Cross-section) 1.1 to 2.5
Grey sandstone 20% >1.5
Red sandstone 77% >1.5
Grey sandstone T= 40. Red sandstone T= 33.

The ard points are made on grey and red sandstones and there are specific shape differences between the two materials with those of grey sandstone being rounder in cross-section than those of red sandstone. Many of the ard points are broken laterally and there was a tendency for this form of breakage amongst those with a flatter cross-section in both material types. Only one of the complete ards is double ended (3780, B.622) whilst most of the other pieces have been flaked around the base opposite the working end (1445, B.220). Two of the points have additional notching on either side which may indicate an alternative form of hafting (1556, B.402). The ard points were often pecked over one or both faces after they had been shaped by flaking and this may have been in order to facilitate hafting as Rees has suggested(Rees 1979) or it may have acted as a form of final shaping as well as to remove some of the flake scars and thereby strengthen the tool.

Wear traces are present on 47 ard points and this takes the form of characteristic smoothing and striations (3780, B.622). Over a quarter of the points have been worn on both faces and these have been turned for re-use after the original point has become too worn. Other evidence for re-use is present on three of the points which appear to have been broken longitudinally through use and which have then been reworked (3759, B.620). There is no difference between the wear patterns produced on those of greyand red

sandstone although there is more evidence for the ard points of grey sandstone to have been pecked to shape.

The ard points were recovered mainly from phases 1.1 to 2.1 and most from the earliest phase were found in pit or posthole fills. In phase 1.2, just under half were associated with the drains of B.217 and B.622 whilst a similar number were recovered from the rubble of the pre- ard wall and associated soils (B.620). From this phase there is a definite contrast between the contexts of the grey and the red sandstone ard points as B.620 and B.622 contain only grey points and B.217 and B.218 have only red ard points. Some of the ard points were found with the two concentrations of knapped sandstone debris and it is possible that ard points were also being manufactured in the locality of the site. In phase 2.1 most of the ard points were recovered from structural contexts although four were found in occupation and old ground surface contexts. In later phases most of the points were found in rubble or mixed field soils.

Worked Shale

This section includes rectangles and points of shale as well as a few miscellaneous shaped objects. In addition 36 worked fragments and 79 unworked fragments were recovered during excavation.

Rectangles

T= 40, 28 complete.
L= 80mm to 318mm, 21 cluster 160mm to 250mm in length.
W= 50mm to 90mm

Half of these pieces are of a tapering rectangular shape and the rest are sub-rectangular to ovoid. In size they are very similar to the flaked sandstone bars although they are thinner in cross-section. All have been flaked bifacially around the edges to shape and the cross-sections are flat (3736, B.620; 3774, B.622).The end morphologies are similar to the flaked sandstone bars in that most are curved in plan although some have distinctive pointed ends. None of these pieces have visible wear traces, but as this material is so friable it is possible that some of the original surfaces have peeled off.

Points

T= 8, 5 complete
L= 80mm to 180mm
W= 26mm to 88mm

The points are long and narrow but are smaller than the rectangles. They have been flaked bifacially to shape and the end opposite the point is curved or squared (3588, B.619; 3876,B.624). None have visible wear traces.

There are a further five pieces of worked shale one of which is a tanged point (1486, B.204). Another two pieces have been shaped to form a handle and a curved working edge (1480, B.1, GF, B. 1) and in form they are similar to a flensing knife although the working edge is not at all sharp. There is a fragment of a heart-shaped implement (2204, B.503) and a lobate piece which has four deep notches worked around the edge (1717, B.218).

The possible functions of these rectangular tools have not been fully explored. It has been suggested by various writers that such implements were too weak for tilling but they are of a similar proportion to the flaked sandstone bars, although they are lighter in weight and at Sumburgh many similar tools had evidence for hafting. It is therefore possible that they were involved in less strenuous agrarian practices such as hoeing. At Jarlshof some of these implements were found with deposits of clay and it was suggested that they may have been used to mix and shape clay (Hamilton 1956).

The worked shale follows the distributional pattern of the ard points quite closely. Over half of the rectangles and points are from phase 1.2 and are associated particularly with the drains of B.622 and activity in B.620. Only a few were recovered from the feature fills of phase 1.1 whilst from phase 2.1 onwards most were recovered from rubble or mixed field soils. Only one pieceof shaped shale, the lobate piece, is well stratified and that is from B.218.

Cobble Tools

Pounder/Grinders T= 17, 12 complete
L= 112mm to 185mm, W= 80mm to 126mm
9 double ended, 3 single ended, 4 with ridged facets
Sedimentary 4, Metamorphic and other 13

Grinders T= 20, 17 complete
L= 81mm to 158mm, W= 58mm to 122mm
11 double ended, 6 single ended, 9 with ridged facets, 2 faceted down sides.
Sedimentary 3, Metamorphic and other 17

Faceted cobbles T= 26, 17 complete
L= 86mm to 235mm, W= 35mm to 78mm
11 double ended, 6 single ended, 12 with additional pecking mainly down the sides.
Sedimentary 10, metamorphic and other 16

Plain cobbles T= 62, 36 complete
L= 83mm to 220mm, W= 35mm to 120mm
Sedimentary 34, metamorphic and other 28

The cobble tools form four major sub-groups on the basis of wear patterns. They are made on a variety of raw materials with sandstones and psammite being equally represented (37%) and there are also hornblendes (11%) and granites (8%). Other materials occur in smaller quantities: semi-pellite; coarse grit; shale; phyllite; and siltstone. The pounder/ grinders and the grinders are essentially quite similar in form as both have broad areas of faceting on the ends and metamorphic rocks were preferred for both. However, the grinders are smaller in size and the pounder/grinders are more heavily worn on the ends, often with heavy flake damage. The faceted cobbles are smaller than the pounders and grinders and the facets are not so developed. The plain cobble tools have a great mixture of wear patterns from pecking to flaking and the use of sedimentary rocks was common to this type. The size range of these tools is large and many may be undeveloped forms of the other three sub-groups. There is also a group of six hammerstones which have been flaked

along part of an edge prior to use, possibly to form some kind of a chopping edge. A few other cobble tools appear to have been used as either anvils or smoothers.

The cobble tools are scattered throughout the site but because of the mixed nature of many of the deposits it has not been possible to observe any chronological differences in the use of such tools. Many of the faceted cobbles and some of the smaller plain hammerstones are most probably associated with the knapping of the quartz and sandstone. The larger pounders and grinders are common to Iron Age sites and at Kebister there is an interesting concentration of such tools from the occupation deposits of phase2.1.

Stone Discs
T= 56
Shale T= 24 D= 59mm to 176mm. 11 > 90mm, 7 < 90mm
Cobbles T= 11 D= 39mm to 190mm. 2 > 90mm, 7 < 90mm
Tabular T= 21 D= 51mm to 170mm. 4 > 90mm, 14 < 90mm

The discs are made on laminated materials such as shale and phyllite (3555, B.616; 457, B.204), on flat cobbles and on tabular fragments of sandstone (2735, B.506; 1829, B.709). They are circular in shape, particularly those with diameters of less than 90mm and as they increase in size they become more ovoid. Most are less than 90mm in diameter although those made on shale tend to be larger. The discs have been chipped around the edge to shape but most of the cobble discs are actually unworked. Five of the discs are hexagonal in shape and these are amongst the smallest pieces (2516, B.506; 379. B.204). One of these has been ground around the edges and only two other discs, of a similar size to the hexagonal ones, have ground edges.

Some of the stone discs may have functioned as pot lids and on some sites such discs are associated directly with pots. The smaller discs are more problematic and may have been used as gaming counters, particularly those with ground edges or as has been suggested by Hamilton as plugs for skin containers (Hamilton1956). The discs are distributed throughout the phases although only one piece comes from phase 1. Many are in redeposited contexts and it has been difficult to detect any patterning of size by phase as is common on other sites. In phases 2.1 to 2.4 the discs have a wide size range and include the smallest and largest of the types. Three of the hexagonal discs and one of the edge ground discs were found in the rubble of phase 2.4. From phases 3.2, 3.3and 4.1 the size range is more discrete (50mm to 90mm) although again many come from mixed deposits. It is interesting to note that, with the exception of those discs from disturbed deposits, the distribution of discs made on shale and sandstone is mutually exclusive and that this is not a chronological difference.

Perforated Objects

Spindle whorls T= 6, 5 complete
Diameter 22mm to 50mm, 5mm to 20mm thick.
Hole diameter 4mm to 10mm
4 shale/ phyllite, 2 sandstone

Other centrally perforated pieces T= 8, 4 complete

L= 47mm to 115mm
W= 55mm to 87mm
Thickness= 9mm to 31mm
Hole diameter 8mm to 15mm
6 phyllite, 2 sandstone - all made on cobbles.

The spindle whorls have been ground either on the edges or over the whole surface to shape and the perforations are parallel-sides or bi-conical in section. The other centrally perforated pieces are larger in size than the spindle whorls and are made on cobbles which are more ovoid in shape. All have bi-conical holes formed by pecking from both faces.

Perforated off-centre T= 14, 11 complete
L= 74mm to 175mm
W= 73mm to 140mm
Hole diameter 3mm to 10mm
10 phyllite, 3 sandstone, 1 psammite

These are all made on cobbles and the perforations have been made either towards one end or in the centre along one long edge. The holes are conical or bi-conical in section and formed by pecking from one or both faces.

A further eight pieces of phyllite and shale were perforated but were too fragmented to identify their characteristics.

Most of these pieces would have functioned as types of weight from the self evident spindle whorls to the those which are perforated off centre and which may have been either net or loomweights.

These pieces are distributed across the site from phases 2.1 onwards and there is no specific patterning to any of thesepieces except for an interesting concentration of five weights with off-centre perforations from disturbed deposits of phase 3.3.

Querns and Quern Rubbers

Saddle Querns T= 16, 9 complete
L= 320mm to 520mm
W= 190mm to 450mm
Th= 25mm to 140mm, most c.90mm in thickness.
Coarse grit 10, sandstone 4, schistose grit 1, granite 1.

Most of the worn surfaces form a shallow asymmetrical concave face and this worn surface continues right up to the edges except on one piece (1532, B.405) which has a broad flat rim. One quern (1114, B.615) has two drilled holes on the base.

These querns are mainly associated with structural contexts of phases 2.1 to 2.4 but two were found together in a pit B.615. One other quern formed part of the capstones to a drain in B.217 (phase 1.2) and there was one from a mixed field soil of phase 4.3.

Trough Querns T= 8, none complete.

W= 200mm to 410mm
Th= 110mm to 180mm
Depth of trough 40mm to 140mm
Coarse grit 7, granite 1.

These are all made on thicker slabs of rock than the saddle querns. The cross section is distinctly asymmetrical with one steep side and one shallower side. One piece may be a re-used trough quern as it has a hole with a bi-conical perforation made in its base (731, B.516) although it may actually be a hollowed stone with a different function entirely.

There is one trough quern in a pit fill of phase 1.1 and four from phase 1.2 which are mainly associated with the drains of B.217 and B.622. Another was recovered from a layer in phase 2.1 B.313.

Quern Rubbers T= 18, 9 complete.
L= 60mm to 310mm
W= 85mm to 200mm
Coarse grit 13, sandstone 4, granite 1.

Most of these quern rubbers have the characteristic D-shaped longsection. Four are from phases 1.1 and 1.2 and are linked to thepresence of the trough querns. Those found in phases 2.1 and later are found in structural contexts although in B.715 there are two from the Norse midden and one from a possible old ground surface.

Rotary Querns T=10, none complete.
Diameters 110mm to 700mm
Th= 30mm to 105mm
Sandstone 6, coarse grit 3, schistose grit 1.

All the rotary querns are circular or sub-circular in plan and the upper face is either flat or gently rounded. Only two rotary querns have evidence for stick holes both of which are worn through to the base and one is upright and the other slanted.

One of the querns was found in a wall of a structure in phase 2.1B.309 and the rest are present from phase 3.1 and onwards, all inredeposited or structural contexts.

Grinders T= 8, none complete
Diameter 95mm to 160mm
Th= 19mm to 35mm
Sandstone 6, phyllite/ shale 3

There are a further eight pieces which are all made on sub-circular flat cobbles. Five of these have an area of pecking in the centre of both faces and the rest have been pecked from one face. They are possibly unfinished rotary querns although they would be amongst the smallest of this type. Alternatively, they could be some form of small hand grinder and such pieces have been found on other Iron Age sites (eg. Pool, Orkney). At Kebister they were found in phases 2.1, 2.4 and 4.3 and 4.4.

Whetstones

There are 11 whetstones of which six are of sandstone and the rest are of phyllite or shale. Four of these pieces have a rectangular section which has been formed by wear on all four faces (2726, B.512) and the rest have at least one worn concave face. On one of the whetstones there is a deep V-shaped groove inthe centre of one face (2417/ 2113, B.713) and another has short score marks which run at right angles to the length.

One of these whetstones was recovered from the rubble of B.620 and the rest from phases 2.3 through to 3.3.

There are a further fourteen pieces which were collected on site.These are all finger-shaped pebbles, mainly of phyllite, and none have any characteristic wear marks however, they may have been intended tools. They come from phases 2.1 through to 4.4 although most are associated with the collapse of the Tiend barn.

Hollowed Stones

There are 6 stone bowls, all are fragments and are of sandstone except for one which has been made on granite. They have rounded rims and outer faces and the inner bowls vary in character from gently curved to quite steep in cross-section. One (727, B.511) has a shallow U-shaped depression channelled around the outer rim. Some of these, particularly the smaller ones, may have been intended as lamps and there is a probable lamp handle fragment from the rubble of phase 2.2. The stone bowls were all found in rubble or construction contexts from phase 2.3 onwards.

One pivot stone was found *in situ* in the paving of the kiln loading room and another possible pivot stone was recovered from a clearance cairn of phase 3.

The remaining hollowed stones are made on either sandstone slabs or on cobbles of granite and coarse grit. Those made on the slabs have only roughly pecked shallow hollows in no particular pattern although one (3039, B.718) has four smoothed egg-shaped hollows,one on one face and three on the opposite face two of which are joined. The hollows made on the cobbles are more regular than those of the slabs and are oval in plan, round-based and they vary in depth.

Some of the hollows, particularly those on the slabs, may have been formed accidentally through the processing of materials on the stone whilst those on cobbles may be either unfinished bowls or some form of mortar. All of these hollowed stones are present from phase 2.2 onwards and are mainly in disturbed contexts although one slab was found in an occupation deposit of B.514.

Stone Clubs

There are five objects of stone wich have been pecked all over to form a handle and a head. Three of these, all of grey sandstone, have a flat oval cross section and are straight in side section. In plan, the junction of the head and handle is asymmetrical as one shoulder is less well developed than the other. They have been pecked all over to shape, particularly down the sides and on one (3820, B.622) there are striations present on one of the faces. Another piece, of coarse grit, is more cylindrical in form but it still has a distinct asymmetry at the shoulder (1374,B.320). The final piece (2660, B.506) is of coarse grit

and is cylindrical in form but it is double ended with asymmetrical sloping shoulders and a smoothed concave area in the centre of one face.

The function of such tools is obscure and it is likely that the term 'club' is a misnomer. The handles are well formed and often quite pointed but they are often short in relation to the size of the head and hence rather unwieldy. The tendency towards asymmetrical shouldering is of interest and as many such clubs exhibit this feature it is possible that they may have been hafted in a particular way.

The three grey sandstone clubs are all associated with the drains of B.622, phase 1.2 and the single ended cylindrical piece is from a gulley fill of B.320, phase 1.1. The double ended object is unfortunately less well stratified and was recovered from the rubble of phase 2.4.

Miscellaneous

The nineteen miscellaneous objects are detailed more fully in the catalogue. The more interesting pieces include five fragments of masonry all of which are from the latest phases except for a large slab of sandstone which was notched at both ends and found in the paving of phase 2.1. A number of flat sandstone slabs were also found during excavation. Most are fragmented and only three pieces have been shaped around the edge. They are associated particularly with rubble or are in construction contexts such as drains.

Two stone bracelets (1319, B.313; 3105, B.518) and a stone ring (2991, B.616) all have D-shaped sections and come from phases 2.1 and 2.2. There is a baking plate of phyllite (2330, B.611) and a bar mould (2456, B.711) from phases 3.2 and 3.3. Finally there are two interesting objects which have been termed borers. Both are of siltstone and one (GF, B.518) has been faceted on all sides to form a four-sided point. The other (2916, B.612) has an isolated rounded projection at one end.

Discussion

Raw materials

The careful selection of different raw materials for certain tasks is apparent from the whole assemblage. Sandstone was the dominant material and was used in both cobble and tabular form being pecked, flaked and ground into a variety of shapes. The use of tabular sandstone occurs mainly among the flaked sandstone bars, ard points and discs although where cobbles of a flat circular shape were available they were also used as discs. The tabular sandstone was most probably quarried from outcrops since there is little evidence for the knapping of cobbles and indeed, many of the sandstone cobbles were probably not of a suitable size or shape for these tools. It is possible that some of the flatter forms of the flaked sandstone bars, particularly those with little or no flaking on either face, are a consequence of the material characteristics of the outcrop being exploited rather than as intended shaping. Some of the sandstones split more readily across a bedding plane than other more homogenous sandstone and there is probably much variability in bedding formations within one sandstone outcrop.

Differences between the selection of grey and red sandstones are apparent. The grey sandstone has a higher clay content than the red (Collins pers comm) and is more

homogenous in texture. Where sandstone is used for cobble tools the grey sandstone is preferred particularly for the pounders and grinders, possibly because this material is more 'elastic' and finer grained. Grey sandstone is also used for many of the ard points and these tend to have a much rounder cross section than those made on red sandstone. Although this may be a functional difference, it may also reflect the relative ease with which the grey material can be flaked and pecked into shape (cf the handled clubs of grey sandstone). The qualities of elasticity and the homogeneity of the grey sandstone may also be more suitable for its use as ard points: perhaps it does not break so readily, and here it is interesting to note that more of the grey sandstone ard points had evidence for re-working and hence a longer functional life.

Amongst the cobble tools there is a particular tendency for the preference of psammite over other materials and the greater density and heavier weight of this material in relation to its size may have been important factors in its selection. Coarse grits have been selected particularly for querns and quern rubbers (cf the choice of sandstone and psammite for the pounders and grinders) but amongst the rotary querns there is a greater use of sandstone.

Chronology

The artefact types present in phases 1.1 and 1.2 include flaked sandstone bars and associated working debris, ard points, worked shale, cobble tools, trough querns, quern rubbers, one saddle quern, handled clubs and a stone disc. Many of the objects from phase 1.1 were recovered from feature fills and as these types are so similar to those from phase 1.2 it is likely that many were derived from activity in this later phase. Much of the coarse stone was derived from the drains of B.217 and B.622 and they were re-used for the lining of the drains and for the capstones. The composition of the artefacts within these two drain complexes is significantly different: all the flaked sandstone bars and ard points from B.217 are of red sandstone whilst those from B.622 are all of grey sandstone. Much of the worked shale and three of the handled clubs are all from B.622 whilst no such artefacts appear in B.217. The differential use of grey sandstone for ard points was repeated in B.620 which also had a significant amount of worked shale. From B.218 all the ard points are red sandstone and there is only a small amount of worked shale. This pattern suggests that activity in area VI was perhaps limited spatially, or even chronologically and that there may be unexcavated areas nearby which are more closely related to this deposit. Evidence for *in situ* working areas is provided by the area of activity in B.218 which has evidence for the production of sandstone bars as well a some quartz knapping.

The assemblage from these phases is similar to those from BronzeAge sites in Shetland. From the Neolithic site of Scord of Brouster there are ard points and flaked sandstone bars which are similar in form to those from Kebister and the local sandstones appear to have been quarried for their manufacture.There are also twenty handled clubs from this site although most are associated with House 1, phases 2 and 3 (Rees 1986, table 7) which have the latest dates from the site within the second millennium bc. There appears to be no worked shale from Scord of Brouster and this may be a chronological difference although such laminated deposits are not present locally. In the south of Shetland the Bronze Age sites of Jarlshof and Sumburgh also have ard points and handled clubs whilst the use of shale for tools is also very common. Some flaked sandstone bars have been identified at Sumburgh but many were produced from split pebbles rather than making use of tabular blanks even though this site is in an area of sandstone. Trough querns are also present in the Bronze Age at Jarlshof whilst the saddle querns appear in later deposits. The shale

tools from these sites are similar in form to those from Kebister, in particular the tapering rectangles although at Sumburgh many have been heavily worn with smoothing and striations particularly on one face and an edge and there is also evidence for the hafting of these pieces. From Kebister the heart-shaped tool, the lobate object and the cleavers can also be paralleled from Bronze Age deposits at these two sites.

The present evidence suggests that the use of certain artefact forms, particularly the ard points and the flaked sandstone bars continued from the Neolithic through to the Bronze Age in Shetland. The differential use of sandstones and shales for similar shaped tools is of interest although whether this represents a functional or chronological difference or is simply a problem of resource access is as yet unresolved.

The coarse stone assemblage from phase 2.1 and later is less easy to follow chronologically at Kebister as much of the material was found in mixed contexts. However, all of the artefacts which first appear in these phases: saddle and rotary querns; pounders and grinders; hollowed stones; pebble whetstones; small stone discs; spindle whorls; and weights are objects which are common on pre-Norse Iron Age sites in the Northern Isles and Scotland generally. The few stone artefacts from the Norse midden are not particularly diagnostic of this period and some may be derived from earlier phases.

KEBISTER, SHETLAND: Coarse Stone Catalogue. Including rotary, trough and saddle querns, stone clubs, hollowed stones, and other miscellaneous objects.

ROTARY QUERNS

1; 906; 1860
Small rotary quern made on a sandstone slab and broken across the width truncating central hole. The base is flat and smoothed and the central hole is worked from both faces to form an hour-glass shaped cross-section.
c. 220mm in diameter and 30mm in thickness.

4.4; 700; 34; 560
Small rotary quern made on sandstone and broken across the width truncating central hole. The base is flattish and the upper face is uneven. The central hole is worked from one face only.
c. 150mm in diameter and 65mm in thickness. The central hole is 30mm in diameter at its narrowest point.

4.4; 700; 30; 161
Fragment of large sandstone slab, the unbroken edge is curved. The upper face is rough and the base is quite smooth. Possible fragment of a rotary quern.
Broken dimensions are 145mm x 120mm and 35mm in thickness.

4.4; 700; 28; 165
Segment of a rotary quern made on sandstone, the central hole is truncated by breakage. Both upper and lower faces are flat and have been pecked and smoothed. The central hole has been worked from both faces to form an hour-glass shaped cross-section.
c. 400mm in diameter and 55mm in thickness.

4.2; 709; 168; 1830
Large fragment of coarse grit. The upper face is curved in cross-section and is probably the natural worn face of a large cobble. The base is flat and has been pecked and smoothed. No hole survives. Probable fragment of a rotary quern.
Broken dimensions are 360mm x 180mm and 85mm in thickness.

3.3; 714; 198; 4401
Rotary quern made on a sandstone slab and broken across the width truncating central hole. The upper face is flat and the base has been pecked and smoothed. The morphology of the central hole cannot be determined due to breakage.
c. 340mm in diameter and 31mm in thickness.

3.3; 718; 229; 3020
Large rotary quern made on schistose grit and broken across the width and along edge truncating both the central hole and the stick hole. The upper face is gently curved in cross-section and the flat base has been pecked and smoothed. The central hole has been worked from the upper face only and the stick hole has been made at an angle to the base.
c. 370mm in diameter and 65mm in thickness. The central and stick holes have diameters of 50mm and 20mm respectively.

2.1; 309; 778; 1252
Large rotary quern made on coarse grit. Breakage has truncated the central hole and the stick hole. The upper face is gently curved in cross-section and the base is flat. The central hole has been worked from the upper face only and has shallow sides. The stick hole is upright and has been worn through to the base.
c. 700mm in diameter and 105mm in thickness.

4.1; 503; 1229; 2207
Fragment of a small rotary quern made on coarse grit. Both the upper face and the base are quite rough. The central hole is worked from both faces to form an hour-glass cross-section.
c. 180mm in diameter and 44mm in thickness.

4.4; 601; 907; 4402
Small rotary quern made on a sandstone cobble and broken across the width truncating the central hole. The upper face is flattish and the base is flat and has been pecked and smoothed. The central hole has been worked from both faces to form an hour-glass shaped cross-section.
c. 220mm in diameter and 44mm in thickness.

SADDLE QUERNS
All the saddle and trough querns are made on naturally occurring slabs or blocks of stone. This differentiates them from directly quarried slabs, the one possible presence of which is find number 1532.

2.4; 204; 534; 1671
Thick slab of coarse grit, broken across width. Upper face is slightly concave in section and has been worn up to the edges. The base is steeply curved.
Broken length 270mm; width 240mm; thickness 100mm.

2.4; 204; 535; 480
Thick slab of coarse grit, oval in plan. Upper face is slightly concave in section and has been smoothed and worn up to the edges. The base has a shallow curve.
Length 350mm; width 220mm; thickness 90mm

2.4; 204; 734; 1418
Thick slab of coarse grit, oval in plan. Upper face is asymmetrically concave in section and has been worn up to the edges. The base is steeply curved.
Length 370mm; width 280mm; thickness 90mm.

2.4; 204; 734; 1420
Thick slab of coarse grit, oval in plan. Upper face is almost flat and has been pecked and smoothed. The base is curved.
Length 370mm; width 280mm; thickness 90mm.

2.2; 207; 580; 793
Thick slab of coarse grit, broken across width. The upper face is asymmetrically concave in section and has been worn up to the edges. The base is gently curved.
Broken length 260mm; width 290mm; thickness 80mm

2.1; 212; 625; 1104
Thick fragment of granite. Upper face is flat and smooth. Probable saddle quern.
Broken dimensions 160mm x 160mm; thickness 95mm

1.2; 217; 698; 1185
Slab of red sandstone, oval in plan. Upper face is slightly concave in section and has been pecked and smoothed and worn up to the edges. The base is gently curved.
Length 390mm; width 260mm; thickness 70mm.

2.1; 311; 860; 1368
Large slab of coarse grit, oval in plan. Upper face is flattish in section and has been pecked and smoothed and worn up to the edges. The base is steeply curved.
Length 405mm; width 230mm; thickness 90mm.

4.3; 405; 1316; 1532
Large slab of grey sandstone, fragment surviving. Upper face appears to have been worn up to a shallow flat rim. The base is flat.
Broken dimensions 265mm x 210mm; thickness 50mm.

2.3; 514; 1293; 3274
Thin slab of schistose grit, broken down length. Upper face is shallow and concave in section and has been pecked and smoothed. The unbroken perimeter is slightly flatter in section than the worn face and the surface is particularly smooth here. The base is gently curved.
Length 320mm; broken width 190mm; thickness 25mm.

2.4; 204; 545; 1684
Slab of grey sandstone, fragment surviving. Upper face is slightly concave in section and is very smooth and worn up to the edges. The base is at an angle.
Broken dimensions 240mm x 175mm; thickness 60mm.

2.3; 615; 665; 1114
Large slab of coarse grit, irregular oval in plan. The upper face is asymmetrically concave in section and is very smooth and worn up to the edges. The base is flat and has two drilled holes made off-centre. ?Re-used saddle quern.
Lenght 520mm; width 450mm; holes are 60mm and 30mm in diameter and 15mm and 5mm deep respectively.

2.3; 615; 665; 1115
Large slab of coarse grit, oval in plan. The upper face is slightly concave and has been pecked and smoothed. The base is gently curved.
Length 365mm; width 245mm; thickness 90mm.

N Wall unit 2, Handigarth; 994
Slab of coarse grit, broken across the width. Upper face is flat and has been pecked and smoothed and worn to the edges. The base is curved.
Broken length 240mm; width 290mm; thickness 80mm.

Unstratified; 995
Slab of sandstone, fragment surviving. The upper face is a shallow concave in section and is worn up to the edges. The base is almost flat.
Broken dimensions 264mm x 170mm; thickness 30mm.

Unstratified; 4405
Large slab of coarse grit, oval in plan. The upper face is asymmetrically concave in section and is pecked and smoothed and worn up to the edges. The base is steeply curved.
Length 375mm; width 240mm; thickness 85mm.

TROUGH QUERNS

1.2; 217; 698; 1183
Large slab of coarse grit, broken across width. Trough is asymmetrical in section and 140mm in depth. The surviving flattish rim is c. 90mm in width. The base is flat.
Broken length 360mm; width 370mm; thickness 280mm.

1.2; 218; 690; 1184
Large fragment of coarse granite. The surviving inner face is worked at a steep angle to the base. The base is flat. Probable fragment from a trough quern.
Broken dimensions 315mm x 230mm; thickness 115mm.

1.1; 220; 1043; 4406
Small fragment of coarse grit. Surviving inner face is worked to a steep curve with a rounded rim. The base is flat. Probable fragment of a trough quern.
Thickness c.115mm; depth of trough c.100mm.

2.1; 313; 782; 1244
Large slab of coarse grit, broken across width. Trough is asymmetrical in section and 40mm in depth. The rim of the steeply curved side is rounded whilst the shallow side and surviving end of the trough have been worked almost up to the edge. The base is flat.
Broken length 205mm; width 200mm; thickness 115mm.

2.3; 516; 602; 731
Large fragment of coarse grit. Surviving inner face is worked to a steep curve with a flattish rim. A hole appears to have been worked from the bottom of the trough and the base to form an hor-glass shaped cross-section c. 50mm in diameter, this is truncated by breakage. The base is flattish. ?Re-used trough quern.
Broken dimensions 460mm x 290mm; thickness 180mm.

1.2; 622; 448; 3770
Large fragment of coarse grit. Surviving inner face is worked to a steep curve with a rounded rim. Depth of trough c.60mm. The base is gently curved.
Broken dimensions 410mm x 250mm; thickness 110mm

1.2; 622; 448; 3771
Large slab of coarse grit, broken across width. Trough os asymmetrical in cross-section and c. 80mm in depth. The surviving rims are rounded. The base is flat.
Broken length 300mm; width 400mm; thickness 140mm.

Unstratified, Planticrub; 4407
Large slab of coarse grit, broken across width. The trough is asymmetrical in section and c.100mm in depth. The rim of the steeply curved side and the surviving end of the trough is wide and quite rounded whilst the shallow side of the trough is worked almost up to the edge. The base is gently curved.
Broken length 520mm; width c.300mm; thickness c.200mm.

ROTARY GRINDERS
All of these pieces are made on sub-circular flat cobbles and five of these pieces have been pecked in the centre of both faces and the rest have been pecked on one face. Their most likely function is that of a small hand grinder.

4.4; 601; 907; 1926
Sub-circular cobble of grey sandstone, broken across width. Pecked areas in centre of both faces.
Diameter 135mm; thickness 26mm.

4.3; 405; 1317; 1578
Flat, sub circular cobble of grey sandstone, broken across width. Area of pecking in centre of one face only.
Diameter 93mm; thickness 21mm.

4.4; 402; 1301; 1502
Flat, circular cobble of sandstone, broken across width. Area of pecking in centre of on face.
Diameter 160mm; Thickness 33mm.

4.4; 402; 1302; 1509
Flat, circular cobble of shale, broken across width. Area of pecking in centre of one face.
Thickness 20mm.

2.1; 316; 770 GF 319
Flat, sub-circular cobble of grey sandstone. Areas of pecking in centre of both faces.
ML 154mm; MW 135mm; MTh 24mm.

2.4; 204; 525; 44
Flat, sub-circular cobble of shale, broken across width. Area of pecking in centre of both faces.
Diameter 95mm; thickness 19mm

Cutting F; 406; 105
Flat sub-circular cobble of coarse grit, fragment surviving. Area of pecking in centre of both faces.
Thickness 35mm.

Unstratified; 3059
Flat sub-circular cobble of grey sandstone, broken across width. Area of pecking in centre of both faces.
Diameter 132mm; thickness 19mm.

STONE CLUBS

1.2; 622; 493; 3840
Grey sandstone. 'Handle' and part of 'head' surviving. Pecked all round handle and head to shape. Asymmetrical shouldering seen in plan.
Length handle 64mm; broken length of head 130mm; MW 56mm; MTh 40mm.

1.2; 622; 458; 3820
Grey sandstone. 'Head' surviving. Flaked and pecked to shape. Asymmetrical shouldering in plan.
ML 187mm; MW 82mm; MTh 30mm

1.2; 622; 1412; 3837
Grey sandstone, very abraded and damaged. 'Head' surviving. Asymmetrical shouldering in plan.
ML 152mm.

1.1; 320; 853; 1374
Coarse grit. 'Handle' and half of 'head' surviving. Pecked and smoothed all over to shape forming a cylindrical head with asymmetrical shouldering at the junction of the handle.
ML 153mm; MW 76mm; MTh 63mm

2.4; 506; 1232; 2660
Coarse grit. Peculiar double-pointed object. Cylindrical in form with each short, isolated point formed by asymmetrical sloping shoulders. In the centre of the piece is a shallow depression formed by smoothing.
ML 173mm; MW 76mm; MTh 52mm

HOLLOWED STONES

Stone Bowls

3.3; 712; 158; 2431
Fragment of a granite bowl. The rim is rounded and the inner and outer faces run parallel at a steep angle to the base.
Height c. 200mm; depth of bowl 180mm.

4.4/ 3.3; 700/713; 161/214; GF
Two sandstone fragments which re-fit to form part of a stone bowl. The rim is rounded and the inner face has been flaked and/ or roughly pecked to form a gently sloping inner face. Possible roughout for a stone bowl.
Broken dimensions: ML 118mm; MW 90mm; MTh 41mm, ML 128mm; MW 143mm; MTh 47mm.

2.3; 514; 1253; 3157
Fragment of a stone bowl made on coarse grit with pebble inclusions. The rim and the outer face are rounded and the inner face is gently curved.
Height 95mm

3.3; 511; 559; 727
Fragment of a bowl made on red sandstone. The rim and the outer face are rounded and the base slopes up quite steeply to below the rim. A shallow, U-shaped depression has been channelled around the top of the rim.
Height 100mm; depth of bowl c.50mm.

4.4; 402; 1302; 1512
Fragment of a stone bowl made on grey sandstone. The rim and the outer face are rounded and the base slopes up quite steeply to below the rim.
Height 50mm; depth of bowl c.30mm.

2.2; 207; 580; 792
Oval-shaped cobble of coarse grit, broken down length. On one face a deep, egg-shaped hollow has been formed with smooth sides. The hollow is asymmetrical in section and truncated by breakage.
ML 260mm; broken width 135mm; MTh 60mm, hollow is c 100mm long and c.25mm deep.

2.4; 204; 525; 28
Fragment of a stone bowl made on red sandstone. The rim and outer face are rounded and the inner face slopes steeply to a flat base.
Depth of bowl c.15mm; diameter of bowl c.160mm.

Pivot stones

4.2; 708; 92; 2116
Heart-shaped boulder of coarse grit. A hole has been made just off-centre and worked from both faces to form an hour-glass shaped cross-section. Found *in situ* in paving.
ML 460mm; MW 480mm; MTh 180mm; diameter of hole at narrowest point 30mm.

3.3; 203; 543; 305
Granite boulder with a flat base and convex upper face. A shallow, round-based concavity has been worked in the centre of the upper face. ?Pivot stone.
ML 220mm; MW 245mm; MTh 130mm.

Miscellaneous hollowed stones

3.1; 718; 229; 3039
Flat slab of grey sandstone, broken across width. On one face a regular egg-shaped hollow has been worked with very smooth sides. On the opposite face three similar hollows have been worked in a line; two are joined and one is separate. These are truncated by breakage.
Broken length 203mm; MW 153mm; MTh 30mm.

3.3; 712; 201; 2446
Sub-round granite boulder. One face is flat and appears to have been pecked and smoothed. A shallow concavity has been worked on this face, truncated by breakage.
ML 310mm; MW 260mm; MTh 140mm.

4.4; 700; 161; GF
Oval-shaped cobble of coarse grit, broken across width. On one end there is a large, flat facet which is pecked and smoothed. On one face a deep, regular concave area has been worked.
Broken lemgth 106mm; MW 65mm; MTh 57mm.

2.3; 514; 1265; 2844
Fragment of a red sandstone slab which appears to have been roughly pecked and flaked on one face to form a shallow, circular, flat-based depression c.5mm deep with a flat curved rim.
Broken dimensions 219mm x 157mm; thickness 22mm; diameter of depression 120mm.

2.2; 406; 1328; 1608
Large cobble of coarse grit with an oval-shaped hollow with a round base pecked onto one face.
ML 155mm ;MW 145mm; Hollow 110mm x 70mm x 17mm deep.

2.4; 204; 535; 439
Broken slab of red sandstone with two areas of pecking on one face, made off-centre. The pecked areas are circular in plan, c.30mm in diameter and 8mm deep. One is truncated by breakage.
Unbroken dimension 255mm; MTh 40mm.

2.4; 204; 524; 351
Slab of sandstone with one face sheared off along bedding plane. The opposite face is worn with indistinct concavities and one short groove.
Broken dimensions 398mm x 210mm; MTh 25mm.

3.3; 203; 526; 60
Fragment of a red sandstone slab which appears to have been roughly flaked on one face to form a shallow, flat-based depression c. 10mm deep with a flat, curved rim.
Broken dimensions 240mm x 230mm; MTh 50mm.

Cut F; 406; 107
Cobble fragment of coarse grit, partially burnt. On one face a shallow hollow with smooth sides has been worked, truncated by breakage.
Broken dimensions 165mm x 150mm; hollow 60mm wide and 10mm deep.

MISCELLANEOUS OBJECTS

2.1; 311; 860; 1369
Large slab of sandstone which has been flaked all over to form a narrow rectangular shape with a notch at either end. ?Masonry.
ML 860mm; MW 220mm; notches 60mm x 45mm.

2.1; 313; 829; 1319
Fragment of a stone bracelet, D-shaped in section. The inner face is heavily marked with long, unidirectional striations and the outer face is highly polished. The broken ends appear to have been smoothed over.
Inner diameter 67mm

2.1; 314; 792; 4398
Fragment of a cobble of coarse grit. The sheared base is flat and the upper face is gently rounded. Areas of light pecking are spread over the upper face. ?Anvil stone.
Broken length 135mm; MW 210mm; MTh 47mm

2.2; 518; 1283; 2758
Fragment of a probable sandstone lamp handle. Burnt. A circular depression pecked onto one face.
No measurements.

2.2; 518; 1296; 4393
Thin finger-like pebble of micaceous siltstone. One end has been worked to form an isolated point. The tip and prominent edges have a very high polish. ?Borer.
ML 94mm; MW 20mm; MTh 13mm

2.2; 518; 1348; 3105
Fragment of a stone bracelet, D-shaped in section. The inner face is highly polished and striations are visible.
Inner diameter 66mm.

2.2; 616; 318; 2991
Small fragment of a stone ring. D-shaped in section.
No measurements.

2.3; 615; 356; 2967
Fragment of slate with fine incisions on one face. No regular pattern formed.
ML 200mm; MW 90mm; MTh 15mm

2.4; 506; 1232; 2680
Fragment of a flat round cobble of coarse grit with two areas of pecking on one face.
ML 136mm; MW 120mm; MTh 43mm

3.2; 303: 758; 1028, 1029, 1030
Three stone uprights from a hearth. Two are of psammite and the other is schistose grit.
ML 240mm; MW 105mm; MTh 66mm: ML 200mm; MW 103mm; MTh 70mm: ML 212mm; MW 110mm; MTh 73mm

3.2; 611; 925; 2330
Fragment of a baking plate made on phyllite and scored with parallel lines.
Thickness 9mm

3.2; 612; 340; 2916
Long, triangular-sectioned pebble of siltstone. One end has been faceted to form a point with four sides.
ML 82mm; MW 10mm; MTh8mm

3.3; 711; 177; 2077
Sub-rectangular fragment of slate with a series of scores and striations on one face which run at right angles to each other.
ML 161mm; MW 111mm; MTh 17mm

3.3; 711; 188; 2456
Sub-rectangular slab of sandstone, broken. Deep, flat U-shaped groove worked in the centre. Bar mould.
ML 250mm; MW 160mm; MTh120mm: groove 20mm wide at surface, 9mm wide at base, 9mm deep.

4.3; 701; 181; 2426
Flat oval shale pebble with fine incisions over one face. ?Decorated.
ML 52mm; MW 71mm; MTh 10mm

4.3; 703; 150; 4397
Sub-rectangular block of grey sandstone. Dressed to shape. Masonry.
ML 141mm; MW 85mm; MTh 67mm

4.4; 500; 1223; 4399
Block of psammite dressed into a regular wedge shape. Masonry.
ML 220mm; MW 240mm; Height 150mm

Vatsland 3103
Piece of masonry made on sandstone. Probable sill.
ML 390mm; MW 265mm; MTh 105mm

E wall of main house exterior
Natural block of sandstone with a rectangular-shaped depression made in the centre of one rounded face. The depression is flat-based and has asymmetrical steep sides. ?Masonry.
Broken length 260mm; MW 330mm; MTh 90mm; depression ML 50mm; MW 25mm; MTh 18mm

KEBISTER, SHETLAND: CODES FOR COARSE STONE CATALOGUES

1. TYPE
13. COBBLE
14. TABULAR
15. LAMINATED
16. FLAKED TOOL

2. SUB-TYPE
4. EDGE CHIPPED
5. PERFORATED

3. CLASSIFICATION
21. GRINDER
22. POUNDER/ GRINDER
23. FACETED COBBLE
24. PLAIN HAMMERSTONE
25. UNUSED COBBLE
26. DISC
27. RECTANGLE
28. SHAPED
29. WORKED FRAGMENT
30. UNWORKED FRAGMENT
31. CENTRAL
32. OFF-CENTRE
33. CANNOT DETERMINE
34. UNFINISHED
35. FLAKED STONE BAR
36. ARD POINT
39. QUERN RUBBER
40. ?WHETSTONE
42. WHETSTONE
44. ANVIL
45. SMOOTHER
46 POINT
47. FLAT SLAB
48. FLAKED BLANK

4. MATERIAL
1. RED SANDSTONE
2. GREY SANDSTONE
3. OTHER SANDSTONE
7. SHALE
8. GRANITE
9. SCHISTOSE GRIT
10. HORNBLENDE
11. COARSE GRIT
12. SEMI-PELITE
13. PSAMMITE

14. SERPENTENITE
15. QUARTZITE
17. SILICEOUS SANDSTONE
18. JASPER
19. PHYLLITE
20. SANDSTONE

5. SHAPE
1. ROUND
2. OVAL
3. FLAT OVAL
4. SUB-ROUND
5. CYLINDRICAL
6. SUB-CYLINDRICAL
7. SUB-OVAL
8. CANNOT DETERMINE
9. IRREGULAR
10. CIRCULAR
11. HEXAGONAL
12. SUB-CIRCULAR
13. RECTANGULAR
14. SUB-RECTANGULAR
15. TAPERING RECTANGULAR
16. CURVED RECTANGULAR
17. POINTED
18. FINGER-LIKE

6. SURVIVAL
1. ALL SURVIVING
2. PROXIMAL
3. DISTAL
4. LEFT LATERAL
5. RIGHT LATERAL
6. TIP
7. SEGMENT
8. BROKEN ACROSS WIDTH
9. FRAGMENT
10. BROKEN DOWN LENGTH

7. CONDITION
1. O.K.
2. ABRADED
3. BURNT
4. EXFOLIATED
5. WITH CONCRETIONS
6. DECOMPOSED

8. WEIGHT

9. MAXIMUM LENGTH

10. MAXIMUM WIDTH

11. MAXIMUM THICKNESS

12. ML:MW

13. MW:MTh

14. NUMBER OF PIECES
UNLESS OTHERWISE STATED, ONLY ONE PIECE PER ENTRY

15. FACETING PRESENT
YES/NO

16. NUMBER OF FACETS

17. LOCATION OF FACETS
1. DISTAL
2. PROXIMAL
3. LEFT LATERAL
4. RIGHT LATERAL
5. FACE 1
6. FACE 2
7. ALL

18. TOTAL AREA OF FACETS
IN SQUARE CENTIMETRES

19. NATURE OF FACETS
1. SMOOTH
2. MEDIUM PECKING
3. HEAVY PECKING

20. PECKING PRESENT
YES/NO

21. LOCATION OF PECKING
SEE NUMBER 17

22. TYPE OF PECKING
1. HEAVY
2. MEDIUM
3. LIGHT

23. DISTRIBUTION OF PECKING
1. RANDOM
2. LOCALISED

3. SPREAD

24. FLAKING PRESENT
YES/NO

25. LOCATION OF FLAKING
SEE NUMBER 17

26. TYPE OF FLAKING
1. HEAVY
2. MEDIUM
3. LIGHT

27. SMOOTHING PRESENT
YES/NO

28. LOCATION OF SMOOTHING
SEE NUMBER 17

30. EDGES CHIPPED
1. UNIFACIAL
2. BIFACIAL
3. NONE
4. CANNOT DETERMINE

31. EDGES MODIFIED/ SMOOTHED
YES/NO

32. DISTAL END OUTLINE
1. SQUARE
2. ROUND
3. POINTED
4. BROKEN
5. CANNOT DETERMINE
6. DIAGONALLY SQUARED
7. DIAGONALLY CURVED

33. PROXIMAL END OUTLINE
SEE NUMBER 32

34. LOCATION OF WEAR
SEE NUMBER 17

35. WEAR TYPE
1. SMOOTHING
2. ROUNDING

40. CROSS-SECTION OF HOLE
1. STRAIGHT

2. CONICAL
3. HOUR-GLASS
4. CANNOT DETERMINE

41. HOLE MANUFACTURE
1. PECKED
2. DRILLED
3. CANNOT DETERMINE
4. PECKED AND DRILLED

42. DIAMETER OF HOLE AT NARROWEST POINT
IN MILLIMETRES

43. SHAPE OF HOLE
1. CIRCULAR
2. OVAL

44. WORKED FROM BOTH SIDES
1. YES
2. NO
3. CANNOT DETERMINE

50. FLAKING LOCATION
1. ALL
2. DISTAL
3. PROXIMAL
4. LEFT LATERAL
5. RIGHT LATERAL
6. FACE 1
7. FACE 2

51. CROSS SECTION
1. OVAL
2. THICK OVAL
3. ELLIPSE
4. ROUND
5. RECTANGULAR
6. FLAT OVAL

52. DISTAL END MORPHOLOGY
1. SQUARED
2. DIAGONALLY SQUARED
3. CURVED
4. DIAGONALLY CURVED
5. STEEP CURVE
6. DIAGONALLY STEEP CURVE
7. POINTED
8. DIAGONALLY POINTED
9. BROKEN

10. CANNOT DETERMINE
11. FLAKED

53. PROXIMAL END MORPHOLOGY
SEE NUMBER 52

54. PECKING PRESENT
YES/NO

55. LOCATION OF PECKING
SEE NUMBER 17

56. SMOOTHING PRESENT
YES/NO

57. LOCATION OF SMOOTHING
SEE NUMBER 17

58. STRIATIONS PRESENT
YES/NO

59. LOCATION OF STRIATIONS
SEE NUMBER 17

60. OTHER USE WEAR PRESENT
YES/NO

61. TYPE OF WEAR
1. ROUNDED EDGES
2. HEAVILY ROUNDED EDGES

62. LOCATION OF OTHER WEAR
SEE NUMBER 17

KEBISTER, SHETLAND: FLAKED STONE BAR CATALOGUE
The first 12 entries are refits A - F and the measurements refer to the joined pieces

Phase	Block	Context	Find no.	4	5	6	7	8	9	10	11	50	51	52	53	54	55	56	57	58	59	60	61	62
1.1D	217	709	1198																					
1.2B	218	637	1124																					
1.2E	204	545	416	2	14	8	1	2100	342	99	56	1	2	9	9	N		N		N		N		
1.2F	218	706	1413																					
2.1A	407	1338	1708	1	14	1	1	1310	261	77	47	1	1	1	1	N		N		N		CD		
2.1D	212	625	1116	1	15	8	1	1205	230	84	41	1	1	4	9	N		N		N		N		
2.2A	207	606	935																					
2.2F	207	564	GF 88	2	14	8	1	320	235	90	28	245	6	1	9	N		N		N		Y	1	134
2.4C	506	1232	2525	1	15	8	1	1812	235	103	45	1	1	3	9	N		Y	5	N		Y	2	134
2.4E	218	690	GF 125																					
4.4C	700	28	92																					
B	1	523	GF 146	1	15	8	1	3441	360	107	71	1	2	5	9	N		N		N		N		
G			3095	1	13	7	2	828	153	76	41	1	1	9	9	N		N		N		CD		
G			3092	3	13	8	1	381	97	70	41	1	2	3	9	N		N		N		CD		
H			3638	1	14	1	2	725	222	73	36	1	1	7	4	N		N		N		CD		
US			3099	1	14	7	1	666	148	109	28	45	6	9	9	N		N		N		N		
US			953	1	14	8	1	725	201	80	36	2456	1	3	9	N		N		N		N		
US			GF 219	1	14	7	2	673	120	88	43	1	1	9	9	N		N		N		CD		
US			GF 233	1	15	8	1	395	118	82	30	1	6	2	9	N		Y	35	Y	35	Y	2	34
1.1	621	438	3739	1	14	8	1	784	172	95	36	2456	1	7	9	N		N		N		N		
1.1	220	703	GF 703	1	16	8	1	563	165	86	30	1	6	10	9	N		N		N		N		
1.1	220	707	GF 103	2	15	8	1	2228	267	99	53	45	5	9	9	Y	56	Y	3	N		Y	2	3
1.1	220	707	GF 91	1	14	7	1	287	72	78	34	1	1	9	9	N		N		N		N		
1.1	320	855	1361	1	15	8	1	542	157	92	28	245	6	1	9	N		N		N		N		
1.1	321	864	1364	1	14	8	1	790	168	75	50	1	1	4	9	N		N		N		N		
1.1	321	864	1364	2	14	8	2	862	143	98	44	2456	1	3	9	N		N		N		CD		
1.1	321	864	1396	1	14	8	1	439	156	83	26	245	6	4	9	N		N		N		Y	2	34
1.1	321	893	1714	1	14	8	1	905	194	78	54	1	2	1	9	N		N		N		N		
1.1	321	895	1398	1	14	8	1	621	133	90	44	1	1	4	9	N		N		N		Y	2	1
1.1	219	1026	1458	1	14	3	1	516	138	88	32	2456	6	1	9	N		N		N		Y	1	34
1.1	219	1026	1456	1	15	8	1	710	176	79	37	1	1	2	9	N		N		N		Y	1	1
1.1	219	1026	1453	1	13	8	1	561	163	83	25	245	6	1	9	N		N		N		Y	1	134

Phase	Block	Context	Find no.	4	5	6	7	8	9	10	11	50	51	52	53	54	55	56	57	58	59	60	61	62
1.1	220	1035	1451	1	14	8	1	858	166	100	34	134	6	4	9	N		N		N		Y	1	1
1.1	220	1098	1466	1	14	3	1	407	117	82	37	1	6	3	9	N		N		N		N		
1.1	220	1176	1479	1	15	1	1	1183	260	86	41	1	1	5	3			Y	5	Y	5	Y	2	
1.1	220	1187	1483	2	15	1	1	736	228	73	37	2345	6	7	3	N		N		N		N		
1.1	205	1209	1651	2	13	8	1	311	123	68	31	1	1	4	9	N		N		N		N		
1.1	409	1326	1626	2	16	1	2	699	225	80	26	1	6	4	4	N		N		N		N		
1.1	624	1417	3866	1	15	8	2	413	162	75	34	1	1	7	9	N		N		N		CD		
1.2	618	430	3709	1	13	1	1	768	202	90	30	2345	6	1	4	N		N		N		Y	2	3
1.2	618	431	3716	1	15	8	1	992	238	88	38	1	6	7	9	N		N		N		N		
1.2	618	433	3708	1	14	1	1	1058	235	95	37	1	6	4	3	N		N		N		Y	1	14
1.2	618	434	3722	1	14	8	1	380	92	92	32	1	1	2	9	N		N		N		CD		
1.2	618	434	3715	2	14	7	1	411	122	92	27	45	6	9	9	N		Y	5	Y	5	Y	1	3
1.2	620	439	3755	2	15	8	1	504	190	93	23	245	6	5	9	N		N		N		N		
1.2	620	439	3743	2	14	7	1	1652	219	129	52	456	2	9	9	N		N		N		N		
1.2	622	462	3852	2	14	1	1	216	131	62	24	1	1	11	11	N		N		N		N		
1.2	622	493	3851	2	14	7	1	1061	190	85	38	45	2	9	9	N		N		N		N		
1.2	213	588	785	1	13	1	1	593	169	62	44	1	2	3	3	N		Y	5	N		Y	2	234
1.2	218	637	1123	1	14	8	1	691	177	100	29	1	6	4	9	N		N		N		N		
1.2	218	660	GF	1	9	9	1	242	96	91	23	4	5	9	9	N		N		N		N		
1.2	218	660	GF	1	9	9	1	309	125	118	24	4	5	9	9	N		N		N		N		
1.2	218	660	GF 133	1	13	8	1	539	165	70	33	245	5	9	9	N		N		N		N		
1.2	218	660	GF132	1	15	7	1	692	122	85	46	1	2	9	9	N		N		N		N		
1.2	218	660	GF131	1	14	9	1	721	128	87	49	1	2	9	9	N		N		N		Y	2	34
1.2	218	660	GF	1	15	8	1		135	100	35	245	6	7	10	N		N		N		N		
1.2	217	669	GF 60	2	15	1	1	766	214	80	37	1	1	5	9	N		Y	5	N		N		
1.2	217	669	GF 93	11	13	8	1	1916	246	108	52	1	1	4	9	N		N		N		Y	2	3
1.2	217	669	GF 94	1	14	3	1	437	133	97	25	1	6	6	9	N		N		N		Y	1	34
1.2	217	670	GF 53	1	15	8	1	959	195	90	49	1	2	7	9	N		N		N		N		
1.2	218	690	1187	1	15	1	1	827	210	80	43	1	1	2	3	N		N		N		Y	1	34
1.2	218	690	1189	1	15	1	1	840	222	92	28	1	1	4	9	N		Y	6	N		Y	2	34
1.2	218	690	1200	1	14	8	1	900	193	90	48	1	5	1	9	N		Y	34	N		N		
1.2	218	690	GF 168	2	15	8	1	687	184	118	27	245	5	9	9	N		N		N		N		
1.2	218	690	GF 110	2	15	8	1	1532	231	118	39	245	6	4	9	N		N		N		Y	1	3
1.2	218	690	1191	1	13	8	1	564	159	87	24	1	6	4	9	N		N		N		Y	2	1
1.2	218	690	1186	2	14	7	1	1050	221	87	43	1	6	9	9	N		N		N		Y	1	34

Phase	Block	Context	Find no.	4	5	6	7	8	9	10	11	50	51	52	53	54	55	56	57	58	59	60	61	62
1.2	218	706	1408	1	13	8	1	449	163	73	23	245	6	4	9	N		N		N		Y	2	1
1.2	218	706	1193	1	14	8	1	554	152	68	41	1	2	2	9	N		N		N		N		
1.2	218	706	1409	1	14	7	1	2367	201	126	71	1	2	9	9	N		N		N		N		
1.2	218	706	1412	1	14	7	1	2180	210	132	60	1	1	9	9	N		N		N		N		
1.2	218	706	1192	1	14	7	1	2392	250	123	63	1	2	9	9	N		N		N		N		
1.2	217	709	1448	1	15	8	1	860	215	70	44	1	3	4	9	N		N		N		Y	2	1
1.2	317	848	1381	1	14	8	1	1323	187	108	38	1	1	9	9	N		Y	5	N		N		
1.2	317	848	1381	2	15	8	1	1176	228	90	45	2456	2	7	9	N		N		N		Y	2	34
2.1	209	561	646	1	15	8	1	599	190	77	27	1	6	4	9	N		N		N		N		
2.1	209	561	631	1	15	7	1	994	199	98	33	45	6	9	9	N		Y	34	N		Y	2	34
2.1	209	561	678	1	15	1	1	970	191	88	40	1	1	4	3	N		N		N		Y	2	134
2.1	212	573	784	1	14	1	1	528	219	64	28	2346	1	2	1	N		N		N		N		
2.1	215	579	1439	1	14	8	1	745	204	90	31	1	1	3	9	N		Y	1	Y	1	Y	1	1
2.1	215	579	1438	1	15	6	1	522	140	76	37	1	6	4	9	N		N		N		N		
2.1	211	590	939	1	14	1	1	412	182	78	20	245	6	3	9	N		N		N		Y	1	134
2.1	212	608	791	1	14	3	1	460	126	83	35	1	1	3	9	N		N		N		Y	1	3
2.1	215	650	1112	1	13	1	1	460	142	72	34	1	1	2	3	N		N		N		N		
2.1	212	657	929	1	14	3	1	377	130	77	32	1	1	2	9	N		N		N		N		
2.1	212	677	1403	2	15	8	1	280	157	65	25	2456	5	4	9	N		Y	1	Y	1	Y	2	34
2.1	212	677	950	2	14	7	2	397	147	70	30	45	1	9	9	N		N		N		CD		
2.1	212	677	1134	1	14	1	1	531	170	70	35	1	1	1	3	N		N		N		Y	1	34
2.1	212	677	1131	1	14	3	1	263	88	71	37	1	6	4	9	Y	3	N		N		N		
2.1	212	677	1133	1	13	3	1	428	137	81	25	1	6	1	9	N		N		N		Y	1	34
2.1	212	677	1177	1	15	8	2	333	127	70	23	1	3	4	9	N		N		N		Y	1	134
2.1	212	677	1136	1	14	7	1	582	135	77	32	1	6	9	9	N		N		N		N		
2.1	212	677	1132	1	14	9	1	560	157	92	27	4	5	9	9	N		N		N		N		
2.1	212	677	1165	1	14	8	1	398	133	91	25	1	5	3	9	N		N		N		N		
2.1	212	677	1199	1	14	8	1	289	134	71	20	245	6	4	9	Y	56	Y	5					
2.1	212	686	1172	1	14	7	1	507	139	98	25	45	5	9	9	N		N		N		N		
2.1	212	695	1170	1	14	8	1	635	171	88	33	1	1	4	9	N		Y	1	N		N		
2.1	212	695	1171	1	15	7	1	733	149	83	44	1	1	9	9	N		N		N		N		
2.1	316	770	893	2	15	1	2	437	156	63	33	1	1	3	3	N		N		N		CD		
2.1	316	770	GF 174	2	14	8	2	583	142	77	36	245	5	3	9	N		N		N		CD		
2.1	316	770	GF 111	1	15	7	1	1630	200	98	52	45	6	9	9	N		N		N		Y	2	34
2.1	316	770	GF 90	1	14	8	1	670	140	87	36	1	5	3	9	N		N		N		N		

Phase	Block	Context	Find no.	4	5	6	7	8	9	10	11	50	51	52	53	54	55	56	57	58	59	60	61	62
2.1	316	770	GF 173	1	14	1	2	912	218	78	42	1	1	3	3	N		N		N		CD		
2.1	313	782	1661	1	13	1	1	982	202	70	48	1	2	1	1	N		N		N		CD		
2.1	313	782	1704	2	14	7	2	247	104	65	28	1	1	9	9	N		N		N		N		
2.1	305	811	1302	1	15	1	1	1184	255	93	34	1	1	3	3	N		N		N		N		
2.1	305	811	1277	1	15	1	1	1336	228	90	52	1	2	1	1									
2.1	313	815	1293	1	15	1	1	1308	228	102	40	2345	6	5	3	N		N		N		N		
2.1	313	815	1293	1	15	3	1	655	146	88	44	1	3	1	9	N		N		N		Y	1	3
2.1	313	815	1293	2	15	8	1	1013	229	110	31	245	6	7	9	N		N		N		N		
2.1	313	829	1354	1	14	7	1	1022	174	102	39	1	1	9	9	N		N		N		Y	1	34
2.1	307	835	1355	1	13	1	1	753	195	76	38	1	1	2	3	N		N		N		CD		
2.1	313	838	1339	1	15	8	1	319	126	77	26	245	6	4	9	N		N		N		Y	1	1
2.1	313	838	1715	2	15	7	4	806	158	93	33	45	1	9	9	N		N		N		CD		
2.1	316	873	1647	1	15	8	1	835	168	85	41	1	1	4	9	N		N		N		Y	1	1
2.1	316	873	1639	1	14	8	1	520	145	70	43	1	1	3	9	N		N		N		Y	1	13
2.1	316	873	1378	1	15	8	1	942	203	90	42	1	1	9	9	N		N		N		Y	2	34
2.1	316	873	1648	1	14	7	1	381	118	85	26	456	6	9	9	N		N		N		Y	2	4
2.1	407	1330	1392	1	15	1	1		231	81	33	1	1	5	3	N		Y	5	N		Y	234	
2.1	407	1330	1390	1	14	8	1	505	130	92	32	1	3	4	9	N		N		N		Y	1	1
2.1	407	1330	1391	2	15	8	1	1159	205	112	32	245	6	2	9	N		N		N		Y	2	3
2.1	407	1338	1713	1	13	3	1	523	130	82	34	245	6	1	9	N		N		N		Y	2	3
2.1	407	1338	1707	1	14	3	1	314	101	79	33	1	6	4	9	N		N		N		N		
2.1	407	1339	1709	2	15	1	1	1375	218	95	51	235	6	4	9	N		N		N		N		
2.2	616	318	2990	1	14	7	1	390	117	87	33	45	6	9	9	N		Y	5	Y	5	Y	2	34
2.2	617	366	3545	2	14	8	2	370	130	51	35	1	2	8	9	N		N		N		CD		
2.2	617	366	3566	1	14	8	1	321	86	96	25	245	5	3	9	N		N		N		N		
2.2	617	366	3547	1	15	1	1	606	199	73	28	2345	1	3	3	N		N		N		N		
2.2	617	425	3575	2	14	1	1	890	190	87	49	1	2	3	4	Y	5	N		N		Y	2	14
2.2	207	564	1130	1	15	8	1	469	123	74	34	1	1	1	9	N		N		N		N		
2.2	207	564	1145	1	16	8	1	645	205	80	34	1	1	8	9	N		N		N		N		
2.2	207	606	912	1	14	1	2	478	148	77	30	1	1	1	1	N		N		N		N		
2.2	518	1292	2843	1	16	8	1	1398	217	98	49	1	1	4	9	N		N		N		Y	2	34
2.2	518	1296	3166	1	15	8	1	532	125	85	43	1	3	6	9	N		N		N		Y	1	1
2.2	406	1309	1547	1	13	7	1	1366	159	100	61	1	2	9	9	N		N		N		N		
2.2	406	1328	1620	1	15	8	1	1158	217	110	41	2456	6	1	9	N		Y	13	N		Y	2	3
2.2	406	1328	1613	1	14	8	4	2057	258	100	53	1	2	3	9	N		N		N		CD		

Phase	Block	Context	Find no.	4	5	6	7	8	9	10	11	50	51	52	53	54	55	56	57	58	59	60	61	62
2.2	406	1334	1629	1	15	8	1	1055	131	114	55	1	2	7	9	N		N		N		N		
2.2	518	1343	3180	2	14	7	1	368	115	83	26	45	6	9	9	N		N		N		Y	2	3
2.2	520	1344	3338	1	14	1	1	559	145	83	33	1	1	3	3	N		N		N		Y	2	234
2.2	520	1344	3339	1	13	8	1	611	142	90	35	1	1	1	9	N		N		N		N		
2.2	518	1348	3308	1	15	3	1	453	120	81	37	1	6	2	9	N		Y	5	N		Y	1	134
2.3	615	420	3567	1	15	1	1	742	218	71	37	1	1	8	4	N		N		N		Y	2	123
2.3	609	541	740	2	15	1	1	1995	313	130	36	2345	6	5	3	N		N		N		N		
2.3	512	575	653	1	16	1	1	738	213	75	34	23567	1	5	4	N		N		N		Y	1	42
2.4	204	525	350	1	14	8	1	428	119	70	33	1	1	3	9	N		Y	5	N		Y	2	34
2.4	204	525	296	2	15	8	2	669	171	70	37	1	1	3	9	N		N		N		CD		
2.4	204	534	264	1	14	8	2	494	156	66	34	1	1	4	9	N		N		N		CD		
2.4	204	534	303	1	14	1	2	727	230	90	27	1	6	2	3	N		N		N		Y	2	2
2.4	204	534	905	1	15	8	1	712	153	93	38	1	6	9	9	N		N		N		N		
2.4	204	534	1494	1	15	8	1		165	115	20	45	5	7	9	N		N		N		N		
2.4	204	534	311	1	16	8	4	1446	193	92	55	1	2	4	9	N		N		N		CD		
2.4	204	534	312	2	15	8	4	731	169	103	28	245	6	4	9	N		N		N		Y	1	34
2.4	506	1232	GF 224	1	14	8	1	317	124	88	22	1	5	9	9	N		N		N		N		
2.4	506	1232	2714	1	14	8	1	3	66	163	62	245	5	4	9	N		N		N		CD		
2.4	506	1232	2716	1	15	1	4	645	170	82	39	1	1	4	4	N		N		N		CD		
2.4	506	1232	2534	2	14	1	2	485	142	78	31	2345	1	3	3	N		N		N		CD		
2.4	506	1240	GF 217	1	14	8	2	1120	179	82	58	1	2	4	9	N		N		N		CD		
3.2	614	312	3503	1	14	8	1	203	78	83	25	245	6	3	9	N		N		N		N		
3.2	614	372	2959	1	15	1	4	1176	225	90	41	2345	1	6	3	N		N		N		CD		
3.2	614	372	2960	1	14	8	2	1403	200	112	46	25	1	3	9	N		N		N		N		
3.2	614	372	2961	1	15	8	1	840	198	114	31	245	5	4	9	N		N		N		Y	1	13
3.2	612	386	2974	2	14	1	1	463	154	74	31	3456	1	1	3	N		N		N		N		
3.2	614	936	2356	2	15	1	1	959	215	68	45	1	2	2	3	N		N		N		Y	2	23
3.2	614	973	2910	1	15	8	1	649	147	77	44	1	2	1	9	N		Y	5	N		Y	1	3
3.2	614	974	2919	2	15	8	2	208	85	78	26	1	6	6	9	N		N		N		CD		
3.2	614	974	2374	1	14	1	1	446	124	103	31	45	6	10	10	N		N		N		N		
3.2	614	974	2921	1	14	8	2	322	98	90	28	1	1	3	9	N		N		N		Y	1	1
3.2	504	1248	2586	1	14	7	1	1123	159	109	40	45	6	9	9	N		N		N		CD		
3.3	712	148	GF 231	11	14	7	2	940	188	80	46	1	1	9	9	N		N		N		CD		
3.3	203	522	116	3	14	8	3	541	121	91	34	245	5	3	9	N		N		N		CD		
3.3	203	526	57	1	15	1	1	820	225	71	43	1	1	5	5	N		N		N		N		

Phase	Block	Context	Find no.	4	5	6	7	8	9	10	11	50	51	52	53	54	55	56	57	58	59	60	61	62
3.3	203	543	306	1	15	8	1	1380	214	100	60	1	2	8	9	N		N		N		Y	2	13
3.3	605	545	908	1	13	7	2	591	156	74	41	456	1	9	9	N		N		N		CD		
3.3	605	545	417	1	15	8	2	543	156	78	25	1	6	9	9	N		N		N		CD		
3.3	605	545	1680	1	15	8	1	811	179	86	39	2456	6	1	9	N		N		N		Y	1	134
3.3	605	545	1682	2	14	8	4	515	138	78	33	1	1	5	9	N		N		N		CD		
3.3	605	545	1673	2	14	8	1	144	85	78	10	245	6	3	9	N		N		N		Y	1	3
3.3	605	545	1676	2	16	8	1	549	172	75	34	1	1	2	9	N		N		N		Y	2	34
3.3	605	545	802	2	15	1	1	897	256	78	36	1	1	4	4	N		N		N		N		
3.3	511	567	GF 62	1	15	3	1	546	116	90	39	1	6	4	9	N		N		N		Y	1	134
3.3	605	912	GF 213	1	15	3	1	461	122	77	38	1	6	1	9	Y	34	Y	5	N		N		
3.3	605	919	2306	1	15	1	1	926	181	95	39	1	1	6	3	N		N		N		N		
4.1	710	176	GF 226	1	14	3	2	231	70	82	31	1	1	4	9	N		N		N		CD		
4.1	503	1229	2228	1	15	7	1	978	155	98	48	45	2	9	9	N		N		N		Y	1	34
4.2	501	1230	2034	1	14	3	1	591	135	90	36	2456	1	2	9	N		N		N		Y	2	3
4.3	302	761	1201	1	15	3	1	578	130	88	40	1	6	5	9	N		N		N		CD		
4.3	302	762	1216	2	15	8	2	486	131	77	48	1	2	5	9	N		N		N		CD		
4.3	404	1304	902	1	15	1	1	713	193	72	36	1	1	3	4			Y	5			Y	2	5
4.3	405	1310	1622	1	15	8	1	755	134	64	60	1	4	1	9	Y	56	Y	5	N		N		
4.3	405	1315	1625	2	14	8	1	272	120	65	26	1	3	8	9	N		N		N		CD		
4.3	405	1315	1572	1	15	8	1	835	170	84	45	1	1	7	9	N		Y	1	N		N		
4.3	405	1315	1602	1	14	1	4	356	139	67	27	1	1	3	3	N		N		N		CD		
4.3	405	1315	1571	1	15	3	1	336	126	79	28	245	6	6	9	N		N		N		CD		
4.3	405	1316	1691	2	15	8	1	374	146	75	26	1	6	4	9	N		N		N		Y	2	34
4.3	405	1316	1696	2	15	1	1	312	164	60	26	1	1	3	7	N		N		N		Y	1	134
4.3	405	1316	1697	3	14	8	2	453	115	77	34	245	1	3	9	N		N		N		CD		
4.3	405	1316	1694	1	13	8	1	537	145	70	39	1	1	2	9	N		N		N		Y	1	34
4.3	405	1316	1688	1	14	1	1	1539	230	82	54	1	2	1	3	N		N		N		CD		
4.3	405	1316	1692	1	15	1	1	1312	245	80	55	1	1	5	3	Y	5	Y	5	N		Y	2	234
4.3	405	1317	1580	2	15	1	2	697	203	85	32	2345	1	3	3	Y	5	N		N		Y	2	34
4.3	405	1327	GF 172	1	15	8	2	705	163	82	41	1	3	2	9	N		N		N		CD		
4.4	700	161	GF 201	1	15	8	1	983	217	75	45	1	1	5	9	N		N		N		Y	1	1
4.4	601	907	1945	1	14	8	1	549	157	77	34	2456	6	1	9	N		N		N		N		
4.4	601	907	1916	1	14	3	1	320	113	78	26	245	6	4	9	N		N		N		N		
4.4	601	907	2124	1	14	3	1	746	138	95	47	1	6	2	9	N		N		N		CD		
4.4	500	1223	GF 211	1	14	7	3	776	137	82	48	1	1	9	9	N		N		N		CD		

Phase	Block	Context	Find no.	4	5	6	7	8	9	10	11	50	51	52	53	54	55	56	57	58	59	60	61	62
4.4	500	1223	GF 200	1	15	1	1	901	230	65	41	1	2	5	5	N		N		N		Y	2	3
4.4	500	1223	GF 237	2	16	7	1	937	156	127	30	45	5	9	9	N		N		N		N		
4.4	402	1301	GF 136	1	15	7	1	939	185	87	39	1	2	9	9	N		N		N		Y	2	34
4.4	402	1301	GF 195	1	14	3	1	515	139	80	36	1	1	7	9	N		N		N		Y	2	34
4.4	402	1301	GF 194	1	13	3	1	382	125	65	41	1	1	1	9	Y	56	N		N		Y	2	134
4.4	402	1301	GF 192	1	13	3	1	400	111	80	26	245	6	3	9	N		N		N		Y	2	3
4.4	402	1301	GF 106	1	14	7	1	644	150	99	31	45	6	9	9	N		N		N		N		
4.4	402	1301	GF 196	1	15	7	1	468	98	141	25	45	5	9	9	N		N		N		N		
4.4	402	1301	GF 193	1	15	1	1	876	220	94	35	1	6	3	9	N		N		N		N		
4.4	402	1301	GF 145	1	14	7	2	859	135	97	45	456	6	9	9	N		N		N		CD		
4.4	402	1301	GF 107	1	15	8	1	820	147	94	42	1	6	4	9	N		N		N		N		
4.4	402	1301	GF 191	1	15	8	1	921	195	97	35	1	6	7	9	N		N		N		N		
4.4	402	1301	GF 8	1	15	1	1	1057	227	72	43	1	2	6	3	N		N		N		N		
4.4	402	1301	GF 121	2	14	1	1	509	168	76	31	1	6	9	9	N		N		N		Y	1	34
4.4	402	1301	GF 184	2	14	7	1		180	75	37	2456	1	9	9	N		N		N		N		
4.4	402	1302	1519	1	14	7	1	431	149	80	25	45	6	9	9	N		N		N		N		
4.4	402	1302	1528	1	14	7	1	699	174	100	27	45	6	9	9	N		N		N		N		
4.4	402	1302	1574	1	14	8	1	1120	188	82	51	1	2	2	9	N		N		N		Y	2	3
4.4	402	1302	1514	1	14	7	1	1189	122	93	60	456	2	9	9	N		N		N		Y	2	34
4.4	402	1302	1525	1	14	7	1	839	140	90	42	1	1	9	9	N		Y	34	N		Y	2	34
4.4	402	1302	1557	1	15	3	1	289	95	66	39	1	3	3	9	N		N		N		Y	2	13
4.4	402	1302	1531	1	14	3	1	630	122	95	46	1	3	4	9	N		N		N		N		
4.4	402	1302	1524	1	14	7	4	365	104	72	34	1	1	9	9	N		N		N		CD		
4.4	402	1302	1561	1	15	8	1	499	152	91	27	1	6	4	9	N		N		N		N		
4.4	402	1302	1516	1	14	1	1	855	166	90	43	2345	1	1	3	N		N		N		N		
4.4	402	1311	1521	1	15	9	1	2118	198	105	71	1	2	9	9	N		N		N		CD		
4.4	402	1311	1523	1	16	1	2	357	104	70	33	1	1	2	3	N		N		N		CD		
4.4	402	1311	1522	1	15	8	2	374	151	75	30	1	3	7	9	N		N		N		CD		
4.4	402	1314	1526	1	15	7	1	4113	340	130	65	45	2	9	9	N		N		N		Y	1	3
4.4	402	1314	1530	1	15	3	1	820	163	83	48	1	1	3	9	N		N		N		N		
4.4	402	1321	1582	1	14	1	4	928	173	87	38	1	1	2	3	N		N		N		CD		
4.4	402	1321	1569	1	14	8	2	383	136	85	25	1	6	9	9	N		N		N		CD		
4.4	402	1323	1565	1	13	8	1	852	156	95	39	1	1	3	9	N		N		N		CD		
	1	147	GF 214	1	15	3	1	569	146	97	30	1	5	4	9	N		N		N		Y	2	134
	1	521	361	1	14	8	1	1898	285	120	36	245	5	3	9	N		N		N		N		

Phase	Block	Context	Find no.	4	5	6	7	8	9	10	11	50	51	52	53	54	55	56	57	58	59	60	61	62
	1	523	GF 49	1	15	8	1	830	180	110	34	2456	6	9	9	N		N		N		N		
	1	523	1491	2	14	1	1	593	171	65	37	1	2	11	11	N		N		N		CD		
	1	523	GF 104	2	15	7	1	546	118	87	40	1	1	9	9	N		N		N		N		
	1	523	GF 113	1	14	3	1	249	100	87	18	245	5	4	9	N		N		N		Y	1	13
	1	523	846	1	13	8	1	1036	185	110	34	2345	6	3	9	N		Y	5	N		N		
	1	523	1471	2	15	8	1	553	176	89	27	245	6	2	9	N		N		N		Y	1	1
	1	523	GF	1	15	7	2	553	119	103	31	456	6	9	9	N		Y	345	Y	345	N		
	1	523	1155	1	15	1	1	853	228	75	37	1	1	4	9	N		Y	56	N		Y	2	1
	1	523	1154	1	14	1	1	780	226	83	27	2345	6	4	4	N		Y	6	N		Y	2	1
	1	523	1167	1	14	1	1	913	205	75	49	1	1	4	1	N		N		N		Y	2	234
	1	523	1153	2	15	1	1	1437	270	90	44	1	1	6	3	N		N		N		Y	2	234
	1	751	961	1	14	3	1	325	98	69	32	1	1	3	9	N		N		N		Y	2	13
	1	751	962	1	14	3	2		127	70	30	1	1	4	9	N		N		N		CD		
	1	751	619	1	14	1	2	395	153	59	30	1	1	4	3	N		N		N		CD		
	1	906	GF 227	2	15	8	2	344	109	73	73	245	6	9	9	N		N		N		CD		
	1	906	1869	1	14	7	1	626	121	75	40	456	2	9	9	N		N		N		Y	2	34
	1	906	1862	1	15	7	1	879	127	84	52	1	1	9	9	N		N		N		N		
	1	906	1877	1	14	8	1	76	86	41	14	245	6	1	9	N		N		N		N		
	1	1222	GF 229	2	9	9	1	527	171	91	30	24	6	4	9	N		N		N		Y	2	4

SOI

KEBISTER, SHETLAND: FLAKED BLANKS CATALOGUE

US			1091	2	14	1	1	2774	242	131	59						
US			1092	1	14	1	1		255	120	80	23	5	1	1		
1.1	219	1026	1457	1	14	1	1	2423	285	112	51	3467	2	9	1		
1.2	622	448	3772	1	9	9	1	3388	244	186	49						
1.2	622	450	3796	1	9	1	1	2425	243	214	43	45	6	9	9		
1.2	622	450	3794	2	9	9	1	1529	216	164	36						
1.2	218	637	1122	1	14	1	1	1627	220	137	38						
1.2	217	670	1433	2	14	1	1	4547	320	155	60	4	5	9	9		
1.2	217	670	1415	2	14	1	1	767	197	62	46	1	2	3	1		
1.2	217	669	GF 565	1	15	8	1	4642	320	150	70	1	2	9	9		
2.1	209	561	630	2	17	1	1	1111	187	68	69	1	4	7	11		
2.1	212/7	677	1175	2	14	8	1	1213	172	90	46	245	2	3	9	Y	345
2.2	207	606	936	1	14	8	1	1642	187	133	46	1	1	3	9		
2.2	207	606	1103	1	15	1	1	643	179	53	43	1	2	3	3		
2.2	207	655	1119	1	14	1	1		257	160	75	5	6	9	9		
2.2	616	400	2993	1	9	9	1	1801	239	170	40						
2.4	204	534	265	1	9	9	1	1701	273	160	35						
3.2	614	937	GF 239	2	9	8	1	1374	225	130	37						
3.3	605	545	827	1	15	1	1		390	190	80	1	1	3	9		
4.3	404	1304	1573	1	14	1	1	4439	275	178	70	5	6	9	9		
4.3	302	761	1202	2	14	9	1	1150	179	132	32						

KEBISTER, SHETLAND: ARD POINTS

Phase	Block	Context	Find no.	4	5	6	7	8	9	10	11	50	51	52	53	54	55	56	57	58	59	60	61	62
1.1	220	707	GF 214	1	14	8	1	1030	166	84	62	1	2	3	8	N		Y	345	Y	345	N		
1.1	219	1026	1454	2	15	8	1	1157	180	92	57	1	2	2	9	Y	56	Y	6	N		N		
1.1	220	739	1442	1	15	8	1	779	177	75	44	1	2	5	9	Y	56	Y	6	N		N		
1.1	220	1007	1452	1	15	1	1	946	178	76	51	1	2	1	11	Y	5	Y	6	Y	6	N		
1.1	220	1043	GF 211	1	15	8	1	1454	236	107	47	1	1	7	9	Y	5	Y	56	Y	56	N		
1.1	409	1326	1598	2	15	8	1	489	142	53	46	1	4	7	9	Y	56	Y	6	Y	6	N		
1.1	409	1326	1599	1	15	1	4	621	183	60	40	1	1	7	3	N		N		N		CD		
1.1	623	1422	3857	2	14	8	1	560	121	68	49	1	4	4	9	Y	56	Y	6	N		N		
1.1	220	1011	1445	2	17	1	1	1176	204	70	66	1	4	1	11	Y	5	Y	56	Y	5			
1.2	217	669	825	1	14	8	1	1111	156	86	61	1	4	3	9	Y	56	N		N		N		
1.2	217	669	817	1	15	1	1	497	136	82	37	1	1	1	11	Y	56	Y	3456	Y	45	N		
1.2	218	706	1406	1	15	8	1	684	142	72	50	1	2	4	9	Y	6	Y	5	Y	5	N		
1.2	218	706	1414	1	14	8	1	541	113	77	41	1	1	4	9	Y	56	N		N		N		
1.2	317	848	1380	2	15	8	1	535	151	71	37	1	1	1	9	Y	56	Y	5	N		N		
1.2	620	1384	3728	2	17	1	1	827	160	63	58	1	4	3	11	Y	56	Y	6	N		N		
1.2	620	439	3742	2	17	1	1	1205	250	66	54	1	4	7	11	Y	56	Y	56	N		N		
1.2	620	1384	3726	2	17	1	1	1210	235	68	57	1	4	17	11	Y	56	Y	5	N		N		
1.2	620	429	3754	2	14	8	1	582	132	71	58	1	4	2	9	Y	56	N		N		N		
1.2	620	440	3759	2	14	10	1	500	193	60	28	1	1	4	9	Y	346	Y	56	Y	6	N		
1.2	620	1384	3748	2	17	10	1	374	141	64	38	1	1	2	9	Y	5	Y	5	N		N		
1.2	620	1384	3727	2	15	8	1	712	169	78	39	1	2	3	9	Y	5	Y	6	Y	6	N		
1.2	620	439	3741	2	14	10	1	405	142	61	47	1	2	11	9	Y	4	N		N		N		
1.2	620	1384	3746	2	14	8	1	678	144	62	56	1	4	11	9	Y	34	N		N		N		
1.2	622	489	3861	2	17	8	1	606	170	57	43	1	4	2	9	Y	56	Y	6	N		N		
1.2	622	493	3846	2	14	7	1	828	174	62	59	1	4	9	9	Y	3456	N		N		N		
1.2	622	435	3798	2	15	8	1	1703	261	81	55	1	2	5	9	Y	3456	N		N		N		
1.2	622	435	3786	2	14	8	1	719	150	72	54	1	2	3	9	Y	345	N		N		N		
1.2	622	464	3822	2	15	10	1	827	213	71	46	1	1	3	11	Y	5	Y	5					
1.2	622	462	3780	2	17	1	4	775	235	60	48	1	4	7	7	Y	56	Y	56	Y	5			
1.2	622	464	3801	2	14	10	1	549				1	1	2	9	Y	5							
2.1	212	608	GF 220	2	15	1	2	851	164	66	48	1	4	3	11	Y	56	Y	6	N		N		
2.1	212	677	1168	2	15	8	1	304	79	60	45	1	4	4	9	Y	56	Y	6	N		N		
2.1	212	686	GF 112	1	14	7	1	1425	198	90	65	1	2	9	9	Y	34	N		N		N		

Phase	Block	Context	Find no.	4	5	6	7	8	9	10	11	50	51	52	53	54	55	56	57	58	59	60	61	62
2.1	209	561	647	1	14	8	1	638	178	86	23	245	1	2	9	Y	56	Y	6	N		Y	2	34
2.1	212	610	944	2	15	8	1	602	184	68	37	2456	1	3	9	Y	345	N		N		N		
2.1	313	838	1344	1	14	1	2	1114	215	90	36	1	1	3	11	Y	56	N		N		Y	2	134
2.1	314	792	GF 238	2	14	7	1	1033	169	65	59	1	2	11	9	Y	5	N		N		N		
2.1	316	770	GF 244	1	15	1	1	879	173	94	42	1	1	3	11	Y	56	Y	5	N		N		
2.1	316	770	GF 56	1	15	1	1	469	160	75	31	1	1	5	11	Y	345	N		N		Y	2	1
2.1	407	1338	GF 224	2	14	1	1	706	147	61	55	1	4	3	11	Y	3456	N		N		N		
2.2	207	606	937	1	1	8	1	640	148	82	44	1	1	4	9	Y	56	Y	56	N		N		
2.2	406	1334	1628	1	14	8	4	1092	154	83	60	1	2	4	9	N		N		N		CD		
2.4	204	534	1495	2	14	8	1	1013	157	68	60	1	4	4	9	Y	3456	N		N		N		
2.4	204	534	309	2	14	10	2	782	172	87	55	1	2	6	9	N		Y	56	N		N		
2.4	506	1282	2814	2	14	1	2	659	153	67	39	1	1	3	11	Y	3456	N		Y	5	N		
3.3	605	545	676	1	15	8	1	1667	233	87	53	1	2	2	9	Y	56	Y	5	N		N		
3.3	712	180	2400	1	15	1	1	850	139	95	48	1	1	3	11	Y	345	Y	5	N		N		
3.3	714	219	GF 221	2	14	1	1	683	136	67	54	1	4	11	1	Y	56	Y	56	N		N		
4.1	710	166	GF 230	2	15	1	2	899	193	70	54	1	2	5	11	N		N		N		N		
4.3	302	761	892	1	13	8	1	1216	175	83	52	1	2	3	9	Y	5	N		N		N		
4.3	302	763	1263	11	14	8	1	720	148	89	42	245	1	2	9	N		Y	3456	N		N		
4.3	405	1310	1632	2	15	1	1	554	133	65	47	1	2	1	11	Y	1	Y	5	N		N		
4.3	405	1316	1538	2	15	8	1	319	83	60	48	1	4	3	9	Y	3456	Y	4	N		N		
4.3	405	1316	1539	1	15	8	1	1560	197	88	68	1	4	2	9	Y	5	Y	6	Y	6	N		
4.3	703	150	1828	2	15	1	1	2153	267	97	52	1	1	8	11	Y	3456	Y	5	N		N		
4.4	402	1302	1550	1	15	1	4	1069	196	83	53	1	2	4	11	N		N		N		N		
4.4	402	1311	1549	1	15	8	1	2426	315	94	65	1	1	8	9	Y	56	Y	56	Y	56	N		
4.4	402	1301	GF 248	1	15	8	1	796	196	83	33	345	1	4	9	Y	56	Y	56	Y	5	N		
4.4	402	1301	GF 249	1	14	8	1	1008	170	82	46	1	1	9	11	Y	56	Y	4	N		N		
4.4	402	1301	GF 237	2	15	8	2	544	152	49	45	1	4	7	9	N		N		N		N		
4.4	500	1223	GF 212	2	15	7	1	988	200	83	41	1	1	3	9	N		Y	6	N		N		
4.4	700	28	91	1	13	1	1	1680	237	83	58	1	2	1	2	N		Y	5	Y	5	Y	2	34
4.4	402	1302	1556	1	14	8	1	1793	218	112	46	1	1	3	9	Y	45	Y	6					
4.4	402	1301	GF 240	1	14	1	1	733	200	68	45	1	2	3	3	Y	56							
	1	521	119	1	14	1	4	833	158	72	50	1	2	3	11	N		N		N		CD		
	1	523	1063	2	14	8	1	504	134	57	40	245	1	2	9	Y	346	N		N		N		
	1	523	1160	1	14	1	1	1106	246	68	48	1	2	3	9	Y	3456	Y	5	N		N		
	1	523	GF 215	1	14	8	1	828	137	88	57	1	2	2	9	Y	456	Y	356	N		N		

Phase	Block	Context	Find no.	4	5	6	7	8	9	10	11	50	51	52	53	54	55	56	57	58	59	60	61	62
	US		1081	2	17	1	2	453	144	56	40	1	2	7	11	Y	5	Y	6	N		N		
	US		1083	2	14	1	1	750	163	66	47	1	2	3	2	Y	3456	N		N		N		
	US		1085	2	15	1	2	869	187	72	46	1	2	4	11	Y	3456	N		N		N		
	US		1082	1	14	1	1	1687	201	97	55	1	2	4	11	Y	5	Y	46	N		Y	2	34
	US		1079	1	15	8	1	1047	176	78	55	1	2	11	9	Y	3456	Y	3456	N		N		

KEBISTER, SHETLAND: STONE DISCS CATALOGUE

Phase	Block	Context	Find no	4	5	6	7	8	9	10	11	30	31	32	33	34	35	
US			3098	19	12	1	1	184	99	80	18	2	N					
US			1080	7	3	1	1	482	160	131	17	1	N					
US			952	2	3	8	1	185	106		13	2	N					
1.1	220	739	GF 472	2	8	9	1	192			10	2	N					
2.1	211	590	1108	7	10	1	1	215	120	132	10	2	N					
2.1	212	625	931	1	10	1	1		195	180	27	2	N					SMOOTHING AND PECKING ON FACES
2.1	313	782	GF 469	7	3	1	1	114	99	77	10	3	N					
2.1	305	811	1336	2	9	9	3	673			18	2	N					
2.2	616	419	3555	7	12	1	1	86	77	70	10	2	N					
2.2	518	1296	3188	2	10	1	1	131	70	69	17	2	N					
2.2	518	1348	3279	7	10	1	1	89	79	75	11	2	N					
2.3	514	1265	2883	2	10	1	1	330	128	123	13	2	N					
2.3	512	1275	2791	2	10	1	1	458	142	136	16	2	N					
2.3	507	1287	2759	7	12	1	1	79	73	73	12	1	N					
2.3	516	1295	3276	1	9	9	1	444			21	2	N					
2.4	204	525	379	2	11	1	1	42	52	51	10	2	N					HEXAGONAL
2.4	204	534	1650	7	10	8	1	147	164		10	2	N					
2.4	204	535	457	7	3	1	1	215	146	119	9	2	N					
2.4	204	545	718	7	11	1	1	330	128	121	16	2	N					HEXAGONAL
2.4	204	558	607	7	3	8	1	323			14	2	N					
2.4	506	1232	2704	7	3	1	1	485	126	108	26	2	N					
2.4	506	1232	2683	7	10	1	1	168	106	98	17	2	N					
2.4	506	1232	2516	2	10	1	1	112	69	65	15	2	N					HEXAGONAL
2.4	506	1234	2750	2	12	1	1	138	81	76	14	3	N					
2.4	506	1239	GF 41	7	10	1	1	21	37	37	8	3	N					
2.4	506	1255	GF 407	1	10	9	1	607	185	95	22	2	N					
2.4	506	1264	2629	19	10	1	1	125	75	74	14	3	Y					
2.4	506	1282	2735	7	10	1	1	242	130	125	10	2	N					
3.2	614	973	2386	1	10	1	1	76	52	52	18	2	N					
3.2	614	975	2901	1	10	7	1	100	74		14	2	N					
3.2	606	989	2384	7	10	7	1	350			14	2	N					
3.3	711	178	2082	2	10	1	1	206	90	93	18	2	N					
3.3	203	529	103	7	3	1	1	49	63	54	9	3	N					
3.3	603	918	2900	11	10	8	1	152	87		17	2	N					

Phase	Block	Context	Find no	4	5	6	7	8	9	10	11	30	31	32	33	34	35	
3.3	605	919	2177	2	10	1	1	94	63	65	16	1	N					
3.3	606	979	2920	2	3	8	1	94	64		16	2	N					
4.1	709	168	1829	2	10	1	1	142	85	83	14	2	N					
4.1	710	176	2057	7	10	1	1	32	61	58	7	1	N					
4.1	602	1225	2576	7	10	1	1	54	75	76	6	2	N					
4.1	503	1227	1763	2	10	1	1	171	68	64	23	2	N					
4.1	503	1227	2020	2	3	9	3	97	79		11	2	N					
4.1	503	1229	2104	7	3	1	1	90	71	62	12	3	N					
4.1	503	1229	2105	2	10	1	1	89	72	68	14	2	N					
4.3	405	1317	GF 480	7	11	1	1	56	58	58	10	2	N					HEXAGONAL
4.4	601	907	1909	2	12	8	1	33	57		10	3	N					
4.4	601	907	1927	7	10	10	1	16	59		6	2	N					
4.4	402	1321	GF 470	19	3	1	1	214	106	90	13	3	N					
4.4	402	1321	1576	7	12	1	1	393	129	117	20	2	N					
4.4	402	1323	GF 475	19	12	8	1	735	170	145	20	2	N					
	1	147	GF 35	7	12	1	1	328	117	102	19	2	N					
	1	159	1815	2	10	1	1	165	67	68	22	2	Y					
	1	521	GF 479	3	11	1	1	79	66	59	16	2	Y					HEXAGONAL
	1	523	1161	7	10	1	1	157	105	105	9	2	N					
	1	906	1882		12	1	1	119	79	72	14	3	N					
	1	906	GF 12	7	3	8	1	82	88		9	2	N					
	1	1222	GF 402	19	12	1	1	43	56	57	13	3	N					

KEBISTER , SHETLAND: WORKED SHALE

Phase	Block	Context	Find no.	3	4	5	6	7	8	9	10	11	30	31	32	33	34	35	
US			1075	27	7	15	1	1	337	167	79	18	2	N	2	5			
1.1	623	485	3827	27	7	14	1	1	455	218	86	21	3	N	6	5			
1.1	220	713	GF 450	27	7	13	1	1	204	111	74	16	2	N	2	1			
1.1	624	1417	3845	27	7	15	8	1	225		61	13	2	N					
1.2	622	398	3808	27	7	14	8	1	240		90	13	1	N	3	4			
1.2	622	398	3776	27	7	15	1	5	500	220	79	22	2	N	3	2			Converging to point
1.2	622	398	3763	27	7	15	1	5	359	196	80	18	2	N	2	4			
1.2	622	398	3807	27	7	15	1	5	330	160	77	19	2	N	2	4			
1.2	622	398	3775	27	7	15	1	1	531	245	92	19	2	N	4	1			
1.2	622	398	3774	27	7	16	1	5	561	269	80	19	2	N	2	4			Curved rectangle
1.2	620	429	3713	27	7	14	1	1	71	84	52	11	2	N	7	1			
1.2	622	435	3829	27	7	7	1	1	646	226	113	21	2	N	3	2			
1.2	620	439	3744	27	7	13	7	2	417		75	18	2	N					
1.2	620	440	3800	27	7	13	1	1	209	159	85	10	2	N	2	4			
1.2	620	440	3760	27	7	15	8	1	154		82	11	2	N	2	4			
1.2	622	464	3795	27	7	14	1	5	182	113	72	18	2	N	1	1	1	2	
1.2	622	465	3809	27	7	14	10	1	408	173	82	20	2	N	4	2			
1.2	622	465	3814	27	4	15	1	5	403	214	62	23	2	N	2	5			
1.2	622	465	3777	27	7	15	1	1	267	210	66	16	3	N	2	3			Converging to point
1.2	622	465	3813	27	7	15	1	5	567	219	74		2	N	3	1			
1.2	620	470	3823	27	7	15	1	1	700	230	82	30	2	N	3	4			
1.2	218	689	1174	27	7	13	1	1	355	185	62	21	2	N	1	5			
1.2	218	706	1411	27	7	13	1	1	59	97	49	9	2	N	2	2			
1.2	620	1384	3732	27	7	15	1	2	216	137	67	21							
1.2	620	1384	3730	27	7	15	1	1	337	167	77	22	2	N	2	2			
1.2	620	1384	3747	27	7	15	8	1	148		59	20	2	N	4	5			
1.2	620	1384	3736	27	7	15	1	2	605	247	67	29	2	N	3	2			
2.1	212	677	1437	27	7	15	1	2	377	188	63	22	2	N	5	5			
2.1	212	677	1194	27	7	14	3	1	398		82	25	2	N	2	4			
2.1	212	686	1173	27	7	13	1	1	621	180	84	24	2	N	6	1			
2.1	313	782	1689	27	7	14	7	1	305		89	17	2	N					
2.1	313	967	3812	27	7	15	1	5	373	242	80	14	2	N	3	3			Converging to point

Phase	Block	Context	Find no.	3	4	5	6	7	8	9	10	11	30	31	32	33	34	35	
2.2	619	333	3593	27	7	14	8	1	231	118	57	28	2	N	2	4			
2.2	406	1328	1616	27	7	14	3	1	272		77	20	2	N	6	4			
3.3	713	210	2494	27	7	14	1	2	209	177	58	15	2	N	2	1			
3.3	605	545	360	27	7	15	1	1	721	215	75	35	2	N	3	2			
3.3	605	545	675	27	7	15	1	1	1321	318	104	28	2	N	2	3			
4.4	402	1301	GF 483	27	19	14	10	1	1109	220	83	46	2	N	3	1			
4.4	402	1321	GF 481	27	7	13	7	1	338		101	14	3	N					
	1	523	1475	27	7	15	1	1	570	197	81	24	2	N	2	2			
1.2	218	689	1717	28	7	9	8	1	55	78	71	11	2	N					Lobate object
2.4	204	534	1486	28	7	17	1	1	201	226	57	15	2	N	3	2			Handled point
4.1	503	1229	2204	28	7	15	8	2	406	118	135	18	2	N					Heart-shaped piece
	1	523	1480	28	7	3	1	1	282	231	71	12	2	N	2	4			Handled blade
	1	1222	GF 405	28	7	3	8	1	210	146	73	15	2	N	2	4			Handled blade
1.1	624	466	3830	29	7	13	7	1	261		79	16	2						
1.1	624	491	3833	29	7	8	9	1	34			7	2	N					
1.1	624	1417	3844	29	7	8	9	1	68			11	2	N					
1.1	624	1417	3843	29	7	13	7	1	235		88	15							
1.2	618	434	3721	29	7	8	9	1	21			7	2	N					
1.2	622	398	3810	29	7	15	7	5	232		75	18	2						
1.2	622	465	3817	29	7	8	9	6	433				4						
1.2	622	465	3815	29	7	8	10	5	148			11	2	N					
1.2	622	450	3792	29	7	9	9	1	198			15	2						
1.2	622	458	3819	29	7	8	9	6	380				4						
1.2	622	452	3821	29	7	13	7	1	280		80	15	1						
1.2	622	435	3803	29	7	8	10	1	142	214		9	2	N					
1.2	622	435	3797	29	7	8	9	1	105			10	2	N					
1.2	622	435	3785	29	7	8	9	1	29			7	2	N					
1.2	620	1384	3737	29	7	13	3	2	203		65	17	1	N					
1.2	620	1384	3735	29	7	9	9	2	147			13	2						
1.2	620	1384	3733	29	7	13	7	1	131		61	13	2						
1.2	620	429	3761	29	7	9	9	6	255				4						
1.2	620	429	3753	29	7	9	9	1	148			12	2						
1.2	620	429	3752	29	7	15	9	1	363			17	2						
1.2	620	429	3707	29	7	8	9	1	26			7	2	N					
2.1	309	784	1664	29	7	9	8	1	404	132	70	24	2	N					

Phase	Block	Context	Find no.	3	4	5	6	7	8	9	10	11	30	31	32	33	34	35
2.2	619	333	3594	29	7	9	9	1	4			5	2	N				
2.4	506	1239	GF 408	29	7	8	9	1	702			25	2	N				
2.4	204	534	1487	29	19	7	9	1	346			20	2	N				
2.4	204	545	1675	29	19	15	7	1	224		78	17	2					
3.2	504	1235	GF 3	29	7	13	7	1	183		67	19	2	N				
3.3	605	912	1894	29	7	15	7	1	106			20	2					
4.1	503	1229	2213	29	7	3	9	1	171	132	77	11	2	N				
4.4	500	1223	GF 403	29	7	9	9	1	214			12	2					
4.4	501	1233	GF 15	29	7	15	7	1	191		98	15	2					
	1	147	GF 48	29	7	9	9	1	47			12	2	N				
	1	751	GF 318	29	7	8	9	1	207			12	2	N				
	1	906	GF 322	29	19	15	8	1	399	187	61	21	2	N	3			
	1	906	GF 2	29	7	14	1	1	118	93	61	14	1	N				
	1	906	GF 1	29	7	13	1	192		93	13	2	N	1	4			
1.1	220	1200	GF	30	7	9	9	1										
1.1	220	1200	GF	30	7	9	9	1										
1.1	220	1200	GF	30	7	9	9	1										
1.1	220	1200	GF	30	7	9	9	1										
1.1	220	1101	1461	30	7	9	9	1										
1.1	220	1204	GF	30	7	9	9	1										
1.1	624	491	3834	30	7	8	9	2	112			12						
1.1	624	1420	3868	30	7	15	8	2	175	150	69	15						
1.1	621	438	3745	30	7	9	9	1	163			13						
1.2	620	429	3762	30	7	9	9	1	57			9						
1.2	620	429	3766	30	7	9	9	6										
1.2	620	1384	3734	30	7	14	7	1	46		67	7						
1.2	622	435	3804	30	7	9	9	1	184			17						
1.2	622	398	3806	30	7	9	9	5	85			7						
1.2	212	677	1404	30	19	9	9	1										
1.2	218	689	1405	30	7	9	9	1										
2.1	309	786	GF	30	19	9	9	1										
2.1	309	771	GF	30	19	9	9	1										
2.1	309	784	GF	30	19	9	9	1										
2.1	312	870	1394	30	7	7	9	1	260	159	77	14						
2.1	313	782	1690	30	19	9	9	1										

Phase	Block	Context	Find no.	3	4	5	6	7	8	9	10	11	30	31	32	33	34	35
2.1	315	795	GF	30	7	9	9	1	159			12						
2.2	520	1344	3750	30	7	15	7	1	196		87	10						
2.4	204	534	55	30	19	9	9	1										
2.4	204	534	GF	30	19	9	9	1										
2.4	204	534	GF	30	19	9	9	1										
2.4	204	534	GF	30	19	9	9	1										
2.4	506	1255	2617	30	7	9	9	1	130			15						
2.4	506	1255	2622	30	7	9	1	1	1634	265	139	34						
2.4	506	1234	GF 401	30	7	9	1	1	631	285	72	21						
2.4	506	1240	GF 403	30	7	9	9	2	96			12						
2.4	506	1240	2558	30	19	9	9	1										
2.4	506	1232	GF 309	30	19	9	9	1										
2.4	506	1255	GF 86	30	7	8	9	1	955									
3.2	610	302	2915	30	19	3	1	1	294	154	93	15						
3.3	605	919	2168	30	7	8	9	1	13			6						
3.3	715	192	GF 306	30	7	9	9	1										
3.3	715	192	GF 306	30	7	9	9	1										
3.3	715	192	GF 75	30	7	9	9	1	28	55	50	10						
3.3	715	192	GF 76	30	7	9	9	1	32	51	51	9						
3.3	713	210	2486	30	7	9	9	1	7	27	34	4						
4.2	501	1228	GF 10	30	7	9	9	1										
4.2	501	1228	GF 10	30	7	9	9	1										
4.2	501	1228	GF 10	30	7	9	9	1										
4.2	501	1228	GF 10	30	7	9	9	1										
4.2	501	1233	GF 318	30	19	9	9	1										
4.2	501	1233	GF 14	30	7	9	9	1	187			14						
4.2	501	1230	GF 71	30	19	9	9	1	83	81	62	11						
4.2	502	1225	GF 69	30	7	9	9	1	55	75	45	15						
4.2	501	1228	2039	30	7	9	9	1	51	64	55	14						
4.2	501	1228	GF 11	30	7	8	9	1	185			12						
4.2	501	1228	2262	30	7	9	9	1	105			10						
4.2	501	1228	GF 10	30	7	9	9	1										
4.3	405	1316	GF	30	7	9	9	1										
4.3	405	1327	GF	30	7	9	9	1										
4.3	302	762	GF	30	19	9	9	1										

Phase	Block	Context	Find no.	3	4	5	6	7	8	9	10	11	30	31	32	33	34	35	
4.3	703	183	GF	30	7	9	9	1											
4.4	402	1323	GF	30	19	9	9	1											
4.4	500	1223	GF 84	30	7	8	9	1	420			17							
4.4	601	907	1944	30	19	8	9	1	145			17							
4.4	500	1223	GF 7	30	7	8	9	1	609			31							
4.4	500	1223	GF 8	30	7	8	9	1	192			15							
	1	2	89	30	7	9	9	1	9	26	41	9							
	1	523	GF	30	7	9	9	1											
	1	523	GF	30	19	9	9	1											
	1	523	GF	30	7	9	9	1											
	1	1222	GF 74	30	7	9	9	1	17	43	31	5							
	1	1222	GF 315	30	7	9	9	1											
	1	1222	GF 315	30	7	9	9	1											
	1	1222	GF 301	30	19	9	9	1											
	1	1222	GF 83	30	19	9	9	1	320	162	59	25							
	1	1222	GF 87	30	7	8	9	1	602			27							
	1	751	968	30	7	8	9	1	166			16							
	1	906	1871	30	7	9	9	1	30	60	55	7							
	1	906	GF 303	30	19	9	9	1											
	1	906	1876	30	7	9	9	1	99			13							
	1	906	1881	30	7	9	9	1	181	106	95	15							
	1	906	1874	30	19	9	9	1											
	cut-F	406	110	30	19	9	9	1											
1.1	624	491	3876	46	7	17	8	5	22	85	32	9	1	N	3	4			Point
1.2	620	1384	3757	46	7	15	1	1	182	175	56	14	2	N	3	2			Point
1.2	622	493	3838	46	7	15	1	5	193	164	88	10	2	N	3	1			Point
1.2	622	1386	3877	46	7	17	1	1	84	180	50	8	2	N					Point
1.2	622	435	3828	46	7	17	8	1	69	120	52	9	1	N	3	4			Point
2.1	520	1344	3385	46	7	15	1	1	159	136	53	17	2	N	3	2			Point
2.2	406	1328	1615	46	7	15	8	1	173		62	9	2	N	3	4			Point
2.2	619	333	3588	46	7	17	1	1	17	80	26	6	2	N	3	1			Point

KEBISTER, SHETLAND: COBBLE TOOL CATALOGUE

Phase	Block	Context	Find no.	Type	4	5	6	7	8	9	10	11	15	16	17	18	19	20	21	22	23	24	25	26	27	28
US			614	21	13	7	1	1	738	111	90	54	Y	5	12	70	3					Y	2	2		
US			3079	21	13	2	1	1	1050	125	80	70	Y	2	12	32	2									
1.1	220	1187	1482	21	10	7	1	1	1368	142	122	54	Y	1	1	18	1	Y	2	3	2	Y	1	1		
1.2	218	660	GF 380	21	13	8	9	1	302	97	82	29	Y	2	12	CD	1									
2.1	211	569	705	21	13	6	1	1	1065	111	78	88	Y	3	1	54		Y	2	1	2	Y	1	3		
2.1	215	627	GF 408	21	10	4	1	1	752	82	79	70	Y	4	1234	80										
2.1	215	627	820	21	13	3	1	1	810	130	70	50	Y	3	12	26						Y	1	2		
2.1	313	829	1325B	21	13	6	1	1	1447	117	90	90	Y	6	12	162										
2.1	313	829	1325A	21	13	3	1	1	749	122	75	54	Y	3	12	14										
2.1	312	870	1637	21	13	7	1	1	954	123	80	60	Y	2	1	14		Y	3456	2	2					
2.2	617	366	2925	21	13	3	1	1	953	127	90	53	Y	2	1	24										
2.2	616	382	3540	21	10	7	1	1	683	123	85	42	Y	2	12	6	2					Y	2	2		
2.2	207	606	925	21	10	4	10	1	795	92	83	63	Y	3	124	120										
2.2	518	1296	3199	21	13	6	1	1	1231	157	74	68	Y	1	1	8	2	Y	2	3	2					
3.3	605	545	1683	21	2	3	1	4	1556	154	110	58	Y	2	12	68						Y	1	3		
4.3	302	761	GF 409	21	13	7	1	1	511	99	60	51	Y	2	12	20	2					Y	12	3		
4.4	601	907	1941	21	13	3	1	1	840	132	86	49	Y	2	1	18										
4.4	402	1301	GF 355	21	2	6	1	1	1292	111	90	84	Y	5	12	80		Y	5	3	2					
	1	147	1801	21	11	6	8	1	697	110	66	60	Y	1	1	10	2									
	1	906	1863	21	13	3	1	1	437	118	58	38	Y	2	12	9	1									
US			1078	22	2	6	8	1	1329	122	98	81	Y	1	1	9						Y	1	2		
1.1	320	853	1634	22	13	3	1	1	950	138	80	50	Y	3	12	20	2	Y	34	1	3	Y	12	2		
1.2	217	709	1424	22	2	3	1	1	1039	147	80	51	Y	2	12	20	2	Y	3	3	3	Y	12	1		
2.1	209	561	823	22	13	3	1	1	884	138	88	47	Y	2	12	10	3					Y	12	1		
2.1	209	561	809	22	8	2	1	3	1113	124	98	61	Y	2	12	16	3					Y	1	1		
2.1	211	569	611	22	10	3	1	1	1272	135	126	48	Y	2	1	18	3	Y	234	1	3	Y	12	1		
2.1	211	590	932	22	2	3	1	1	718	128	85	46	Y	3	12	18						Y	2	3		
2.1	407	1330	1389	22	13	3	1	1	1729	158	102	64	Y	3	12	30	2					Y	1	1		
2.2	518	1348	3320	22	?	2	8	1	991	118	90	59	Y	1	1	10	2	Y	3	2	3	Y	1	1		
3.3	713	214	GF 105	22	2	2	1	1	2060	182	110	67	Y	2	12	11	3	Y	3	2	3	Y	2	1		
3.3	603	918	2129	22	13	7	1	1	1987	176	98	76	Y	2	12	18						Y	12	1		
4.1	503	1229	2501	22	13	3	1	3	987	150	82	59	Y	1	1	8	2	Y	2	1	3	Y	2	1		
4.3	302	763	1213	22	10	3	1	1	917	133	100	39	Y	2	12	15	2					Y	2	2		
4.3	405	1315	1607	22	10	2	9	3	917	112	90	67	Y	1	1	6	3									

Phase	Block	Context	Find no.	Type	4	5	6	7	8	9	10	11	15	16	17	18	19	20	21	22	23	24	25	26	27	28
4.4	402	1302	1529	22	13	6	1	1	1700	183	85	72	Y	1	1	9	2					Y	12	1		
	1	523	GF 392	22	13	3	8	1	616	91	100	45	Y	1	1	8						Y	1	1		
	1	751	GF 363	22	13	3	8	1	683	86	86	52	Y	1	1	10	2	Y	34	1	3	Y	3	2		
US			1421	23	13	2	1	1	1412	235	75	75	Y	2	12	14	3					Y	12	3		
US			613	23	8	2	10	1	231	108	57	33	Y	CD	12	CD	2									
1.1	220	1098	1465	23	2	6	8	1	570	104	65	60	Y	1	1	1	2									
1.2	218	689	1425	23	2	3	1	1	247	86	65	28	Y	1	1	1	1									
1.2	217	709	GF 367	23	13	6	8	1	1251	149	77	65	Y	1	1	9	3					Y	1	3		
2.1	212	677	GF 394	23	10	2	1	1	434	107	55	42	Y	1	1	2	1	Y	2345	2	2					
2.1	313	815	1273	23	13	2	1	1	758	167	70	45	Y	1	1	4	2	Y	13	1	2	Y	2	1		
2.2	617	366	3564	23	13	3	1	1	324	110	59	34	Y	1	1	1	1	Y	2	3	2					
2.2	616	408	3508	23	3	3	1	1	299	115	62	29	Y	2	12	4	2	Y	3	1	2	Y	2	3		
2.2	518	1286	3314	23	3	3	1	1	382	117	62	33	Y	2	12	6	1									
2.2	518	1296	3271	23	13	6	1	1	297	125	44	37	Y	2	12	3	2					Y	2	2		
2.2	406	1328	1617	23	13	7	1	1	325	94	67	44	Y	2	1	4	1					Y	1	2		
2.3	512	1275	2824	23	13	3	1	1	328	117	68	28	Y	1	1	1	2									
2.4	204	525	41	23	13	3	1	1	1099	178	78	55	Y	2	12	12	1									
2.4	204	545	720	23	13	6	8	1	1052	133	88	66	Y	1	1	7	3	Y	4	1	2					
3.3	712	180	2401	23	3	6	1	1	550	129	50	51	Y	2	12	7	2									
3.3	605	919	2140	23	13	3	1	1	465	118	62	42	Y	2	12	2	2									
4.1	602	1225	GF146	23	2	3	8	1	480	99	89	36	Y	1	1	9	1	Y	34	3	3	Y	1	2		
4.1	602	1225	GF 102	23	13	2	1	1	189	97	35	28	Y	4	12	7	1	Y	4	3	2	Y	2	3		
4.1	503	1229	GF 149	23	2	3	8	1	425	90	77	44	Y	1	1	2	1									
4.3	703	150	1831	23	13	3	1	1	438	133	61	34	Y	2	12	3	2	Y	34	2	3	Y	2	1		
4.3	701	181	GF 129	23	1	3	8	3	205	70	60	29	Y	2	34	8	1	Y	34	3	3	N			Y	34
	1	523	46	23	10	3	1	1	480	131	51	35	Y	2	12	7	2									
	1	1222	GF 109	23	1	3	8	1	209	83	79	22	Y	2	34	4	1	Y	134	3	3	Y	1	3		
	1	1222	GF 115	23	1	3	8	1	514	118	71	37	Y	1	1	4	3	Y	3	1	2					
	1	1222	GF 114	23	12	3	1	1	315	131	58	25	Y	2	34	11	1	Y	12	2	2	Y	12	2		
US			3068	24	3	6	8	1	2730	185	118	93						Y	1	1	3	Y	1	1		
US			2115	24	13	9	8	1	1829	176	121	64						Y	1	1	2	Y	1	1		
1.1	621	438	3740	24	1	7	8	1	396	92	83	36						Y	1	1	3	Y	1	1		
1.1	321	864	1395	24	2	3	1	1	832	146	97	38										Y	12	1		
1.2	620	429	3765	24	8	7	1	1	831	112	83	58						Y	12	1	3	Y	12	1		
1.2	618	430	3714	24	2	9	1	1	368	144	79	24						Y	12	3	2	Y	34	1		

Phase	Block	Context	Find no.	Type	4	5	6	7	8	9	10	11	15	16	17	18	19	20	21	22	23	24	25	26	27	28
1.2	622	462	3782	24	10	7	10	1	634	172	70	40						Y	12	2	2					
1.2	622	462	3781	24	19	14	8	2	674	190	65	38										Y	1	2		
1.2	218	660	GF 391	24	13	3	8	1	181	84	55	29						Y	1	2	3					
1.2	218	706	1410	24	13	2	1	1	758	154	59	50						Y	5	2	3					
1.2	620	1384	3731	24	13	7	1	1	1024	145	77	68						Y	12345	1	2	Y	12	1		
2.1	211	569	706	24	8	2	1	1	2160	163	108	85						Y	12	1	3	Y	12	1		
2.1	212	625	GF 393	24	13	7	1	1	1831	220	86	70						Y	12	3	3					
2.1	314	792	GF 369	24	13	2	10	1	1053	194	73	52						Y	1	2	3					
2.1	313	829	1324	24	10	3	1	1	1146	126	105	46						Y	12	1	3	Y	12	2		
2.2	616	408	3500	24	8	6	10	3	494	144	47	48						Y	12	1	3	Y	12	2		
2.2	616	419	3554	24	2	6	1	1	422	117	58	48						Y	1	1	2	Y	1	1		
2.2	518	1286	3378	24	10	3	1	1	183	85	54	23						Y	12	3	2					
2.2	518	1296	3192	24	2	3	1	1	291	158	52	25						Y	1256	3	1	Y	1	3		
2.2	518	1343	3179	24	1	2	1	1	122	98	33	22						Y	12	3	2					
2.3	512	1275	2792	24	2	6	8	1	573	132	73	40						Y	15	3	1					
2.3	515	1345	2899	24	2	6	8	1	745	122	69	57						Y	1	1	3	Y	1	1		
2.4	204	525	271	24	13	2	1	3	1682	152	110	69						Y	12345	1	2	Y	2	1		
2.4	204	525	362	24	12	2	1	1	1662	189	98	54						Y	1234	1	2	Y	12	1		
2.4	204	534	115	24	2	3	1	1	968	195	104	31										Y	12	1		
2.4	204	534	114	24	8	1	1	1	2058	145	120	75						Y	1234	2	2					
2.4	204	537	257	24	2	2	1	1	183	83	40	35						Y	12	3	2					
2.4	204	537	261	24	2	3	1	1	203	109	64	19						Y	134	3	1	Y	14	3		
2.4	506	1232	GF 111	24	1	3	8	1	162	94	43	23						Y	34	3	3					
2.4	506	1232	3101	24	13	8	3	1	334	75	69	57						Y	1	2	3					
2.4	506	1232	2669	24	13	2	1	1	177	94	40	27						Y	12	3	2					
2.4	506	1232	2746	24	2	3	1	3	376	152	79	25						Y	123456	3	1	Y	2	3		
2.4	506	1232	2713	24	2	3	1	1	312	140	67	21						Y	1234	2	2	Y	123	2		
2.4	506	1234	2611	24	2	3	8	1	349	122	56	34						Y	134	3	1					
2.4	506	1234	GF 171	24	2	3	8	1	596	120	112	29						Y	34	2	3	Y	4	1		
2.4	506	1240	GF 123	24	13	2	1	1	238	95	45	35						Y	1	3	3					
2.4	506	1255	GF 166	24	19	7	1	1	646	145	68	37										Y	12	1		
3.2	611	325	GF 130	24	2	3	1	1	890	177	109	29	N					Y	1234	2	3	Y	1	1		
3.3	712	180	GF 67	24	7	3	1	1	298	124	68	24						Y	123456	3	3	Y	12	1		
3.3	605	341	2937	24	2	3	8	1	370	125	88	21	N					N				Y	123	1		
3.3	203	526	59	24	2	3	1	1	460	140	82	28						Y	56	2	2	Y	12	1		

Phase	Block	Context	Find no.	Type	4	5	6	7	8	9	10	11	15	16	17	18	19	20	21	22	23	24	25	26	27	28
3.3	605	914	2342	24	8	2	8	1	731	124	80	47						Y	1	1	3	Y	1	1		
3.3	605	919	GF 103	24	2	6	8	1	114	77	28	27						Y	1	3	1					
4.1	503	1229	GF 148	24	13	3	1	1	1040	177	71	50						Y	12	2	2	Y	12	1		
4.3	405	1315	1603	24	10	2	1	1	717	112	75	52						Y	12	3	3					
4.3	405	1316	1555	24	8	2	1	1	2455	178	97	87						Y	12	1	3	Y	12	1		
4.3	405	1316	1545	24	2	3	8	1	606	123	78	38						Y	134	1	3	Y	1	1		
4.3	405	1316	1695	24	2	3	8	1	484	120	96	30						Y	134	2	3	Y	13	1		
4.3	405	1317	1588	24	2	2	1	1	318	119	47	39						Y	12	3	2					
4.3	405	1325	1596	24	8	2	9	10	361	118	44	60						Y	12	2	3					
4.4	700	163	1832	24	2	14	8	4	734	155	67	49						Y	2	2	2					
4.4	201	536	427	24	20	2	1	1	472	123	66	39						Y	12	1	2					
4.4	402	1301	GF 414	24	13	9	1	1	1033	145	85	57										Y	12	1		
4.4	402	1302	1554	24	8	2	10	3	972	132	100	49						Y	12	2	2	Y	12	2		
4.4	402	1302	GF 372	24	13	7	8	1	838	123	82	60						Y	13	1	2	Y	13	1		
4.4	402	1321	1568	24	1	14	7	1	580	131	122	20										Y	45	2		
	1	523	1146	24	13	4	1	1	2098	154	115	89						Y	12	2	3	Y	12	3		
	1	523	47	24	12	7	1	1	1228	207	77	51										Y	12	1		
	1	523	1470	24	2	14	8	1	451	123	105	20										Y	134	2		
	1	906	GF125	24	2	2	1	3	183	90	47	32						Y	1	2	2	Y	1	2		
	1	906	GF 151	24	7	3	1	1	85	103	44	12						Y	1	3	2	Y	1	3		
	1	1222	GF 175	24	2	8	9	1	194			28						Y	1	2	3					
US			GF 43	25	7	3	8	2	230	139	54	23														
2.2	518	1296	GF 145	25	18	7	1	1	27	36	27	17														
2.2	518	1296	3199	25	2	3	8	1	240	128	48	25														
2.4	506	1232	GF 165	25	10	3	8	1	238	87	70	23														
2.4	506	1232	GF 174	25	10	7	1	1	516	150	65	38														
2.4	506	1234	GF 124	25	15	3	1	1	126	60	55	25														
2.4	506	1239	GF 162	25	13	3	1	1	78	50	45	22														
3.1	718	229	GF 164	25	19	9	1	1	161	65	68	22														
3.2	614	936	2352	25	10	3	1	1	152	67	58	23														
3.3	203	529	285	25	10	3	1	1	212	86	60	23														
3.3	203	529	334	25	14	3	1	2	36	42	35	19														
3.3	605	914	2336	25	1	3	1	1	66	59	43	14														
3.3	605	919	GF 172	25	1	2	8	1	166	100	47	24														
3.3	605	919	GF 161	25	17	2	1	1	7	34	15	8														

Phase	Block	Context	Find no.	Type	4	5	6	7	8	9	10	11	15	16	17	18	19	20	21	22	23	24	25	26	27	28
4.1	503	1229	GF 167	25	17	3	8	1	17	37	14	11														
4.2	709	170	GF 143	25	10	9	8	1	532	84	85	54														
4.3	302	763	978	25	10	9	1	1	647	117	62	59														
1.1	623	492	3836	39	11	3	1	1		275	137	68														
1.2	622	435	3785	39	11	3	1	1		250	145	63														
1.2	620	440	3758	39	2	3	1	1		310	140	90														
1.2	622	448	3791	39	11	9	7	1		141	120	57														
2.1	212	625	947	39	11	3	8	1		175	230	110														
2.1	212	641	1121	39	11	3	1	1		260	125	63														
2.1	212	691	1417	39	1	3	1	1		290	200	75														
2.2	207	564	1128	39	8	3	1	1		164	140	92														
2.3	516	1281	3239	39	11	3	8	1	2379	200	148	60														
2.4	506	1255	2118	39	11	3	1	1	2276	196	136	49														
2.4	506	1282	2753	39	11	3	10	1	568	120	112	32														
3.3	715	192	2475	39	11	3	1	1	1436	164	85	63														
3.3	715	192	2114/GF	39	2	3	1	1	2105	270	100	49														
3.3	605	919	2321	39	11	8	7	1	2644	132	165	63														
3.3	205	1217	1685	39	11	8	9	1		130	88	30														
4.1	503	1229	GF 170	39	1	3	8	1	873	196	109	27														
4.4	700	164	GF 160	39	11	3	8	1	844	110	114	55														
	1	2	GF 352	39	11	8	9	1	971	115	95	70														
Handigarth			3619	44	2	7	8	1	1206	174	78	57						Y	456	1	2					
US			3825	44	2	3	1	1	1145	178	131	34						Y	5	1	2					
1.1	220	713	GF 412	44	13	3	1	1	274	91	63	32						Y	15	3	2					
2.1	316	770	GF 398	44	19	2	1	1	1022	200	77	41						Y	1456	2	2	Y	34	1		
2.2	520	1344	3373	45	10	3	1	1	175	97	41	29													Y	5
2.4	506	1282	2772	44	2	3	10	1	626	186	81	28						Y	125	2	3	Y	2	2		
4.1	503	1227	GF 132	45	11	3	1	1	238	125	55	24										Y	134	2	Y	5
	1	906	GF 126	45	2	2	10	1	176	85	34	40													Y	4

KEBISTER, SHETLAND: PERFORATED PIECES CATALOGUE

Phase	Block	Context	Find no	1	3	4	5	6	7	8	9	10	11	40	41	42	43	44	
2.1	316	886	1642	15	31	19	10	1	1	37	38	37	17	3	2	8	1	3	Ground with rounded edges
2.1	209	561	672	14	31	2	10	1	1	32	36	35	21	1	2	10	1	3	Ground with rounded edges
2.1	212	625	949	13	31	7	12	1	1	93	86	76	15	3	4	10	1	1	
2.2	518	1286	2120	15	31	19	1	1	1	8	22	22	11	1	2	6	1	2	Ground with vertical sides
2.2	518	1296	3177	15	31	19	12	8	1	48	61		15	3	1	9	2	1	Refits with 3356
2.4	204	524	353	15	31	19	12	8	1	5	32		8	3	1			1	Edge ground
2.4	204	535	601	15	31	19	12	1	1	161	71	67	19	3	4	11	1	1	
3.3	715	192	2415	15	31	19	12	1	1	9	33	32	5	1	2	4	1	2	Edges chipped and ground
3.3	715	192	2420	13	31	7	9	9	1	75	66	57	15	3	2	10	1	3	
4.1	502	1226	3356	15	31	19	12	8	1	42	63		15	3	1	8		1	Refits with 3177
4.1	503	1227	GF 55	13	31	2	10	9	1	287			31	3	1		1	1	
4.4	501	1246	2581	13	31	19	3	1	1	30	60	47	9	2	1	10	1	2	
	1	1222	GF 59	13	31	7	12	8	1	219			22	3	1			1	
	1	523	1473	14	31	11	10	1	1	61	50	49	15	3	2	5	1	2	edge ground
	1	1222	GF 65	14	31	1	8	9	3	392	115	55	65	3	1	15	2	1	
CUT F		406	106	13	32	19	12	1	1	248	91	106	21	3	1	3	2	1	
HGarth			3634	13	32	19	3	1	1	433	94	130	25	3	4	10	1	1	
HGarth			3625	13	32	7	3	1	1	358	110	82	27	3	1	7	1	1	
2.1	215	627	906	13	32	19	3	1	1	348	134	73	22	3	1	5	1	1	
2.4	204	545	1678	13	32	7	9	1	1	349	133	75	29	3	1	7	2	1	
3.3	711	178	2087	13	32	19	9	10	1	111	74		13	2	2	8		2	
3.3	203	543	333	13	32	19	3	1	1	476	94	123	32	3	4	7	1	2	
3.3	203	526	56	15	32	13	9	1	1	149	91	105	13	3	1	6	1	1	
3.3	605	919	2145	13	32	19	12	1	1	523	114	122	22	3	1	4	2	1	
3.3	605	919	2137	13	32	2	3	1	1	527	95	140	27	3	1	7	1	1	
4.3	405	1325	1601	13	32	19	3	1	1	285	102	79	25	3	1	8	2	1	
4.4	501	1228	2264	13	32	2	8	9	1	203			23	3	1	8		1	
4.4	701	182	2434	13	32	3	4	5	1	983	175	140	33	3	1	8	1	1	?Re-used as quern rubber
	1	2	71	13	32	7	3	1	1	202	76	112	19	3	1	4	1	1	

Phase	Block	Context	Find no	1	3	4	5	6	7	8	9	10	11	40	41	42	43	44	
2.2	518	1296	3190	15	33	7	12	8	1	141	108		10	2	1			2	
2.4	506	1234	2603	14	33	11	8	9	1	37				2	1			2	
3.3	713	210	3001	15	33	7	8	9	1	26			10	3	1	9		1	3 light incisions on one face
4.1	503	1227	GF 79	14	33	2	8	9	1	630	173	97	21	3	1			1	2 holes made
4.1	503	1229	2215	15	33	1	8	9	1	94	90	59	10	2	1			2	
	1	1222	GF 61	14	33	1	9	9	1	122	114		7	2	1	25		2	
	1	1222	GF 60	15	33	7	8	9	1	26	69	35	10	1	3	9		2	
	1	1222	GF 73	15	33	19	8	9	1	13			6	2	1			2	

KEBISTER, SHETLAND: FLAT SLABS CATALOGUE

Phase	Block	Context	Find no	1	3	4	5	6	7	8	9	10	11	
1.2	622	493	3839	14	47	1	14	9	1	848	176	87	36	
2.1	212/7	592	723	14	47	2	9	9	1	2785	200	200	50	
2.4	506	1240	GF 373	15	47	1	9	9	1	374	104	83	21	regular curved corner angle
3.2	612	316	2927	14	47	1	9	8	1		400	280	30	smooth on faces and edges,?grinder
3.2	614	927	2369	14	47	1	9	9	1	520	136	110	30	
3.3	605	914	2335	15	47	1	15	1	1	793	112	119	33	
3.3	605	919	2319	14	47	1	8	9	1	538	192	131	23	
3.3	203	526	100	14	47	2	8	9	1		150	135	30	
4.2	709	170	GF 364	14	47	2	8	9	1	200			21	
4.2	709	170	GF 366	15	47	1	9	9	1	1756	280	185	25	bifacial flaking to thin edge angle.
4.2	501	1246	GF 372	15	47	1	9	9	1	769	88	180	32	
4.2	501	1233	GF 371	15	47	2	9	9	3	698	133	180	28	
4.2	501	1224	GF 377	15	47	1	14	1	1	313	84	110	18	
4.2	501	1224	GF 365	14	47	1	8	9	1	509			25	
4.2	501	1230	GF 361	14	47	1	9	9	1	635	145	124	28	
4.2	501	1233	GF 370	14	47	1	8	9	1	832	127	157	29	
4.4	500	1223	GF 367	15	47	1	9	9	1	128	96	79	14	
4.4	500	1223	GF 368	15	47	1	9	9	1	606	134	135	21	
4.4	700	161	GF 369	15	47	1	14	1	1	4160	285	202	33	One side formed to a wide curve
	1	1222	GF 80	15	47	1	9	9	1	185	133	90	10	

KEBISTER, SHETLAND: WHETSTONES CATALOGUE

Phase	Block	Context	Find no	1	3	4	5	6	7	8	9	10	11	
2.1	313	829	GF 410	13	40	19	18	8	1	30	61	23	17	
2.4	204	545	1670	13	40	9	18	1	1	27	90	20	10	
3.3	715	199	2472	13	40	19	18	1	1	41	88	20	16	
3.3	712	180	GF 152	13	40	19	18	1	1	35	73	22	16	
3.3	711	178	GF 156	13	40	19	18	1	1	33	96	22	9	
3.3	712	180	GF 153	13	40	19	18	1	1	74	92	28	17	
4.1	503	1227	GF 157	13	40	19	3	10	1	16	83	20	7	
4.1	710	176	GF 155	13	40	19	3	8	1	16	60	23	8	
4.1	710	166	2052	13	40	19	18	8	1	60	105	21	20	
4.1	710	166	1849	13	40	19	3	1	1	66	100	33	13	
4.3	703	150	GF 140	13	40	19	18	8	1	11	58	15	7	
4.4	700	164	1824	13	40	2	18	8	1	52	71	25	23	
4.4	700	28	171	13	40	19	18	1	1	82	115	32	15	
4.4	201	550	461	15	40	19	14	1	1	5	60	10	5	
US			3100	13	41	7	18	1	1	184	125	38	30	One smooth face. Score marks around circumference
1.2	620	1384	3768	13	41	2	18	1	1					
2.3	512	1275	2726	13	41	1	13	1	1	72	87	28	17	Rectangular section. 6 regular worked faces
2.3	615	343	2940	13	41	3	14	8	1	13	68	13	9	Rhomboid section. Concave wear on 3 faces
2.4	506	1232	2687	13	41	7	18	1	1	28	85	16	10	
2.4	506	1282	2781	13	41	19	6	1	1	279	186	35	28	One concave face
2.4	506	1232	2682	13	41	1	15	1	1	110	103	39	16	
3.2	611	988	2389	13	41	1	14	8	1	545	156	40	46	Square section with 4 smooth faces
3.3	715	192	2417/2113	15	41	7	13	1	1	13	101	12	6	Rectangular section. Deep V-shaped groove on one face
	1	1222	GF 108	13	41	1	13	1	1	140	99	35	24	One smooth, concave face
	1	751	GF 411	15	41	19	14	8	1	26	68	20	15	One concave face

POOL, SANDAY: COARSE STONE ASSEMBLAGE

Introduction

The coarse stone assemblage comprises 769 objects and is subdivided into 15 main groups: Skaill knives; worn cobbles; stone discs; hollowed stones (including counter-sunk hollowed stones); whetstones; querns and mortars; spindle whorls; weights; axes; flaked blanks; slabs; sculpted stones; sharpening stones; and a group of miscellaneous objects which are detailed in the catalogue. Each of these artefact groups is discussed in more detail below with reference to raw material, manufacture, form, use and phasing. The conclusions obtained from this analysis are summarised and combined in the following discussion of the assemblage by phase.

Neolithic

The neolithic phases account for 70% of the total coarse stone assemblage just under three-quarters of which come from phase3.1. The paucity of finds from the earliest phases may be attributable to the small size of the excavated area which relates to this period and, consequently, direct comparison of these artefacts cannot be made with those from later phases.

This period is characterised by the use of Skaill knives (large flakes of sandstone) and cobble tools both of which may be regarded as constituents in the processing of raw materials. Precise functions for both the flake and cobble tools cannot, as yet, be assigned but recent experimental work has shown that the Skaill knives are most likely to have been used to work on fairly pliant substances and are particularly proficient in such work as butchering (Clarke 1990). Such flake tools would have had a short working life: there is almost no evidence for the resharpening of the working edge and, since they are so easily made, they were probably used only once and then discarded and this partially explains their occurrence in such large numbers on sites. The cobble tools were most probably used to work a wider variety of materials and these cobbles would have been carefully selected according to material, size and shape for particular functions. During the Neolithic period at Pool the cobbles chosen for use were of a smaller size and of a wider variety of material types than those used in the later periods and an examination of the wear patterns which formed during their use suggests that many of the cobbles may have been used as hammerstones for flint knapping. The characteristics of end faceting and the discrete areas of pecking on the faces of the cobbles are similar to those noted on hammerstones used in experimental flint knapping (Callahan 1987). Other cobble tools may have been used for activities such as crushing and grinding although more direct evidence for such comes from the presence of a saddle quern in phase 1.2 and a probable quern rubber from phase 3.1.

Skaill knives are the major constituent of the assemblages of phases 3.1 and 3.2 whilst the ratio of cobble tools to flakes is higher in the preceding phases. The reasons for such a pattern are complex: it may be a function of the excavation of selective activity/ dump areas from different phases or it may actually reflect the increased use of flake tools in later phases and support for this latter hypothesis may be given by the flake-dominant assemblages at the later Grooved ware sites of Links of Noltland and Skara Brae (Clarke in prep). Flaked cobbles are another element which seem to appear in the later Neolithic phases. At Links of Noltland, Skara Brae and Pool (phases 3.1, 3.2) they are found in small numbers and their association with an increase in the use of flake tools leads to the

possibility that they may have provided a complementary tool to the Skaill knife by providing the choice of a heavier chopping edge.

Stone discs are present from phases 2.2 to 3.2 but are dominant in phase 3.1. Many of the larger discs have evidence for heat damage, in the form of a discolouration, which is most commonly located around the perimeter on one or both faces and this suggests their use as overhanging pot lids whilst the pot is on the fire. The smaller discs are less likely to be burnt and these may possibly be associated with the storage of substances in pots. Unfortunately, the diameters of the discs cannot be compared with those of the pots as many of the original pottery shapes have been distorted through deposition processes.

The axes are of a variety of forms including two fine miniature axes, one 'adze' shape and two damaged and reworked pieces. The latter three objects certainly bear evidence for use in the form of flake damage whilst both of the miniature axes and the 'adze' have areas of high polish on parts of the sides which is suggestive of their having been hafted. There are also two other pieces which appear to have been flaked all over to shape but which bear no evidence for surface grinding or polishing and these have tentatively been classified as axe roughouts although there are no comparable forms from other Neolithic sites. With the exception of one piece, found in a tip of phase 3.1, all the other axes and roughouts can be attributed to earlier phases.

The sculpted stones are of interest, all are from phase 3.1. They are characterised by the formation of sub-conical projections but differ in overall composition from each other. In form they are most like those objects from the chambered tomb at Quoyness, Sanday (Henshall 1963, p247) whilst at Skara Brae this conical element has also been used create sculpted objects which are more symmetrical in form, some of which also include additional decoration at specific locations on the piece (Clarke et al 1985, Ills 3.22, 3.27).

The other artefact types are represented by only one object and it is only those artefacts which have comparable forms at other sites which are noted here. From an occupation layer of structure 4, phase 2.3 there is a grinder (6289) which has a flat pecked base and a domed upper face and is similar in form to those fromKnap of Howar (Ritchie 1983, fig 16). A similar grinder was also recovered from phase 2 at Toftsness. Another artefact which iscomparable to those from Knap of Howar is the stone borer (3590) which was recovered from a layer in structure 8, phase 3.1 (Ritchie 1983, fig 15 particularly 195). A borer was also found at Links of Noltland (Clarke in prep). Three other artefacts: the ground stone cylinder (3683) from the primary occupation of structure 7; the ground 'spatulate' stone (6169) from an ?organic layer; and the multi-hollowed stone (6804) from the rubble of structure 11, which are all from phase 3, are comparable to some artefacts from Barnhouse (Clarke in prep). There are also two hollowed stones, one made on a sub-rectangular block (5141, 2.2) and another on a cobble (3571, 3.1) which are both similar in size and form to those from Skara Brae (Childe 1931). In all cases where only one of these artefact types is present at Pool there are comparable types which occur in larger numbers at the other sites. The possible functions for all of these artefacts have not been fully investigated.

The coarse stone assemblage from phase 3.1 has elements which appear in all other Neolithic assemblages from Orkney; the large quantities of Skaill knives and stone discs are comparable to the later Grooved ware sites of Links of Noltland and Skara Brae whilst

the sculpted stones have decorative elememts which are repeated on certain objects from Skara Brae and Quoyness. Other artefact types of which only one object is present have parallels from the sites of Knap of Howar and Barnhouse both of which are earlier than the late Grooved ware of phase 3 at Pool.

Abandonment
Phases 4.1 and 4.2 have only 18 objects of coarse stone the majority of which are Skaill knives and the rest are cobble tools of a variety of types.

Iron Age and Interface
Phase 5.1 has only one stone disc from a redeposited context and its manufacture and size suggests that it is Neolithic in origin.From phase 5.2 there are two plain cobble tools, two hollowed stones, a counter-sunk hollowed stone and a grinding stone.

The assemblages of phases 6 and 7 are initially very similar to each other particularly with regard to the presence of discs, hollowed stones, counter-sunk hollowed stones and cobble tools. The various functions of the hollowed stones are not clear and this classification scheme most probably covers a wide range of usage. Certainly the stone lamps are identifiable as such, particularly those which have shaping additional to the worked hollow and there is at least one large object (3135, 6.2) which must have served as some form of water container as it has a drainage hole worked into the base. One other piece (3319, 6.3) is a probable mould. The other hollowed stones are made on either sub-rectangular blocks or rounded cobbles and on the former shallow, flat-based hollows have been formed whilst the latter tend to exhibit deeper round-based hollows. The cobble tools from the Iron Age phases tend to be much larger in size than those of the Neolithic and are made only on sandstone with the heavily worn faceted forms being most common. The stone discs from these phases are smaller in diameter than those in use during the Neolithic period and they have been roughly chipped around their perimeter to form a rather abrupt edge. In some cases this edge and sometimes the faces have then been ground down to form a smooth surface and these are amongst the smallest discs.

There are, however, clear differences between the phases in other artefact types. The only types of whetstones from phase 6 are those made on lightly worn pebbles whilst in phase 7 the large haunched hones are exclusive and the haunched hones and rectangular-sectioned whetstones also appear. All but one of the rounded spindle whorls occur in phase 6 whilst the large perforated stone weights are present only from phase 7. The selection of new raw materials for tools is also noticeable in phase 7 with the introduction of micaceous and garnetiferous schist for a whetstone and some of the querns.

Comparison of these phases at Pool with the Iron Age and early Viking periods at Jarlshof is of interest as, with the exception of differences in gross numbers of artefacts types, much of the patterning is similar (Hamilton 1956). Throughout the Iron Age at Jarlshof there are stone discs of a comparable size range to those at Pool, large cobble tools, pebble whetstones, stone lamps and other hollowed stones, although there are no counter-sunk hollowed stones. Spindle whorls also appear from the earliest Iron Age although none of these are made on coarse stone, whilst the rotary quern makes an appearance in the third phase. Stone moulds also present in the later period. From the earliest Viking midden deposit are many perforated stone weights and grooved line sinkers. Stone discs are abundant and large cobble tools are present. Three classes of whetstone are also noted:

small perforated, haunched and a larger type which may be equivalent to those classified as hones from Pool, all are made on fine-grained siltstones. The spindle whorls continue to be made on steatite. There, however, appear to be none of the hollowed stones which are a feature of the Viking interface at Pool and there is no introduction of new raw materials in this period.

The presence of Skaill knives in phase 6.1.1 and the ground stone axe and the facially pecked and faceted cobbles in phase 7, all of which are most probably Neolithic types, may be accounted for by their presence in re-deposited contexts.

Norse

There are only 34 artefacts from the Norse period, some elements of which (the discs, hollowed stones, querns and cobble tools) are similar to those from phase 7 although they are present in smaller quantities. Two of the small discs have a conical depression made on one face and are probably some form of counter. Only two types of whetstone are present: the haunched hones, all of which are of micaceous schist; and the rectangular-sectioned whetstones. These are found particularly in phase 8.2.3 and possibly linked with these is the presence of large sharpening stones. The stone weights are again slightly different from those in phase 7 as one is a grooved net sinker and the other two are perforated cobbles which appear to have been manufactured slightly differently to those from phase 7, being worked from only one face. Only two spindle whorls are present, one of which is of a much smaller size than the rest and may be a bead.

During the Norse period at Jarlshof only two types of whetstone are present: the more numerous haunched hones and perforated whetstones and, as at Pool, there are none of the larger hones present in this later period (Hamilton 1956). Stone discs continue to appear in large numbers and from the third phase at Jarlshof there are two small semi-perforated counters similar to those from Pool and these are also comparable to one from Birsay (Morris, 1989 p191). The spindle whorls and stone weights from Jarlshof all appear to be made of steatite whilst the use of garnetiferous schist for querns is not present until the later Norse period.

From the Iron Age through to the Norse period at Pool there are very similar patterns in the presence of different artefact types to those from Jarlshof. The main differences appear to be due to the availability of different raw materials as, at Jarlshof, the local presence of steatite has made its use for such worked objects as spindle whorls, stone weights and lamps preferential to the more intractable sandstones which were used at Pool.

The Artefacts

Skaill Knives (T=425)

These are stone flakes which have been removed from beach cobbles by throwing the parent cobble hard against a large anvil. This method was first noted by George Petrie (Petrie 1867) and they were subsequently named after the Bay of Skaill in Orkney by which Skara Brae is situated. It is unlikely that these flakes were knapped using direct percussion ie. held in the hand or held against an anvil stone and worked with a hammerstone, as many of the flakes retain a characteristic crushed scar on the proximalend indicative of the use of considerable force (5783, 2.2). The majority of the flakes retain all,

or most, of the original cobble cortex on the dorsal face (3720, 3.1; 3906, 3.1). The Skaill knives are present mainly in phase 3.1 (table 1). Only a few of these flakes occur in the earliest Neolithic deposits whilst those recovered from post-Neolithic contexts can be attributed to redeposition processes. As the large majority of the flakes come from a single phase the assemblage has been treated as one unit.

All but one of the flakes, which is of quartz, are made on thelocal micaceous sandstones and of these 52% are made on the grey sandstone, 32% on the black sandstone and the remainder were too burnt or abraded to distinguish. In shape the flakes tend to be broader than long (4922, 2.3) and this shape provides a long working edge located opposite the thicker proximal end which would have been held against the palm of the hand. Others may be rounder in shape or longer than broad (3908, 3.1) but all have an adequate amount of useful flake edge. There are slight differences in shape between the two types of sandstone as there is a tendency for those flakes made on black sandstone to be more elongated than those made on grey sandstone. This pattern was observed on the Skaill knives from Tofts Ness and confirms the theory that the difference in flake shape is either as a result of the different cobble shapes between the sandstones or that the grey and black sandstones flake in a different manner. The size of the flakes ranges from 30mm to 190mm in length (4043, 3.1;4104, 3.1, 5111, 2.3) and by weight they range from 7g to 1478g although over 80% are actually less than 160g and flake numbers are reduced considerably in the heavier weight categories.

Twenty eight of the flakes have evidence for some form of alteration to the original flake edge prior to use (5083, 8.2.2;4996, 2.3). There are no uniform characteristics to this retouch; equal numbers have been flaked unifacially and bifacially around the edge and in many cases only a small portion of the edge has been modified. On some of the pieces large, single flakes have been detached and the resultant edge, which may have been steepened or thinned, is denticulate in plan (3672, 3.1). On other pieces the flaking is more continuous along the edge and can result in a modification of the flakes' plan by angling the edges (6197, 3.1; 6736, 6.1.1). One other flake is of interest as this has had two notches worked on one edge both of which have been heavily rounded (5922, 3.1). The retouched flakes have a large size range and, unlike those from Tofts Ness, there is no emphasis on the selection of heavier flakes for retouching.

The presence of macroscopic edge damage was noted on just 22% of the flakes which is a similar proportion to those from Tofts Ness. Although not fully confirmed by replicative experimental work, it is likely that most of the edge damage which occurs on these flakes is a direct result of their use rather than a product of depositional processes and in fact many flakes with edge damage were excluded from this category when functional and depositional damage could not be separated. The most common form of wear was a light unifacial or bifacial flaking, sometimes accompanied by blunting, along part of an edge (4922, 2.3; 3719,3.1; 3906, 3.1). In other cases the edge just appeared to have been dulled through use and on only a few pieces was there evidence for more heavy wear (5111, 2.3). The use wear is most commonly confined to the distal edge which is normally the location of the finest edge angle, although a combination of the use of both ends and sides was observed.

The Skaill knives are flake tools which are quickly and easily produced from an almost infinite resource of beach cobbles. They require little further modification before use with

the original sharp edge being sufficient for most needs. It is highly likely that they were disposable tools as there is no evidence for their curation and, once blunted, they were rejected in favour of a fresh flake. This high disposability partially accounts for their presence in large numbers at sites such as Pool, Skara Brae and Links of Noltland (Clarke in prep). The functional repertoire of such flakes tools has not been fully determined but recent experimental work suggests that they are very efficient as butchery tools (Clarke 1990) and it is likely that their use was confined to the processing of pliant raw materials. Skaill knives are mainly confined to Orkney although a few have been recovered from Sumburgh in Shetland (Lamb pers comm). They are most numerous during the Neolithic period, and are particularly associated with late Grooved ware contexts, however, these flakes are also present in Bronze Age contexts as at Tofts Ness (thisvolume) and also Iron Age contexts from Tofts Ness, the Calf of Eday, and Pierowall Quarry (Sharples 1984).

Worn Cobbles (T=97)

These are cobbles which have required no further modification to the original shape prior to use. They are distinguished through the presence of wear traces, the location and form of which have been used to define four sub-types:

A. Facially pecked cobbles: those cobbles with areas of pecking on one or both faces.

B. Facially pecked and faceted cobbles: those cobbles with pecked areas on one or both faces and faceted wear on one or both ends and/ or sides.

C. Faceted cobbles: those cobbles with faceted wear on one or both ends and/ or sides. D. Plain cobbles: those cobbles with more random types and location of wear.

These four groups are the same as those which have been identified from Tofts Ness and are thus directly comparable.

Facially pecked cobbles T= 25

The majority of these are made on sandstone and there are three of quartz and quartzite and one of amphiboite. By weight the cobbles range from 137g to 1344g although the majority (t= 14) are less than 800g and in shape they are either rounded or an elongated oval. The areas of pecking on the faces vary from lightly worked spreads to heavily worn linear or circular indentations (6709, 2.3; 6532, 3.1). These pecked areas normally occur only singly on one or both faces but on six pieces there are two discretely pecked areas on one face (6709, 2.3). In addition to the wear on the faces half of the cobbles have use wear in the form of pecking and, occasionally, flaking on the ends and/ or sides.

These cobble tools are present in quantity in phases 1 to 3 whilst only three occur in post-Neolithic contexts. Between the phases there is little differentiation between material or form although those that are made on cobbles of quartz, quartzite and amphibolite are only present in phase 2 and 3 (table 2).

Facially pecked and faceted cobbles T= 18

The majority of these are of sandstone and there are five of quartz or quartzite. By weight they range from 93g to 1800g but most are between 300g and 1000g and in shape they tend to be oval but a few more rounded forms are present. The forms of facial pecking are as diverse as those in type A (4030, US; 4033,3.1) and seven cobbles have two discretely pecked areas on one or both faces (5587, 1.2). The faceting which is present on the ends of the cobbles is again quite diverse in character and ranges from a light single facet to the more developed forms which are multi-faceted and which exhibit ridges between the facets (5587,1.2; 4708, 2.3). There are also cobbles with more broad areas of faceting

(4033, 3.1). One cobble (6491, 2.3) is slightly different from the rest as the wear is continuous over one end, both sides and the protruding area of one face.

The majority of these cobble tools are present in phase 1 to 3 (Table 2) and at least two from the post- Neolithic phases are in redeposited contexts. As in the case of the type A cobbles there is little differentiation between the phases in patterns of wear and form but those of quartz and quartzite are only present in phase 2 and 3.

Faceted cobbles T= 26
The majority of these cobbles are of sandstone and there are three of quartz or quartzite. By weight they range from 110g to2235g although most are between 300g and 1000g. The six largest pieces all occur in the later phases 6, 7 and 8. All of the sandstone cobbles are an elongated oval in shape whilst those of quartz and quartzite are rounder and in the later phases there is a tendency for the sandstone cobbles to be even more elongated than those of earlier phases.. The characteristics of the end wear are similar to, and are as diverse as, those of type B(2885, 6.5; 2129, 7.1; 1923, 7.2) although there is little evidence for ridges to occur between the facets. On five of the cobbles, all of which are from later phases, heavy flaking accompanies the end faceting (2885, 6.5; 2129, 7.1). The wear is more commonly confined to one end but where the wear does occur on both ends of the cobble then it is predominantly on those pieces from phases 6, 7 and 8. The three quartz cobbles are quite different from the rest as not only are they the smallest pieces but the wear tends to be continuous from one end down the sides (4776, 2.3).

These cobble tools are present in phases 1 to 4 and 6 to 8 and as in types A and B those of quartz and quartzite occur only in phases 2 and 3. The largest cobbles occur only in the last three phases and it appears that not only were the elongated shapes being selected in these later phases, but that these cobbles have been more heavily worn and they tend to be used on both ends.

Plain cobbles T= 28
The majority of these cobbles are made on sandstone and there are five of quartz and quartzite and one of amphibolite, and as is the case with all the other cobble tools the non-sandstone materials are present only in phases 2 and 3. By weight the plain cobbles range from 36g to 3766g and those from phases 2 and 3 are amongst the smallest of this type. The plain cobbles are characterised by a variety of either undeveloped or random wear patterns and are present throughout phases 2 to 9.

In addition to the worn cobble tools there are 11 cobbles which bear no sign of wear and these are mainly sandstone beach cobbles but there are two shiny pebbles of porphyryr one of which (5731,2.2) may have a source on the east coast of Scotland (A Livingstone pers comm) and which may be glacial in origin.

Although four broad groupings have been assigned according to the wear patterns present on the cobble tools it is apparent that there is a certain amount of variation within each type. The reasons for such variability are complex and are discussed fully in the relevant section of the Tofts Ness coarse stone report (this volume). At Pool the majority of the cobble tools occur in the Neolithic phases and types A and B are almost exclusive to this period with the few which occur in later phases tending to be in secondary contexts. There is little differentiation in variables between the phases although materials other than

sandstone are only in use during phases 2 and 3. The cobble tools from the Iron Age and later phases are dominated by the faceted cobbles all of which are made of sandstone and are larger, of a different shape and more heavily worn than those from the earlier phases. The specific functions of the cobble tools cannot be fully determined particularly as they can be used to process a wide variety of raw material types and very little experimental replicative work has been carried out to match wear patterns with specific activities. However, at Pool it is possible that many of the cobble tools from the Neolithic period were used to knap flint. The wear on the facially pecked and faceted cobbles (types A and B) is similar to wear which has been produced on experimental knapping hammerstones (Callahan 1987 45-6) and such cobble tools are found associated with flaked quartz assemblages in Sweden (Broadbent 1979 126). This facial pecking and faceting is particularly common to hammerstones which have been used to work flint or quartz in a bi-polar fashion (See Finlayson this volume). During the later phases the larger cobbles were most probably used for some form of crushing or grinding.

Stone Discs T=81

This category includes all artefacts which have been made on flat slabs of stone and chipped around the edge to form a circular shape. Some of these discs have also been ground on the edge and/or faces.

A total of 35 discs occur in the Neolithic deposits and the majority come from phase 3.1 (table 1). Nine of the discs are made on laminated materials such as shale and the rest are of a finely bedded micaceous sandstone. In diameter the measurable discs range from 54mm to 270mm although the majority have diameters between 80mm and 180mm (ill 1). All but four of these discs have been chipped bifacially around the edge to shape and, of the rest, two have been roughly chipped around the edge to form a more abrupt edge (5261, 2.2), one has a ground edge and the other has pebble cortex on one face and has been chipped unifacially. Thirteen of the discs exhibit evidence for burning or heat damage in the form of a surface discolouration, often reddish-brown in colour. On 10 of these discs the burnt areas are discretely located around the edges on both faces and on the remaining discs there are more extensive burnt areas on both faces. With the exception of one smaller disc all the rest of these pieces have diameters over 130mm (Ill 1).

Only one stone disc is present in phase 5.1 from the rubble spread of the souterrain foundation and its large diameter andt he bifacial chipping of the edge suggests that it is Neolithic in origin.

There are 17 discs from the Iron Age of phase 6. All are made on finely bedded sandstone and in diameter they range from 28mm to 190mm with the majority occurring between 28mm and 95mm (Ill 1) (2251, 6.7; 2949, 7.1). The two largest discs are both from repedosited contexts one of which is chipped bifacially (3602,6.2) and both have evidence for heat damage around their edges.Only one other disc has been bifacially chipped (the third largest piece) and the rest have been roughly chipped, five of which have then been ground on the edges or all over. Only one other disc has evidence for heat damage but this was found in a tip which included other burnt material. There are a total of nineteen discs from phase 7, all are made on sandstone and in diameter they range from 29mm to 100mm (2082,7.2; 1960, 7.2) with the majority occurring between 40mm and 80mm (Ill 1). All but one of these discs has been roughly chipped around the edge and the two smallest pieces

have ground edges.Only one piece shows any evidence for heat damage and this is quite extensive.

There are five discs from the Norse phases and all are made of sandstone. In diameter they range from 30mm to 90mm. The two smallest have been ground and have a small conical depression in the centre of one face (5138, 8.1), there is one other ground disc and the other two have roughly chipped edges.

From the above examination of the physical characteristics of the stone discs several factors can be identified which separate the Neolithic material from later periods. Those discs from the earliest phases are almost exclusively bifacially chipped and, as well as using finely bedded sandstones, discs made on shales are also common. In later phases the discs are roughly chipped and sometimes ground around the edge to shape and all are of sandstone. Discrete size ranges within the earlier and later periods are also apparent as, in the Neolithic deposits, the majority of the discs have diameters larger than 80mm whilst in later phases the majority are less than 90mm (Ill 1). Evidence for burning is present on many of the Neolithic discs and this also occurs on discrete parts of the discs notably around the edges. The only similarity between the earlier and later phases is in the thickness of the discs and the size range of 6mm to 30mm is constant throughout the phases.

Given the differences observed between the securely stratified discs of the earlier and later phases, then it is probable that the disc from phase 5.1 and the two largest from phase 6, all of which are from secondary contexts, may be attributable to the Neolithic. Of particular interest are the Neolithic discs with burnt edges. With the exception of one smaller disc, all the rest have diameters between 130mm and 230mm (Ill 1). This suggests the possibility of different disc sizes performing different functions with perhaps the largest discs serving as overhanging pot lids whilst the pot is on the fire and the smaller discs associated with storage in pots or other containers whereby the lid sits inside the neck to form a more permanent seal. Unfortunately it is not possible to compare the diameters of the stone discs and pots from Pool as much of the pottery was distorted through post-depositional processes. The stone discs from the Iron Age and later phases may have also served a variety of purposes. The small ground discs, including those with conical perforations, are most probably gaming pieces and can be paralleled at sites such as Jarlshof (Hamilton 1956) and Birsay (Morris 1989). The larger discs are also common to many Iron Age and later sites such as Hurly Hawkins (Taylor 1982) and Jarlshof (Hamilton 1956) and have a similar size range to those from Pool. Their functions are unknown and may vary from their use as pot lids to plugs (Hamilton 1956).

Hollowed Stones T=28

These are stones which have had a hollow worked on one face and they are sub-divided according to the type of parent block which was used: rounded cobbles; and sub-rectangular blocks. Those made on rounded cobbles number 20 of which eight are classified as lamps. These range in length from 116mm to 230mm and are 45mm to 75mm in overall thickness. They are made on oval cobbles of sandstone and have flattish bases and rounded rims. The hollows are oval in plan, more often than not with a gently rounded base and are between 7mm and 25mm in depth. Four of the lamps have additional shaping in the form of a thumb grip (5795, 6.5), a handle (2366, 6.7), a notch made on the end of

the bowl (1173, 9) and one which, as well as having a thumb grip, has a raised rim in the centre of the hollow (5610, 7.2). These lamps are found in phases 6 and 7 (table 1).

The remaining 12 hollowed stones which are made on rounded cobbles are all larger than those classified as lamps being 230mm to 490mm in length and 85mm to 165mm in thickness. The hollows have all been worked on one face and vary in depth and character from deep, round-based hollows (3571, 3.1; 2351, 6.7) of up to 85mm in depth to simple, shallow, pecked areas (1560, 7.2). The eight hollowed stones which have been made on sub-rectangular blocks vary in length from 130mm to 310mm and are 25mm to 150mm in thickness. All have circular to oval shaped hollows worked on one face and all but one have shallow, flat-based hollows of 5mm to 45mm in depth (3058, 6.5; 2989, 6.4). The exception is 5141,2.2 which has a round-based hollow. The functions of these hollowed stones are unknown. Certainly one (3135, 6.2) must have functioned as a container for liquid as there is a drainage hole worked in the base. The rest may have been used for a variety of tasks eg. as mortars, anvils or bowls, and some may actually be unfinished objects. The two hollowed stones from the Neolithic phases are characteristic of those mortars which are present at Skara Brae (Childe 1931).

Counter-sunk Hollowed stones (T=8)

These are mainly made on rounded cobbles of varying sizes and they feature hollows of up to 40mm in depth which are worked on opposite faces. In two cases the hollows which have been formed are quite irregular (4970, 8.1) but on the rest they are round-based and circular to oval in plan (3864, 7.1; 1610, 7.2). Only one is different from the rest and this is a block fragment witha steep-sided, flat-based hollow worked on opposite faces, one of which has an isolated projection worked in the centre (2331,6.4). These counter-sunk hollowed stones are present throughout the post- Neolithic phases at Pool and their function is unknown.

Whetstones (T=35)

The whetstones are divided into four groups on the basis of shapeand wear patterns: pebble whetstones; hones; haunched hones; and rectangular-sectioned whetstones.

The pebble whetstones (T= 11) are all made on fine black micaceous sandstones and are between 80mm and 175mm in length and 20mm to 45mm in width with mainly oval-shaped cross sections. In all cases the original shape of the pebble has not been altered by the use to which it was put although most of the pieces exhibit one or more faces with areas of smoothing and 'polishing' with, in some cases, accompanying striations (1871, 7.2). One whetstone (3582, 6.1.2) has an attempted perforation at one end.

The hones (T= 6) are made on blocks of fine-grained micaceous sandstone and are up to 175mm in length and 30mm to 50mm in width. They are squarish in section and have one or more worn faces. The finest example has all four faces worn to a sinuous profile (183, 7.2). Another hone (101, 7.2) also has score marks on one face.

The haunched hones (T= 6) are all made on micaceous schist and all are fragments with their widths varying between 12mm and 31mm. They are characterised by the distinct tapering of the faces towards the centre of the piece to form a waisted profile (2861, 7.2; 2101, 8.2.1). One fragment has subsequently been rounded on the broken ends.

The rectangular-sectioned whetstones (T= 12) are characterised by their distinct cross section which has been formed by wear on the faces of the whetstone. They include a variety of sub-types which have been identified on the basis of raw material. There are four fragments which have been made on micaceous schist and, as the faces of these whetstones are parallel they are unlikely to be fragments of haunched hones (1162, 9). Two whetstones are made on slate, one is a fragment which is tapering in plan and the other is split longitudinally (1542, 9). Both are very fine pieces with thicknesses of 7mm. Four whetstones have been made on micaceous siltstone, two of which are both of a similar size and have been perforated at the narrower end (3879, 7.2) whilst another (4492,8.2.3) has had an isolated projection formed at one end possibly to facilitate some form of attachment. The last two whetstones are much broader than the rest and are made on siltstone. One has been worn heavily on both faces and on one side and striations are visible whilst the opposite side is roughly flaked and the scars are rounded and shiny possibly from having been held (92,8.2.3). The other piece (5264, 7.2) has flat ends and sides but the wear has been obscured through heat damage.

The whetstones are present from phase 6 onwards although types other than the pebble whetstones do not appear until phase 7.1 (table 3). The large hones are all from phase 7, four of which come from the same context, and those pebble whetstones from this phase are amongst the largest of the group and may have been selected for their use as hones. The haunched hones and rectangular-sectioned whetstones are present from phase 7.2 through to the latest Norse period (table 3).

Querns and Mortars (T=16)

Only one saddle quern was found and this is a large piece found in a drain lining of phase 1.2 (5742).

There are nine rotary querns, five of which are just small fragments. Most of the querns are made of sandstone but there are two of mica schist and three of garnetiferous schist. The more complete querns range in diameter from 480mm to 595mm and from58mm to 95mm in thickness (5549, 6.5). They have all been shaped and are generally of a disc form with a flat upper face although there is one with a collar formed around the hopper and another which has a rectangular depression made at the side of the hopper (1726, 7.2). Evidence for complete stick holes is present on only two querns and in both cases the perforation has been made at an angle and is worn through to the base. One other quern (2322,7.2) has two small circular depressions pecked towards the edge which may be some form of stick hole. There is an additional large dressed disc without a central hole but which may be a lower quern stone.

A further four pieces have been dressed to shape but none are completely perforated and instead have a circular pecked area in the centre of one or both faces (2550, 6.5). They tend to be smaller in diameter than the rotary querns (195mm to 485mm) but are of a similar thickness. They are possibly unfinished quernstones although at least three of these pieces have worn bases and they may be some other form of mortar.

The rotary querns and mortars are present from phase 6.4 onwards although the use of schists for querns does not appear until phase 7.1.

Spindle Whorls (T=10)

All of the spindle whorls are made on sandstone and eight have been ground all over to form flat faces and rounded sides. The perforations are mainly parallel-sided although some conical and bi-conical holes are present (3316, 6.3; 3294, 6.4; 5721, 6.4;5794, 6.5). In diameter the whorls range from 24mm to 38mm although most are 32mm or 33mm in size. The diameters of the holes range from 5mm to 12mm. These spindle whorls are present throughout phase 6 and there is one from phase 8.1. A smaller perforated object was recovered from phase 8.2.2 and is conical in shape and perhaps rather too small for a spindle whorl. There is an additional burnt fragment of a perforated object (2886,6.6) which has been made on an irregular-shaped pebble and the perforation appears to have been gouged using a narrow metal tool.

Stone Weights (T=9)

All of the stone weights are made on sandstone cobbles and eight have perforations made off-centre, generally towards the narrow end (1748, 7.2). All of the weights from phases 7.1 and 7.2 have been perforated by heavy pecking from both faces of the cobble and in two cases there is additional gouging from one face using a narrow metal implement (5302, 7.1; 1510, 7.2). Two other weights have been reworked after breakage along a previous perforation. The two weights from phases 8.2.1 and 8.2.2 have been worked from only one face (1851, 8.2.1). For all of these weights the diameter of the perforation is a standard 6mm to 9mm at the narrowest point. There is an additional fragment of a grooved weight with the groove worked round the long axis (107,8.1).

Axes and Roughouts (T=8)

The six axes are varied in material, form and survival. Only four are complete two of which (3745 and 4853, both from phase2.3) are miniatures with splayed sides and a broad blade end and they have both been ground all over. Another piece (3395, 3.1) is more of an adze form with a long, curved profile and has been ground only around the blade end. The other complete axe (5597,7.2) is simply a small flat siltstone pebble which has been ground bifacially at the broad end to form a fine, curved blade end. Three of these axes (3745, 2.3; 4853, 2.3; 3395, 3.1) also have shiny areas part way down the sides and, in the first two cases, on the faces as well which may be traces of original hafting. The two other axes (4877, 2.2; 3605, 3.1) are quite heavily damaged and there is evidence for the reworking of these pieces. On the former there is heavy flaking from the sides which has almost removed the original polished face and on the latter there is pecking down both sides over the polishing. The materials employed for the manufacture of these axes include siltstone, pitchstone, epidote amphibole and an unidentified fine-grained rock which may be volcanic in origin (A. Livingstone pers comm). All the identifications were done without the use of thin sectioning. Finally from phase 2.3 there are two artefacts which have been made on gneiss and flaked all over (4065, 5048) but which bear no sign of additional grinding or polishing.Their form is unlike anything seen from other Neolithic assemblages and they may tentatively be regarded as roughouts for stone axes.

Flaked Blanks (T=6)

These are cobbles which have been modified prior to use by flaking in order to produce distinctive tool shapes. There are three bifacially flaked cobbles and three flaked sandstone bars. Of the cobble tools, two are of sandstone and one is of quartzite. All are of a flat circular shape and the flaking of those on sandstone has produced a denticulate edge whilst

that of quartz is heavily rounded on the edges through wear and is similar to those from the Bronze Age at Tofts Ness. Two of them have had the cortex removed entirely from one face and the other is heavily flaked from both faces. All of the flaked sandstone bars are made on rectangular pebbles. Two of these are standard flaked sandstone bars with much of the original cobble cortex being removed through flaking whilst the smallest piece has only been bifacially flaked down one side and on the broadest end. The two sandstone bifacially flaked cobbles come from phase 3.1 and that of quartz from phase 6.4. The flaked sandstone bars come from phases 3.1 and 3.2. Therefore most of these tools are certainly Neolithic in origin.

Slabs (T=5)

All of these slabs are rectangular in shape and have been chipped bifacially around all the sides. They range in length from 295mmto 410mm and are most likely to be a structural component. Three were found in phases 2.3 and 3.1 and the other two were recovered from rubble spreads in phase 3.2.

Sculpted Stones (T=5)

Four sculpted stones and one possible related fragment were recovered from phase 3.1. All of the pieces are made on a black micaceous siltstone and have been worked first by pecking and then by grinding, the striations of which are visible on some surfaces. They are all similar in form although there is a great variety in the quality of working. The finest piece (6000) has one conical projection at one end, two at the opposite end and four conical projections worked around the upper half, one of which has been removed and the scar pecked over. Another object (3585) is unfortunately incomplete but appears to have been more symmetrical in form than the previous piece. It has two large conical projections and a smaller, more bulbar one at one end whilst the centre of the piece is slightly waisted and the opposite end worked to a flat face. Piece number 3848 is much rougher and more fragmented. It appears to have had at least four projections, three of which are broken at the tip and the fourth which has been completely removed and the scar pecked over. The final object (6782) is larger and more crudely formed than the other pieces. If seen as a T-shape then the leg of the T is sub-conical and the bar is formed by two broad projections. One face is quite flat whilst the opposite is more bulbous and appears to have originally had another worked projection. The upper end of this piece is broad and irregular and it is likely that this is an unfinished sculpted stone.

The style of these objects: 3-dimensional with conical projections is most similar to those from the chambered tomb at Quoyness, Sanday (Henshall 1963) although in actual form they are quite different. The conical element is also used at Skara Brae for objects which are more symmetrical in form and some of which have additional decoration (Childe 1931, Clarke et al1985).

Sharpening Stones (T=4)

These stones have a series of striations or grooves on one or both faces. One piece from phase 1.1 is of a soft yellow sandstone with a concave face and on the opposite face there is a group of four deep striations. The three pieces from phase 8 have a series of deep grooves on parts of the faces and all are made on a coarse grit (1908, 8.2.2).

The miscellaneous artefacts are detailed fully in the catalogue and a discussion of some of these pieces can be found in the introduction.

POOL, SANDAY: COARSE STONE CATALOGUE

Pieces marked * are stored at Tankerness House, Kirkwall.

FLAKED STONE BARS

3.1, 2627, 6770
Sub-rectangular flat cobble of grey sandstone. Cortex flaked entirely from one face and around the edges on opposite face.
115 x 72 x 23.

3.1, 2636, 6534
Sub-rectangular flat cobble of grey sandstone. Flaked bifacially on one side and one end.
142 x 77 x 27.

3.2, 2604, 6358
Sub-oval flat cobble of grey sandstone. Flaked bifacially down one long edge and unifacially flaked on proximal end.
82 x 53 x 15.

STONE DISCS

RC= roughly chipped
BC= bifacially chipped
SS= sandstone
Lam= laminated shale

2.2, 1318, 5261
RC, SS, burnt around edges on both faces.
195 x 182 x 13

2.3, 2478, 6360
BC, SS, burnt around parts of edge on both faces.
155 x 136 x 13

2.3, 979, 3954
BC, SS, burnt around parts of edges on both faces.
135 x 129 x 12

2.3, 1919, 4505
BC, Lam, partially flaked flat pebble.
134 x 93 x 15

3.1, 866, 3574
BC, SS.
270 x 260 x 23

3.1, 866, 3909
BC, Lam, fragment
8mm thick

3.1, 942, 397
BC, Lam, heavily burnt on both faces, fragment.
Diameter c.165mm, 9mm thick.

3.1, 2479, 5976
BC, SS, Fragment, burnt on edges of both faces.
Diameter c. 173mm, 14mm thick

3.1, 2479, 6740
Perimeter ground, SS.
56 x 54 x 9

3.1, 2506, 6027
BC, Lam, fragment.
Diameter c. 150mm, 14mm thick

3.1, 2612, 6747
BC, SS.
54 x 50 x 6

3.1, 2627, 6755
BC, Lam, fragment.
Diameter c. 200mm, 20mm thick

3.1, 2635, 6216
BC, SS, fragment, burnt around edge of both faces.
Diameter c. 170mm ,16mm thick

3.1, 2635, 6217
RC, SS.
84 x 84 x 13

3.1, 2635, 6218
BC, SS, fragment.
11mm thick

3.1, 2636, 6239
BC, SS, burnt on one face.
230 x 225 x 21

3.1, 2636, 6240
BC, SS, fragment.
9mm thick

3.1, 2636, 6528
BC, SS.
114 x 112 x 11

3.1, 2636, 6529

Unifacially chipped, SS, cortex on one face.
Diameter 120mm, 7mm thick

3.1, 2636, 6530
BC, Lam, fragment.
13mm thick

3.1, 2636, 6531
BC, SS, Fragment, burnt around edges on both faces.
Diameter c. 215mm, 12mm thick.

3.1, 2636, 6539
BC, Lam, Fragment.
Diameter c. 130mm, 12mm thick

3.1, 2667, 6466
BC, Lam, fragment.
Diameter c. 265mm, 12mm thick

3.1, 2685, 6605
BC, SS.
115 x 106 x 12

3.1, 2735, 6488
BC, SS.
83 x 83 x 9

3.1, 2735, 6568
BC, SS.
123 x 111 x 17

3.1, 2735, 6569
BC, SS.
134 x 128 x 17

3.1, 2739, 6469
BC, SS, half of both faces are burnt.
170 x 165 x 10

3.1, 2762, 6602
BC, SS.
106 x 99 x 15

3.1, 2769, 6652
BC, SS, partially burnt around edges on both faces.
175 x 170 x 18

3.1, 2769, 6653

BC, SS, fragment, burnt around edge on both faces.
8mm thick

3.2, 830, 3644
BC, SS, burnt around edge on both faces.
130 x 130 x 10

3.2, 2689, 6321
BC, Lam.
160 x 160 x 17

3.2, 2697, 6344
BC, SS.
101 x 98 x 9

3.2, 2697, 6356
BC, SS, partially burnt around edge on both faces.
85 x 78 x 12

5.1, 2718, 6554
BC, SS, fragment.
Diameter c. 225mm, 16mm thick

6.2, 409, 2236
RC, SS.
52 x 48 x 11

6.2, 857, 3602
RC, SS, cortex on one face, partially burnt at edge on one face.
175 x 52 x 20

6.2, 2529, 5972
RC and partially ground around the edge.
28 x 25 x 8

6.2, 2540, 5893
Perimeter ground, SS, fragment.
Diameter c. 75mm, 9mm thick

6.3, 351, 3587
BC, SS, burnt around edge on both faces.
190 x 180 x 11

6.3, 582, 2928
RC, SS.
54 x 50 x 14

6.3, 582, 3129

RC, SS.
93 x 92 x 20

6.5, 446, 3132
RC, SS.
46 x 46 x 10

6.5, 578, 2906
RC, SS.
55 x 54 x 13

6.5, 617, 2849
RC, SS, ?partially burnt on edge.
64 x 62 x 14

6.6, 739, 3735
RC, SS.
75 x 72 x 18

6.7, 422, 2134
Edge and both faces ground, SS, gaming piece.
36 x 32 x 9

6.7, 456, 2332
RC and some edge grinding, SS.
50 x 48 x 9

6.7, 468, 2251
RC, SS
90 x 83 x 20

6.7, 518, 2925
Edge and both faces ground, SS, gaming piece.
28 x 28 x 6

6.7, 1080, 3986
RC, SS.
83 x 83 x 12

6.7, 2399, 5558
BC, SS.
116 x 111 x 10

7.1, 145, 736
RC, SS.
80 x 70 x 30

7.1, 416, 2058

RC, SS.
66 x 64 x 16

7.1, 416, 2131
RC, SS.
70 x 64 x 9

7.1, 573, 2949
RC, SS.
79 x 74 x 14

7.1, 1043, 3962
RC, SS.
57 x 57 x 16

7.1, 2379, 5474
RC, SS.
100 x 86 x 30

7.2, 59, 1049
RC, SS.
55 x 51 x 10

7.2, 85, 924
RC, SS.
60 x 57 x 7

7.2, 278, 1960
RC, SS.
77 x 76 x 19

7.2, 278, 2681
RC, SS.
81 x 74 x 16

7.2, 339, 2015
RC, SS.
80 x 76 x 17

7.2, 341, 2081
Edges ground, SS.
35 x 33 x 6

7.2, 341, 2082
RC, SS.
48 x 46 x 9

7.2, 344, 1815

RC, SS, burnt.
69 x 64 x 13

7.2, 349, 1725
RC, SS.
48 x 47 x 16

7.2, 367, 2020
RC, SS.
56 x 54 x 16

7.2, 375, 2558
RC, SS.
40 x 39 x 11

7.2, 386, 1881
Unworked flat pebble, SS.
50 x 50 x 12

7.2, 661, 5037
Partially ground edges, SS.
30 x 29 x 10

8.1, 2146, 4948
Finely shaped with ground flat faces and sides and bevelled edges. There is a small conical depression made in the centre of one face. Gaming piece, SS.
30 x 30 x 14

8.1, 2239, 5138
Circular pebble with one ground face and a small conical depression made in the centre. gaming piece, SS.
41 x 40 x 22

8.2.1, 2118, 5003
Edge is ground, SS.
76 x 74 x 14

8.2.2, 107, 334
RC, SS, burnt.
74 x 73 x 22

8.2.3, 2092, 4664
RC, SS.
90 x 89 x 13

9, 2, 49œ
RC, SS.
56 x 51 x 10

9, 270, 1124
RC, SS.
80 x 69 x 15

9, 276, 1350
RC, SS, burnt.
71 x 65 x 11

Unstratified, find no. 4034
BC, SS, possibly burnt on both faces.
90 x 87 x 15

SPINDLE WHORLS

6.1.1, 2586, 6173
Sandstone, flat faces, rounded sides, slightly conical hole.
32 x 32 x 13, diam hole 6mm.

6.3, 747, 3316
Sandstone, flat faces, flat sides, bi-conical shaped hole.
32 x 32 x 9, diam hole 5mm.

6.4, 2466, 5721
Sandstone, flat faces, rounded sides, slightly conical hole.
32 x 32 x 17, diam hole 6mm.

6.4, 724, 3294
Sandstone, flat faces, rounded sides, parallel-sided hole.
33 x 33 x 11, diam hole 10mm.

6.4, 486, 2988
Sandstone, flat faces, rounded sides, parallel-sided hole.
38 x 38 x 16, diam hole 12mm.

6.5, 2438, 5794
Sandstone, round faces and sides, parallel-sided hole.
24 x 24 x 16, diam hole 5mm.

6.6, 514, 2886
Sandstone, fragment of a perforated object, irregular in shape. The hole has been pecked and gouged from one face. ?Spindle whorl.
16mm thick.

6.7, 528, 2775
Sandstone, flat faces and rounded sides, parallel-sided hole.
34 x 32 x 12, diam hole 8mm.

8.1, 321, 1572

Sandstone, fragment, flat faces and rounded sides.
c. 36mm diameter, 18mm thick.

8.2.2, 114, 122
Sandstone, small conical piece with conical-shaped hole. ?Spindle whorl.
Diam base 17mm, diam top 11mm, thickness 12mm, diam hole 5mm-8mm

STONE WEIGHTS

7.1, 2279, 5302
Sandstone. Flat oval cobble perforated at one end. The hole has been heavily pecked and gouged with a narrow implement from both faces.
129 x 84 x 46, diam hole 6mm, 630g.

7.1, 2381, 5669
Sandstone. Flat oval cobble perforated at one end. The hole has been heavily pecked from both sides.
118 x 85 x 43, diam hole 7mm, 539g.

7.2, 290, 1748
Sandstone. Triangular shaped cobble perforated at narrow end. The hole has been pecked from both faces.
135 x 81 x 46, diam hole 7mm, 616g.

7.2, 349, 1510
Sandstone. Oval cobble which has been pecked all over the surface. Perforated at one end and broken at a perforation on opposite end. The hole has been pecked and gouged with a narrow implement from both faces. Reworked stone weight.
79 x 62 x 40, diam hole 7mm, 239g.

7.2, 353, 1665
Sandstone. Oval cobble perforated at narrow end. The hole has been heavily pecked from both faces.
129 x 97 x 62, diam hole 7mm, 866g.

7.2, 2380, 6313
Sandstone. Sub-rectangular slab perforated in the middle of one long side. The hole has been pecked from both faces. Another perforation has been truncated by breakage. Re-worked stoneweight.
115 x 115 x 46, diam hole

8.1, 28, 107
Sandstone. Fragment of a cobble with a groove running around the length. Probable net sinker.
Not measured.

8.2.1, 275, 1851

Sandstone. Flat oval cobble perforated off centre. The hole has been pecked from one face.
149 x 110 x 26, diam hole 9mm, 625g.

8.2.2, 65, 339
Sandstone. Flat oval cobble perforated in the middle of one long side. The hole has been pecked from one face.
132 x 103 x 43, diam hole 9mm, 531g.

SHARPENING STONES

1.1, 2780, 6706
Irregular-shaped cobble of soft yellow sandstone. One face is concave and very smooth and the opposite face has a small group of deep striations made on one side.
157 x 74 x 34

8.2.2, 281, 1908
Large fragmented slab of coarse sandstone. On one face three deep grooves run parallel to each other whilst there is a group of six narrower grooves which run at an angle to the first group.
230 x 170 79

8.2.2, 2059, 4873
Flat oval cobble of coarse grit. On one face five narrow grooves run parallel to each other whilst two deeper ones run at an angle to the first group.
155 x 125 x 72.

8.2.3, 203, 1002
Small fragment of burnt sandstone slab with two deep grooves on one face and one on the opposite face.
74 x 63 x 20

SLABS

2.3, 2826, 6708
Flagstone slab, bifacially chipped around the edges.
410 x 350 x 23.

3.1, 866, 3572
Flagstone slab, bifacially chipped around the edges.
310 x 300 x 37.

3.1, 2703, 6428
Flagstone slab, bifacially chipped around the edges.
295 x 230 x 31.

3.2, 660, 3379
Flagstone slab, bifacially chipped around the edges.
410 x 358 x 35.

3.2, 830, 3378
Flagstone slab, bifacially chipped around the edges.
300 x 290 x 30.

LAMPS

6.1.1, 849, 3570
Flat oval sandstone cobble with flattish base. The hollow is oval in plan with a slightly rounded base and has been worked in the centre of the face.
128 x 112 x 52, hollow 61 x 51 x 10mm deep.

6.2, 586, 2868
Oval sandstone cobble with a flattish base. The hollow is oval in plan and round-based. Sooty on exterior.
140 x 95 x 54, hollow 105 x 70 x 31 deep.

6.5, 2438, 5795
Oval sandstone cobble with flattish base. One large hollow is oval in plan and round-based and has been worked towards one end to make room for an adjacent smaller circular depression.
177 x 113 x 66, hollow 90 x 60 x 25 deep.

6.7, 433, 2366
Oval sandstone cobble with flattish base. A circular hollow with a rounded base has been worked towards the broad end whilst the opposite end has been tapered from the sides.
230 x 155 x 60, hollow 140 x 130 x 21 deep.

7.1, 2359, 5447
Oval sandstone cobble with flattish base. Broken down length, possible heat damage. The hollow is oval in plan and round-based.
Length 150mm, thickness 75mm.

7.2, 2387, 5610
Flat oval sandstone cobble with a flattish base, probable heat damage. A shallow groove runs around the sides. One hollow which is circular in plan and flat-based has been worked towards the broad end and there is a smaller adjacent depression worked at the narrow end. The larger hollow has a circular raised rim formed in the centre.
125 x 104 x 50, hollow 67 x 67 x 7mm deep.

9, 276, 1173
Oval sandstone cobble with a flat base. The hollow is oval in plan and flat-based and has a small notch worked at one end.
116 x 102 x 48, hollow 74 x 64 x 7mm deep.

U/S, -, 1989
Flat oval sandstone cobble with flat base, broken laterally. Sooty all over. The hollow is oval in plan and flat-based.

Width 170mm, thickness 45mm, hollow 17mm deep.

ROUNDED HOLLOWED STONES

* 3.1, 866, 3571
Round-based block of sandstone, pecked all over. The hollow is circular in plan, steep-sided and round based.
230 x 195 x 130, hollow 128 x 120 x 65mm deep.

5.2, 2542, 5947
Flat oval sandstone cobble, heat damage. The hollow is circular in plan, round-based, shallow and rough.
122 x 105 x 43.

* 5.2, 2559, 6807
Round-based block of sandstone. The hollow is circular in plan with a very flat base and has been worked almost up to the edges.
320 x 280 x 165, hollow 215 x 205 x 5mm deep.

* 6.2, 730, 3135
Large block of sandstone with a flattish base, oval in plan and pecked all over. The hollow is oval in plan and deep with a flattish base through which a perforation has been made in the centre. Probable water container.
490 x 345 x 140, hollow 360 x 200 x 85mm deep, perforation 55 x45.

* 6.5, 560, 3052
Large rounded sandstone cobble with a shallow round-based hollow pecked in the centre of one face. ?Unfinished.
260 x 205 x 135, hollow 170 x 110 x 25mm deep.

* 6.5, 578, 2733
Sub-triangular shaped block of sandstone, weathered. The hollow is small and sub-circular in plan and has been worked in the centre of one face. ?Unfinished.
250 x 200 x 90, hollow 80 x 65 x 10mm deep.

* 6.7, 420, 2351
Fragment of a round-based block, abraded. The hollow is steep-sided and has a curved base.
Thickness 90mm, depth of hollow 35mm.

* 7.1, 413, 2071 and 6.7, 447, 2345
Oval sandstone cobble with a round base. The hollow is oval in plan with a steeply curved base.
280 x 215 x 85, hollow 120 x 115 x 40mm deep.

* 7.1, 413, 2126

Large rounded block of sandstone with uneven base. Broken across width. A natural shallow hollow has been formed by the bedding structure the base of which has been pecked.
Width 350mm, thickness 130mm.

7.1, 2336, 5495
Fragment of a rounded sandstone block with a flattish base, burnt and abraded. The hollow is steep-sided with a possible flat base.
No measurements.

* 7.2, 353, 1596
Large elongated oval sandstone cobble with a round base. The hollow is oval in plan with a steeply curved base.
270 x 140 x 100, hollow 175 x 80 x 20mm deep.

* 7.2, 368, 1560
Oval sandstone cobble with a flattish base. A small hollow has been worked in the centre of one face. ?Unfinished.
235 x 213 x 90, hollow 70 x 65 x 17.

SUB-RECTANGULAR HOLLOWED STONES

2.2, 1310, 5141
Roughly cuboid block of sandstone. A hollow has been worked in the centre of one face, it is circular in plan and has a steeply curved base.
128 x 107 x 76, hollow 66 x 65 x 16.

* 6.1.2, 777, 3268
Sub-rectangular block of sandstone. The hollow is circular in plan and very shallow with a flat base. It is very rough and maybe unfinished.
230 x 200 x 95, hollow 145 x 140 x 5.

6.3, 747, 3319
Flat sandstone slab, possibly burnt. A shallow hollow with a flat base is pecked onto the face of the slab, it is egg-shaped inplan. ?Probable mould.
150 x 104 x 25, hollow 115 x 65 x 9.

* 6.4, 352, 2989
Regular-shaped block of sandstone. The hollow has a flat base and steep sides and is egg-shaped in plan.
230 x 245 x 150, hollow 145 x 115 x 20.

* 6.5, 560, 3058
Rectangular block of sandstone with a flat pecked base. The hollow has been worked in the centre of one face and is rectangular in plan with a flat base and steep sides. The base of the hollow is roughly pecked.
295 x 260 x 125, hollow 205 x 150 x 35.

* 7.1, 2337, 5463

Sub-rectangular water-worn block of sandstone. Broken down length. The hollow is sub-oval in plan and has a shallow concave base with steep sides.
Length 310, thickness 100, length of hollow 180, depth 25.

7.2, 29, 338
Irregular-shaped block of sandstone. Fragment, possibly burnt. The hollow is deep and flat based and is circular in plan.
Hollow c. 125 diameter, 45 deep.

8.2.3, 2028, 4384
Slab of yellow sandstone. Fragment. Small, irregular hollow pecked towards centre of one face.
Broken length 210, width 150, thickness 47.

COUNTER-SUNK HOLLOWED STONES

5.2, 2293, 5824
Oval sandstone cobble, broken across width. One hollow has been pecked on opposite faces, one is deeper than the other. Both have steeply sloping sides and steeply curved base.
Broken length 615, width 143.

6.2, 2566, 6082
Elongated oval sandstone cobble. One regular circular hollow has been pecked on opposite faces towards the broad end.
195 x 97 x 72, hollows 59 x 51 x 7, 49 x 45 x 5.

6.2 and later, 409, 2280
Oval cobble of sandstone with one hollow pecked on opposite faces. One is more developed than the other.
103 x 76 x 56, hollows 46 x 41 x 15, 41 x 31 x 7.

* 6.4, 451, 2331
Water-worn block of sandstone, fragment. One hollow is steep-sided and flat based, whilst the opposite is similar but with an isolated projection towards the centre.
Length along break 255, depth 95, depth of hollows 10 and 20.

* 7.1, 1081, 3864
Flat sub-rectangular shaped cobble of sandstone. One small hollow has been worked on opposite faces.
185 x 165 x 54, hollows both 40 x 40 x 10.

* 7.1, 2366, 5512
Large flat oval sandstone cobble. On opposite faces there is an area of pecking towards the centre, this is sub-circular in plan and very shallow.
310 x 280 x 70, hollows c. 60 diameter and 5 deep.

* 7.2, 344, 1610

Flat sub-rectangular cobble of sandstone. A small hollow has been worked on two opposite faces towards one end.
205 x 165 x 56, hollows 60 x 50 x 20 and 45 x 45 x 15.

8.1, 2203, 4970
Flat oval sandstone cobble. Burnt. One irregular hollow has been pecked on two opposite faces. ?Anvil stone.
115 x 94 x 33, hollows 33 x 21 x 8 and 38 x 20 x 5.

QUERNS

* 1.2, 244, 5742
Saddle quern
No measurements or description. Left on site.

* 6.4, 486, 2990
Rotary quern, fragment, very abraded, made on sandstone. Raised collar around the hopper. The base is concave and very smooth.
Diameter c. 450, thickness 60.

* 6.5, 2431, 5549
Rotary quern made on sandstone. It is irregular in plan and has a bi-conical central hole. Part of the upper face is pecked and the base is very smooth, particularly around the outer edge.
Diameter c.520, thickness 95, Hopper 45 at narrowest.

* 6.7, 523, 2325
Rotary quern made on sandstone, broken down middle and partially dressed around perimeter. It is circular in plan and has a bi-conical central hole. The upper face has two deep and two shallow score marks and the base is smooth and pecked.
Diameter c. 560, thickness 75, hopper 35 at narrowest.

7.1, 517, 2600
Small fragment of ?rotary quern made on sandstone. The base is flat and smooth and a small perforation has been made at an angle to the base - probable stick-hole.
35 thick.

7.1, 2346, 5444
Fragment of ?rotary quern made on micaceous schist, very abraded. The base is worn smooth.
55 thick.

7.2, 2224, 5240
Small fragment of ?rotary quern made on mica schist. The base is worn smooth and a small perforation is truncated by breakage.
44 thick.

* 7.2, 2357, 5464
Large disc of sandstone which has been shaped by flaking and pecking around the perimeter. Both faces have been roughly pecked and one face is quite smooth.
Diameter c470, thickness c. 70.

* 7.2, 423, 2322 A & B
Large rotary quern, made on sandstone, irregular in plan. The base is concave and has been pecked and smoothed. The central hole is conical in section. Two small hollows have been pecked towards the edge - possible stick holes.
Diameter c. 480, thickness 75, diameter central hole 40.

* 7.2, 290, 1726
Large rotary quern of garnetiferous schist, broken across width. Very regular shape, dressed and pecked all over. The central hole is biconical and a rectangular hollow has been worked by the hole.
Diameter 595, thickness 58, rectangular hollow 38 wide and 20deep.

8.2.1, 2076, 4847
Small fragment of a ?rotary quern made on garnetiferous schist.The base is worn smooth. 63 thick.

9, 2018, 4265
Small fragment of a ?rotary quern made on garnetiferous schist. The base is worn smooth. 50 thick.

QUERNS/MORTARS

* 6.5, 533, 2550
Flat circular fragment of a sandstone cobble. The slightly domed upper face has a small hollow pecked towards the centre.
248 x 225 x 45, hollow 48 x 45 x 10.

* 6.7, 523, 3033
Sandstone disc, slightly oval in plan, shaped by flaking and pecking around the perimeter. Both faces are quite smooth and flat with some random pecking. On both faces a discrete area of pecking, circular in plan, occurs towards the centre.
270 x 250 x 66, pecked areas 40 diameter and 3 deep.

* 7.2, 278, 1738
Sandstone disc shaped by pecking around the perimeter. The base is very flat and smooth with some pecking. The centre of the upper face has a small shallow area of pecking, circular in plan.
Diameter c 195, thickness 49, pecked area 23 diameter, 3 deep.

* 8.2.1, 1019, 3713
Large sandstone slab which has been pecked around most of the perimeter to a sub-circular shape. There is a shallow pecked area in the centre of one face.
485 x 450 x 90.

WHETSTONES

PEBBLE WHETSTONES

6.1.2, 879, 3582
Black micaceous sandstone, oval in section, fragment. Attempted perforation made on one face towards broad end.
width 25, thickness 13.

6.2, 730, 3610
Grey sandstone, cuboid in section, possibly some smoothing down sides.
175 x 47 x 32.

6.4, 616, 3022
Black micaceous sandstone, oval in section, possibly some shiny areas on face.
86 x 30 x 15.

6.4, 488, 2438
Black micaceous sandstone, oval in section, part of one face is shiny and worn along the length.
83 x 22 x 16.

7.2, 59, 1050
Grey sandstone, oval in section, striations on one face and linear grooves on opposite face.
141 x 42 x 22.

7.2, 25, 292
Grey sandstone, oval in section, one face is very smooth and shiny.
145 x 30 x 28.

7.2, 309, 1279
Black micaceous sandstone, irregular in section, possibly worn flat on one face.
101 x 25 x 23.

7.2, 341, 1871
Black micaceous sandstone, sub-rectangular in section, faces possibly smoothed.
160 x 37 x 21.

8.2.3, 287, 1844
Black micaceous sandstone, oval in section, fragment, smooth and shiny area on one face.
32 wide, 23 thick.

9, 202, 1077
Grey sandstone, oval in section, one face possibly worn.
82 x 30 x 20.

9, 294, 1182
Black micaceous sandstone. oval in section , fragment, fine striations all over especially towards unbroken end.

31 wide, 25 thick.

HONES

7.1, 313, 2687
Fine-grained sandstone, sub-oval in section. Both faces are shiny with worn striations.
163 x 54 x 34

7.2, 25, 101
Sandstone, square in section, fragment missing. Both faces have been worn flat and one exhibits long score marks. One side has been worn to a concave section.
175 x 41 x 32.

7.2, 25, 183
Black micaceous sandstone, square in section, segment surviving.
All faces have a worn twisted profile.
33 wide, 32 thick.

7.2, 25, 177
Black micaceous sandstone, rectangular in cross section. All faces quite smooth.
124 x 51 x 29.

7.2, 25, 190
Grey sandstone, subrectangular in section. One face has been smoothed.
140 x 54 x 51.

7.2, 58, 1111
Grey sandstone, sub-rectangular in section. One face is very flat and smooth.
115 x 40 x 30.

HAUNCHED HONES

7.2, 480, 2861
Micaceous schist, square in section, fragment.
16 wide, 13 thick.

8.2.1, 275, 2101
Micaceous schist, oval in section, fragment.
22 wide, 15 thick.

8.2.2, 370, 1860
Micaceous schist, oval in section, fragment.
31 wide, 12 thick.

8.2.3, 2028, 4354
Micaceous schist, sub-square in section. Re-used fragment, the broken ends are heavily rounded and worn.
82 x 23 x 21.

8.2.3, 2028, 4371
Micaceous schist, sub-rectangular in section, fragment.
21 wide, 10 thick.

8.2.3, 2067, 4425
Micaceous schist, oval in section, fragment.
12 wide, 12 thick.

RECTANGULAR-SECTIONED WHETSTONES

7.2, 364, 2713
Black micaceous siltstone, square in section, fragment.
10 thick.

7.2, 1007, 3879
Black micaceous siltstone, rectangular in section, fragment. Tapering in plan, the complete narrower end is rounded with a perforation. All faces are flat.
15 wide, 8 thick.

7.2, 2260, 5264
Burnt sandstone, rectangular in section. Sides, end and faces worn flat.
97 x 40 x 13.

8.2.3, 118, 92
Black siltstone, rectangular in section, fragment. Both faces and one side are very worn and exhibit striations. The opposite side is roughly flaked and has been rounded and worn possibly from being held.
34 wide, 14 thick.

8.2.3, 2035, 4492
Siltstone, sub-rectangular in section, fragment. The sides are faceted and waisted with striations running across the width on one face. The unbroken end has been shouldered to form an isolated projection possibly for some sort of attachment.
17 wide, 13 thick.

8.2.3, 2055, 4440
Slate, rectangular in section, fragment. Tapering in plan with three worn faces.
14 wide, 8 thick.

9, 101, 1112
Micaceous schist, sub-rectangular in section, fragment.
No measurements.

9, 276, 1542
Slate, rectangular in section, split longitudinally. All faces worn very smooth.
90 long, 6 thick.

9, 277, 1162
Micaceous schist, square in section, fragment.
13 wide, 12 thick.

9, 277, 1355
Micaceous schist, sub-oval section, fragment.
17 wide, 10 thick.

9, 2001, 4181
Micaceous schist, rectangular in section, segment.
18 wide, 10 thick.

9, 2006, 4239
Black siltstone, square in section. All faces are flat and the ends squared. The narrower end has an incomplete perforation made from both faces.
73 x 10 x 8.

SCULPTED STONES

Maximum unbroken dimensions only.

3.1, 960, 3585
Fragment made on siltstone. At one end there are two large complete conical projections and a smaller, more bulbar one, truncated by breakage. The opposite end has been worked to a flat face. At the middle this piece is slightly waisted. The surface has been ground smooth and fine striations are visible.
80 x 73.

3.1, 980, 3848
Rather rough and fragmented piece of siltstone. It appears to have had at least four conical projections, three of which survive although they are broken at the tip, whilst the fourth has been knocked off and the scar roughly pecked.
81 x 76

3.1, 2636, 6000
Complete, made on siltstone. There is one conical projection at one end and two conical projections at the opposite end. Four conical projections have been worked around the middle towards one end, one of which has been knocked off and the scar pecked over. The piece is finely ground and striations are visible.
123 x 76 x 44.

3.1, 2636, 6810
Siltstone, possible fragment from the tip of a conical projection.
22 x 18 x 8.

3.1, 2796, 6728
Very rough, made on siltstone. Three irregular projections have been worked around the piece and there is one that has possibly been knocked off. Irregular in shape and surface is quite rough. Probably unfinished.

155 x 130 x 79

AXES

2.2, 1296, 4877
Fragment of a polished axe made on pitchstone. One face is almost entirely re-flaked leaving a remnant polished surface in the middle. The butt and blade ends are heavily damaged and there is some pecking down one side at the butt end.
66 x 41 x 22

2.3, 1047, 4065
Possible axe roughout, made on gneiss. Oval in shape. Appears to have been completely flaked.
133 x 87 x 51

2.3, 1060, 3745
Miniature axe, made on an unidentified rock which is fine grained and possibly volcanic in origin. Ground all over. The sides diverge towards the cutting end and they are slightly bevelled. The cutting end is asymmetrical. Damaged at butt end and on one face. High polish on faces and sides but not on cutting edge.
59 x 50 x 18

2.3, 1267, 4853
Miniature axe, made on an unidentified rock but which is fine-grained and possibly volcanic in origin. Ground all over. The sides diverge towards the curved cutting edge and are bevelled. Damaged on butt end and on one face. Both sides are shiny towards the butt end suggestive of hafting.
40 x 37 x 10

2.3, 1289, 5048
Possible axe roughout made on gneiss. Tapering oval in shape. Appears to have been flaked all over.
95 x 38 x 21

3.1, 854, 3395
Ground stone adze made on an unidentified material which is very fine-grained and possibly volcanic in origin. Curved profile. The sides diverge to a curved asymmetrical cutting edge. Both faces and sides are shiny from the butt end to over half way downprobably from hafting.
153 x 67 x 3395

3.1, 946, 3605
Polished axe made on epidote amphibole. Sides converge. The butt end and cutting end are heavily damaged and the sides are re-pecked over the polishing.
64 x 38 x 19

7.2, 2387, 5597
Ground stone axe made on a pebble of micaceous siltstone. The pebble is oval in plan and flat and the broad end has been ground bifacially to form a regular, curved cutting edge.

49 x 43 x 10

MISCELLANEOUS

2.3, 2853, 6289
Rounded cobble of sandstone. The base is ground flat with a central pecked depression, sub-circular in plan. The upper face is domed and has been heavily pecked on the sides and off-centre. Knap of Howar grinder.
125 x 97 x 82

3.1, 720, 3590
Stone 'borer'. Elongated oval pebble of fine-grained sandstone, split down the length. At the narrower end an isolated projection has been formed by shouldering at the sides. The projection has a blunt, rounded tip.
185 x 28 x 13

* 3.1, 829, 3543
Fragment of a sandstone slab with 'carving' on one face. The lines are formed by pecking and breakage truncates the pattern.
350 x 305 x 70

3.1, 853, 3622
Small flat oval piece of siltstone. Ground all over. The edge has irregular facets and both faces are flattish. Striations are visible.
33 x 29 x 9

3.1, 925, 4044
Small sandstone pebble with small ground facets over surface.
36 x 35 x 29

3.1, 1028, 3683
Piece of black siltstone ground into a cylindrical shape with light faceting down the length, broken laterally. One end has been ground to a blunt end with two facets, whilst the piece splays out towards the broken end.
Broken length 50, width at top 8, width at break 12, thickness 8.

3.1, 2636, 6538
Lump of haematite. Partially worn.
89 x 51 x 34

3.1, 2731, 6169
Flat, narrow pebble of black micaceous sandstone, abraded. Multi-directional striations on one face particularly at broad end. The broader end is spatulate in form.
96 x 20 x 10

3.1, 2731, 6482
Sandstone quern rubber. Worn asymmetrically on base.
135 x 127 x 97

3.1, 2880, 6804
Sub-oval cobble of sandstone, abraded. One irregular hollow has been pecked on opposite faces. Both sides are also heavily indented by pecking.
128 x 87 x 67, hollows 38 x 33 x 5 and 40 x 30 x 5.

5.2, 2289, 5507
Oval sandstone cobble, broken across the width. Naturally curved base. The upper face is ground and has a regular oval-shaped depression ground in the centre. ?Grinding stone.
Broken length 134 x 121 x 69, hollow 71 x 42.

6.1.2, 769, 3373
Small sandstone pebble with small ground facets over surface.
44 x 40 x 26

6.2, 730, 3394
Pebble fragment of black micaceous sandstone. The upper face is rounded and the fracture has been ground to form a flat base withsome faceting of the edge. Striations visible.
39 x 36 x 19

* 6.3, 439, 2991
Sandstone slab, broken across the width. One wide bi-conical shaped perforation is made in centre and another smaller one made to one side and truncated by breakage. Unknown function.
Broken length 240, width 185, thickness 50, diameter of hole 56.

* 6.4, 457, 2205
Large water-worn block of sandstone in which two holes have been bored from one flat face vertically through to an exit on one side. ?Probably natural.
230 x 210 x 190

6.5, 2417, 5602
Small disc of amphibolite. Ground all over with a straight edge and a shallow conical face. ?gaming piece.
19 x 19 x 7.

7.1, 343, 1536
Small cylindrical ?bead, limestone, polished. Two indentations at either end, but not pierced through.
Length 15, diameter 7.

* 7.2, 290, 1380
Very large elongated oval cobble of sandstone. Heavily pecked and battered on both faces and ends. Unknown function.
540 x 135 x 117

7.2, 2151, 5036
Small fragment of a garnetiferous schist plaque.

5mm thick.

9, 276/330, 1654
Lignite/ ?shale disc. Roughly chipped around the edge. One face is flat and the opposite face is possibly grooved. ?Centre of shale bracelet.
34 x 33 x 6

Unstratified, find no. 3426
Polished translucent green stone, serpentine. D-shaped. Striations visible on all surfaces.
17 x 13 x 13.

POOL AND TOFTS NESS, SANDAY: ATTRIBUTE AND CODE LIST FOR COARSE STONE CATALOGUE

1. PHASE

2. LAYER

3. FIND NUMBER

4. TYPE:
1. PRIMARY FLAKE
2. SECONDARY FLAKE
3. INNER FLAKE
4. BIFACIALLY FLAKED COBBLE
5. FACIALLY PECKED COBBLE
6. FACETED COBBLE
7. UNUSED COBBLE
8. FACIALLY PECKED AND FACETED COBBLE
9. PLAIN COBBLE
10. WHETSTONE
11. FLAKED SANDSTONE BAR
12. ARD POINT

5. MATERIAL
1. GREY MICACEOUS SANDSTONE
2. BLACK MICACEOUS SANDSTONE
3. RED MICACEOUS SANDSTONE
4. BURNT
5. ABRADED
6. QUARTZITE
7. LAMINATED
8. AMPHIBOLITE
9. QUARTZ
10. GRANITE
11. PORPHYRYR
12. ALTERED PORPHYRYR

6. SURVIVAL
1. COMPLETE
2. LATERAL BREAKAGE
3. LONGITUDINAL BREAKAGE
4. FRAGMENT MISSING
5. FRAGMENT
6. SEGMENT

7. MEANS OF DETACHMENT
1. CRUSHED
2. PERCUSSED

3. CANNOT DETERMINE

8. PLATFORM TYPE
1. CORTICAL
2. INNER
3. CANNOT DETERMINE

9. OUTLINE
1. FLAT
2. CONCAVE
3. CONVEX
4. SINUOUS
5. STEPPED
6. IRREGULAR
7. CANNOT DETERMINE

10. END MORPHOLOGY
1. FEATHER
2. STEPPED
3. HINGED
4. CANNOT DETERMINE
5. OVERSHOT
6. ABRUPT

11. SECONDARY RETOUCH
1. NOT PRESENT
2. UNIFACIAL
3. BIFACIAL

12. POSITION 1 OF RETOUCH
1. DISTAL
2. PROXIMAL
3. LEFT LATERAL
4. RIGHT LATERAL
5. 1&3
6. 1&4
7. 1&3&4
8. 3&4
9. 1&2&3&4

13. POSITION 2 OF RETOUCH
SEE NUMBER 12

14. EDGE DAMAGE
1. NOT PRESENT
2. ROUNDED
3. UNIFACIALLY FLAKED
4. BIFACIALLY FLAKED
5. DENTICULATE

6. CRUSHED AND BATTERED
7. BEVELLED
8. SNAPPED
9. 2&3
10. 2&4
12. CANNOT DETERMINE

15. POSITION OF EDGE DAMAGE
SEE NUMBER 12

16. MAXIMUM LENGTH
IN MILLIMETRES

17. MAXIMUM WIDTH
IN MILLIMETRES

18. MAXIMUM THICKNESS
IN MILLIMETRES

19. WEIGHT
IN GRAMMES

21. TP:UP
RATIO OF TOTAL PERIMETER TO USED PERIMETER

22. SHAPE
1. ROUND
2. OVAL
3. FLAT OVAL
4. SUB-ROUND
5. CYLINDRICAL
6. SUB-CYLINDRICAL
7. SUB-OVAL
8. CANNOT DETERMINE
9. IRREGULAR
10. CIRCULAR
11. HEXAGONAL
12. SUB-CIRCULAR
13. RECTANGULAR
14. SUB-RECTANGULAR
15. TAPERING RECTANGULAR
16. CURVED RECTANGULAR
17. POINTED
18. FINGERLIKE
19. TAPERING OVAL
20. FLAT ROUND
21. ELONGATED OVAL

23. FACETING PRESENT
1. YES
2. NO

24. NUMBER OF FACETS
IN TOTAL

25. LOCATION OF FACETS
1. DISTAL
2. PROXIMAL
3. LEFT LATERAL
4. RIGHT LATERAL
5. FACE 1
6. FACE 2
7. ALL OVER

26. TOTAL AREA OF FACETS
IN CM2

27. NATURE OF FACETS
1. SMOOTH
2. MEDIUM PECKED
3. HEAVILY PECKED

28. PECKING PRESENT
1. YES
2. NO

29. LOCATION OF PECKING
SEE NUMBER 25

30. TYPE OF PECKING
1. HEAVY
2. MEDIUM
3. LIGHT

31. DISTRIBUTION OF PECKING
1. RANDOM
2. LOCALISED
3. SPREAD

32. FLAKING PRESENT
1. YES
2. NO

33. LOCATION OF FLAKING
SEE NUMBER 25

34. TYPE OF FLAKING

1. HEAVY
2. MEDIUM
3. LIGHT

35. FLAKING LOCATION
1. ALL
2. DISTAL
3. PROXIMAL
4. LEFT LATERAL
5. RIGHT LATERAL
6. FACE 1
7. FACE 2

36. CROSS SECTION
1. OVAL
2. THICK OVAL
3. ELLIPSE
4. ROUND
5. RECTANGULAR
6. FLAT OVAL

37. DISTAL END MORPHOLOGY
1. SQUARED
2. DIAGONALLY SQUARED
3. CURVED
4. DIAGONALLY CURVED
5. STEEP CURVE
6. DIAGONALLY STEEP CURVE
7. POINTED
8. DIAGONALLY POINTED
9. BROKEN
10. CANNOT DETERMINE
11. FLAKED

38. PROXIMAL END MORPHOLOGY
SEE NUMBER 37

39. PECKING PRESENT
1. YES
2. NO

40. LOCATION OF PECKING
1. DISTAL
2. PROXIMAL
3. LEFT LATERAL
4. RIGHT LATERAL
5. FACE
6. FACE 2
7. ALL

41. SMOOTHING PRESENT
1. YES
2. NO

42. LOCATION OF SMOOTHING
SEE NUMBER 40

43. STRIATIONS PRESENT
1. YES
2. NO

44. LOCATION OF STRIATIONS
SEE NUMBER 40

45. OTHER USE WEAR PRESENT
1. YES
2. NO
3. CANNOT DETERMINE

46. TYPE OF WEAR
1. ROUNDED EDGES
2. HEAVILY ROUNDED EDGES
3. FLAKING

POOL, SANDAY: COARSE STONE/ WORN COBBLES

1	2	3	4	5	6	16	17	18	19	22	23	24	25	26	27	28	29	30	31	32	33	34
Phase	Layer	F No	Type	Mat	Sur	ML	MW	MTh	Wgt	Sh	Fac	F No	F Loc	Area	F Nat	Peck	P Loc	P Type	P Dis	Flak	F Loc	F Typ
2.2	1301	5019	9	5	1	75	45	33	138	7	2					1	1	1	3	1	1	3
2.2	1304	5072	9	1	1	59	54	40	167	4	2					1	134	1	3	2		
2.2	1324	5781	9	9	1	41	31	22	36	7	2					1	12	3	2	2		
2.2	3246	5784	9	9	1	54	40	34	103	7	2					1	1	3	2	2		
2.3	1296	5049	9	9	1	46	42	28	79	4	2					1	12	2	3	2		
2.3	2825		9	8	1	76	43	31	153	9	2					1	35	3	2	2		
3.1	839	3593	9	1	1	84	42	36	174	21	2					1	1234	2	3	2		
3.1	952	3711	9	2	5					7	2					2				1	1	3
3.1	2627	6244	9	9	1	59	46	34	129	7	2					1	12	2	2	2		
3.1	2636	6557	9	1	1	155	60	50	666	21	2					1	1	3	2	2		
3.1	2636	6733	9	6	1	49	39	38	95	2	2					1	12	2	3	2		
3.1	2636	6809	9	1	1	195	137	115	3766	7	2					1	156	1	3	2		
3.1	2734	6467	9	1	1	92	33	15	64	21	2					1	12	3	2	2		
3.1	2777	6609	9	1	2					2	2					1	1	2	2	2		
3.1	2777	6631	9	1	2					7	2					1	1	1	2	2		
3.2	2609	6312	9	1	1	100	65	31	323	7	2					1	13	1	2	1	1	3
4.2	797	3438	9	2	1	147	66	35	489	3	2					1	1	2	2	1	12	2
4.2	2226	5511	9	1	1	110	82	82	965	7	2					1	13	1	3	2		
5.2	547	3096	9	1	1	200	86	59	1367	21	2					1	12	1	2	1	2	2
5.2	2289	5543	9	1	1	135	68	59	804	7	2					1	123	2	3	2		
6.3	747	3361	9	1	1	145	52	40	472	21	2					1	12	2	2	2		
6.4	352	2491	9	1	1	245	120	76		21	2					1	12	1	2	2		
6.4	426	4169	9	1	1	210	95	67	1835	7	2					1	12	1	3	1	1	1
6.4	457	2218	9	1	1	250	91	70	2164	7	2					1	12	2	2	2		
6.7	420	1951	9	1	1	230	113	55	2185	21	2					1	12	2	2	2		
7.2	375	1873	9	1	1	135	43	33	316	21	2					1	12	3	2	2		
8.2.1	2078	5084	9	2	1	195	63	48	866	6	2					2				1	12	1
9	2013	4563	9	4	2					2	2					1	1	2	2	2		
1.1	2886		7	1	1	49	43	18	53	3												
2.2	1323	5731	7	11																		
2.2	3208	5782	7	1	1	54	54	49	176	1												
2.3	1068	3899	7	4	2					7												

2.3	1250	4896	7	1	5																	
3.1	2627		7	1	4	43	30	24	53	7												
4.2	226	1037	7	1	2					21												
6.7	456	2338	7	1	1	126	50	36	289	21												
7.1	2282	5487	7	1	1	37	37	35	63	1												
7.2	2395	5811	7	12	2																	
0	2369	5964	7	1	1	63	34	34	109	7												
1.1	2780	6707	6	1	1	115	96	59	753	7	1	1	1	12	1	2				1	1	3
1.1	2787	6726	6	1	2					7	2	1	1	12	1	2				2		
1.2	238	1030	6	1	1	154	83	45	791	3	1	1	1	8	1	1	2	3	2	1	1	3
1.2	2469	5750	6	1	1	127	73	57	735	2	1	3	12	33	2	2				1	12	3
2.2	3258	5785	6	9	1	58	46	31	110	7	1	1	3	1	2	1	124	2	2	2		
2.3	1277	4776	6	6	1	86	74	31	289	7	1	3	123	16	1	1	45	2	2	1	2	2
3.1	812	3607	6	1	1	154	59	55	740	21	1	1	1	6	1	1	2	2	2	1	2	3
3.1	920	3709	6	1	1	160	67	49	742	2	1	1	1	3	2	1	2	1	3	2		
3.1	1273	4785	6	6	1	75	69	37	268	7	1	4	1234	22	2	2				2		
3.1	2703	6419	6	1	2					7	1	1	1	3	3	1	34	1	2	2		
4.1	2288	5560	6	1	2					21	1	1	1	1	2	2				1	1	3
6.4	352	2458	6	1	1	215	187	67	1923	7	1	3	12	8	2	1	3	2	3	1	2	1
6.4	724	2995	6	1	1	145	119	100	2235	4	1	1	1	14	2	1	2	2	2	2		
6.5	578	2885	6	1	1	205	78	61	1488	21	1	2	12	15	2	2				1	12	2
6.7	298	1843	6	1	1	152	94	53	1264	3	1	2	12	3	2	1	34	3	2	1	1	3
7.1	416	2129	6	1	1	137	72	40	603	3	1	2	12	4	3	2				1	12	1
7.1	1043	3947	6	1	1	143	65	48	651	7	1	1	1	2	3	1	2	1	2	1	1	3
7.1	2366	5483	6	1	1	116	50	43	382	21	1	2	12	5	2	2				2		
7.2	278	2456	6	1	1	227	92	66	2021	21	1	2	12	25	3	2				2		
7.2	407	1923	6	1	1	147	48	46	475	21	1	1	1	9	1	1	2	2	3	2		
7.2	448	2118	6	1	1	146	85	55	1000	7	1	1	1	4	2	2				1	2	1
7.2	2284	5372	6	1	1	107	41	29	202	21	1	1	1	2	2	1	2	3	2	2		
7.2	2284	5406	6	1	2					7	1	1	1	9	3	2				2		
8.2.2	2111	4967	6	1	1	127	60	48	572	7	1	3	12	20	2	2				1	12	1
8.2.3	204	510	6	1	1	151	84	43	815	3	1	3	12	22	3	2				1	12	2
8.2.3	279	1351	6	1	1	187	101	55	1551	3	1	2	12	17	3	2				2		
1.1	2776	6734	5	1	1	110	96	75	1087	2	2					1	13456	2	3	2		
1.1	2886	6285	5	1	2					2	2					1	156	2	3	2		
1.2	243	1013	5	1	1	170	44	30	305	21	2					1	56	2	2			

2.2	1318	5269	5	6	1	55	46	37	137	2	2					1	1256	3	3	2		
2.2	1320	5454	5	6	1	65	60	40	237	20	2					1	56	3	2	2		
2.3	781	4014	5	8	4	100	64	41	393	7	2					1	156	3	2	2		
2.3	1049	4898	5	1	1	84	53	46	269	7	2					1	5	2	2	2		
2.3	1200	4229	5	1	1	121	79	57	709	2	2					1	456	1	3	2		
2.3	1263	4783	5	1	2					2	2					1	56	3	2	1	1	1
2.3	2827	6709	5	1	1	125	71	61	772	7	2					1	3456	1	3	2		
3.1	801	3601	5	1	2					2	2					1	1456	1	3	2		
3.1	874	3609	5	6	1	105	105	70	1064	4	2					1	1356	2	3	2		
3.1	946	4053	5	1	1	125	120	35	723	3	2					1	1	5	2	1	1	2
3.1	2627	6193	5	1	2					2	2					1	13456	2	2	2		
3.1	2636	6532	5	1	1	98	84	60	637	2	2					1	3456	2	2	2		
3.1	2636	6533	5	1	1	136	64	50	568	2	2					1	13456	1	2	2		
3.1	2636	6558	5	1	2					7	2					1	56	3	3	2		
3.1	2636	6732	5	1	1	69	55	48	234	2	2					1	56	2	3	2		
3.1	2703	6414	5	1	1	103	41	29	160	2	2					1	1256	3	3	2		
3.1	2479	5921	5	1	2					21	2					1	15	3	3	2		
3.1	2479	6258	5	1	5					7	2					1	5	2	3	2		
3.1	2735	6640	5	1	2					2	2					1	56	3	2	2		
4.1	2288	5537	5	1	1	99	60	56	463	7	2					1	23456	1	3	2		
7.1	2341	5810	5	2	1	215	79	49	1344	21	2					1	5	2	2	1	12	1
8.1	2010	4362	5	1	1	65	62	34	222	20	2					1	5	3	2	2		
1.2	213	5587	8	1	1	123	101	58	982	3	1	3	12	42	1	1	56	2	3	2		
2.3	1232	4713	8	9	1	88	54	46	304	7	1	2	1	8	1	1	25	2	3	2		
2.3	1234	4653	8	1	1	160	105	76	1800	2	1	2	12	24	2	1	56	2	2	2		
2.3	1247	4708	8	6	1	101	76	37	448	3	1	3	12	30	1	1	56	3	3	2		
2.3	1289	5045	8	6	1	100	73	52	562	7	1	2	1	12	1	1	5	2	2	2		
2.3	2853	6491	8	6	1	119	80	55	813	7	1	1	134	68	1	1	56	2	3	2		
3.1	838	3604	8	1	1	73	61	61	395	4	1	1	1	4	2	1	234	2	1	2		
3.1	853	3612	8	1	1	111	77	44	490	7	1	1	1	14	3	1	256	1	2	1	1	3
3.1	874	3611	8	1	1	125	75	64	803	7	1	2	12	38	1	1	456	1	2	1	1	3
3.1	980	4033	8	9	1	127	101	85	1745	7	1	2	12	70	2	1	3456	2	2	2		
3.1	2400	6081	8	1	1	127	82	56	851	2	1	2	12	15	1	1	2345	2	3	2		
3.1	2613	6750	8	1	1	107	40	31	194	21	1	2	12	4	2	1	5	2	2	1	12	2
3.1	2627	6261	8	1	1	78	33	31	93	21	1	2	12	2	2	1	456	3	2	1	1	3
7.2	353	2907	8	1	1	253	75	61	1781	21	1	2	12	6	3	2				1	12	3

8.2.3	204	491	8	1	2					3	1	1	1	8	2	1	56	2	2	2	
8.2.3	208	866	8	1	1	163	84	52	1050	2	1	2	1	24	1	1	256	2	3	2	
9	276	1326	8	1	1	138	66	41	508	7	1	1	1	2	3	1	2345	2	3	2	
0	0	4030	8	1	1	102	78	74	875	7	1	2	12	32	3	1	3456	2	3	2	

FLAKED COBBLES

3.1	2627	6194	4	1	1	135	127	56	941	7	2					2			1	1235	1
3.1	2703	6410	4	1	1	113	111	33	387	7	2					2			1	1234	1
6.4	675	3048	4	9	1	94	91	31	366	20	2					2			1	235	1

POOL, SANDAY: COARSE STONE/ SKAILL KNIVES

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	21
Phase	Layer	F No	Type	Mat	Sur	MOD	Plat	Outl	EM	Ret	Pos 1	Pos 2	ED	Pos ED	ML	MW	MTh	Wgt	TP:UP
1.1	2886	6705	1	2	1	1	1	2	1	2	1		12		82	74	11	72	
2.1	1216	4412	1	1	1	1	1	2	1	1			2	1	62	105	21	117	2.2
2.1	1306	5074	1	5	4	1	1	3	1	1			12		103	136	18	216	
2.1	1306	5076	1	2	1	1	1	6	1	1			1		65	70	9	31	
2.2	1241	5244	1	9	3	1	1	3	1	1			12						
2.2	1300	4976	1	1	1	1	1	1	1	1			3	5	154	174	30	784	2.3
2.2	1308	5079	1	5	1	1	1	4	1	1			12		140	155	18	392	
2.2	1308	5114	1	2	1	1	1	3	1	1			1		59	42	11	24	
2.2	1310	5362	1	1	1	1	1	5	2	1			12		88	124	16	152	
2.2	1318	5379	1	2	1	1	1	5	1	3	7	7	12		86	70	26	120	
2.2	3208	5783	1	1	1	1	1	6	1	2		2	2	1	155	155	33	800	2.4
2.3	235	5961	1	5	1	1	1	2	1	1			12		72	45	14	33	
2.3	905	4092	1	2	1	1	1	2	1	1			1		40	27	12	9	
2.3	1015	3948	1	1	1	1	1	6	2	1			3	1	92	95	18	119	2.1
2.3	1015	3949	1	2	4	1	1	6	2	1			12		66	78	13	45	
2.3	1015	3950	1	2	1	1	1	5	1	1			10	1	50	79	16	51	2.5
2.3	1015	3951	1	1	1	1	1	6	2	1			12		33	55	8	15	
2.3	1016	4002	2	1	1	1	1	3	2	1			12		95	114	20	233	
2.3	1029	3827	2	2	1	1	1	2	1	1			1		64	69	10	27	
2.3	1029	3835	1	5	1	1	1	4	1	1			12		97	43	17	59	
2.3	1029	3838	1	5	1	1	1	6	2	3	9	9	12		72	99	17	113	
2.3	1029	3952	1	5	4	1	1	5	1	1			1		36	60	14	27	
2.3	1029	3953	1	2	5	1	1	6	1	1			1						
2.3	1029	3975	1	1	1	1	1	4	3	1			3	4	74	127	10	97	5
2.3	1029	3976	1	1	4	1	1	6	2	1			12		56	60	9	30	
2.3	1046	3959	1	2	1	1	1	2	2	1			12		82	47	9	34	
2.3	1047	4066	1	1	1	1	1	3	1	1			1		50	63	15	37	
2.3	1047	4067	1	1	4	1	1	6	1	1			12		64	60	9	25	
2.3	1047	4068	1	1	1	1	1	4	2	1			12		60	68	7	25	
2.3	1130	4130	1	2	1	1	1	2	1	1			4	4	135	115	18	294	4
2.3	1130	4131	1	1	5	3	3	7	4	1			12						
2.3	1130	4132	1	2	1	1	1	5	2	1			1		33	53	10	13	

2.3	1197	4251	2	2	1	1	1	2	1	1			1		37	39	8	13	
2.3	1200	4365	1	1	1	1	1	3	2	1			1		71	74	14	68	
2.3	1200	4366	1	2	5	1	1	2	1	1			12						
2.3	1217	4413	1	2	1	1	1	3	2	1			1		55	76	10	37	
2.3	1218	4542	1	1	1	1	1	6	2	1			12		83	94	15	113	
2.3	1218	4543	1	2	1	1	1	2	1	1			12		69	54	7	17	
2.3	1219	4460	1	1	1	1	1	2	2	1			12		59	86	13	48	
2.3	1219	4461	1	5	1	1	1	5	1	1			12		142	79	18	100	
2.3	1230	4596	2	2	4	1	1	2	1	1			12		88	105	13	87	
2.3	1231	4875	1	1	1	1	1	3	2	1			12		43	72	11	32	
2.3	1257	4709	1	2	1	1	1	2	1	1			12		50	83	13	46	
2.3	1263	4784	1	1	1	1	1	3	1	1			12		67	77	14	59	
2.3	1278	4778	1	2	1	1	1	2	2	1			12		63	50	10	22	
2.3	1286	4922	1	1	1	1	1	3	1	1			3	1	90	124	14	109	2
2.3	1294	4900	1	2	1	1	1	6	1	1			12		66	88	14	67	
2.3	1294	4901	1	1	1	1	1	3	2	1			12		89	142	24	281	
2.3	1294	4916	1	5	1	1	1	6	1	1			12		111	149	29	480	
2.3	1298	5111	1	5	1	1	1	6	2	1			6	1	143	180	43	1171	3.4
2.3	1298	5112	1	1	5	1	1	6	2	1			12						
2.3	1411	4506	1	1	1	1	1	5	2	1			2	1	88	94	15	107	2.6
2.3	1566	4996	1	1	1	1	1	1	1	3	9	9	12		133	108	37	577	
2.3	1840	5054	1	2	1	1	1	6	2	1			12		43	91	10	29	
2.3	1840	5055	1	5	1	1	1	3	1	1			12		47	64	7	14	
2.3	1852	4507	1	1	1	1	1	6	2	1			12		77	71	20	87	
2.3	1919	4504	1	2	1	1	1	3	1	1			12		56	54	12	29	
2.3	2478	5897	1	1	1	1	1	6	2	1			12		80	86	16	109	
2.3	2478	6158	1	5	4	1	1	2	1	1			12		59	58	8	25	
2.3	2836	6805	2	1	1	1	1	2	1	3	5	5	12		135	111	20	335	
2.3	3025	4508	1	1	5	1	1	1	1	3	9	9	12						
3.1	721	3672	1	5	1	1	1	2	1	2	7		12		77	85	16	108	
3.1	801	3507	1	1	1	1	1	2	1	1			12		113	87	36	211	
3.1	851	3603	1	5	1	1	1	2	1	1			12		150	100	33	355	
3.1	851	3608	1	5	4	1	1	2	1	1			12		58	75	12	34	
3.1	851	3832	1	5	1	1	1	4	2	1			1		50	64	9	21	
3.1	866	3908	1	1	1	1	1	4	1	1			3	6	160	90	36	413	2.6
3.1	866	3910	1	1	1	1	1	3	1	1			12		39	67	10	21	

3.1	866	3911	1	1	4	1	1	2	4	1	12		54	65	9	22		
3.1	866	3912	2	2	5	3	3	7	4	1	1							
3.1	874	3756	1	2	1	1	1	6	2	1	12		50	69	9	30		
3.1	894	3770	1	1	4	1	1	5	1	1	12		71	81	13	54		
3.1	894	3771	1	2	1	1	1	2	2	1	1		71	97	13	62		
3.1	894	3904	1	1	4	1	1	3	1	1	12		57	89	13	54		
3.1	898	3606	1	1	1	1	1	6	1	1	3	1	137	70	30	401	8.7	
3.1	906	3901	1	2	1	1	1	6	1	1	3	1	99	103	21	193	7.6	
3.1	906	3902	1	2	2	1	1	7	4	1	12							
3.1	906	3903	2	1	1	4	2	4	1	1	1		123	47	19	97		
3.1	925	4043	1	1	1	1	1	2	1	1	12		49	53	9	20		
3.1	934	3719	1	1	1	1	1	4	1	1	3	1	71	91	16	77	3	
3.1	934	3720	2	1	1	1	1	3	1	1	4	7	115	95	28	299	1.7	
3.1	934	3906	1	1	1	1	1	6	2	1	3	1	80	128	14	134	4.1	
3.1	934	3907	1	1	1	1	1	6	2	1	12		72	124	17	125		
3.1	935	3733	1	1	1	1	1	6	1	1	3	1	72	75	10	49	2.8	
3.1	935	3757	1	1	1	1	1	6	2	1	1		74	94	13	76		
3.1	942	3583	1	1	1	1	1	5	2	1	12		132	82	18	191		
3.1	946	4045	1	1	1	1	1	6	1	1	3	1	123	82	20	193	4.6	
3.1	953	3783	1	1	1	1	1	6	1	1	1		72	34	11	23		
3.1	980	3845	1	1	1	1	1	2	1	1	1		56	51	8	19		
3.1	981	3787	1	5	1	1	1	6	2	1	12		68	71	10	34		
3.1	1056	4005	2	1	1	1	1	6	2	1	1		142	97	28	295		
3.1	1097	4097	1	2	1	1	1	3	2	1	1		53	78	11	30		
3.1	1097	4098	1	2	3	1	1	2	4	1	12							
3.1	1097	4099	1	1	1	1	1	6	2	1	12		84	110	15	121		
3.1	1097	4100	2	1	4	1	1	3	1	1	3	5	54	112	13	47	3	
3.1	1097	4101	1	1	2	3	3	7	4	1	1							
3.1	1097	4102	1	2	1	1	1	6	1	1	3	5	81	74	12	67	2.8	
3.1	1097	4103	2	1	1	1	1	4	1	1	12		51	51	11	18		
3.1	1097	4104	1	1	1	1	1	3	1	1	12		32	45	7	8		
3.1	1097	4105	2	2	1	1	1	4	2	1	1		52	138	12	59		
3.1	1100	4114	1	1	1	4	1	6	2	1	12		42	73	10	23		
3.1	1100	4115	1	5	1	1	1	6	2	1	12		66	36	14	29		
3.1	2479	5922	2	1	4	2	2	4	1	1	12		165	66	15	125		
3.1	2479	5923	1	2	1	1	1	4	2	1	9	7	55	88	12	54	1.8	

3.1	2479	5924	2	2	4	1	1	2	4	1		12		74	46	9	28	
3.1	2479	5925	1	1	1	1	1	6	2	1		3	7	84	108	11	82	2.3
3.1	2479	5926	1	2	1	1	1	6	2	1		4	7	111	137	22	227	1.8
3.1	2479	5927	1	2	4	1	1	1	2	1		1		48	69	7	23	
3.1	2479	5927	1	5	1	1	1	2	2	1		12		76	60	17	62	
3.1	2479	5928	1	1	4	1	1	2	1	1		2	1	42	63	18	36	2.7
3.1	2479	5930	1	5	1	1	1	2	1	1		12		73	99	14	101	
3.1	2479	5954	1	2	4	1	1	2	1	1		12		57	73	9	27	
3.1	2479	5955	2	2	1	1	2	4	1	1		1		55	58	9	27	
3.1	2479	5977	1	1	1	1	1	3	1	1		1		78	83	18	94	
3.1	2479	5978	1	1	1	1	1	3	1	1		12		58	88	15	79	
3.1	2479	5979	2	2	1	1	1	6	1	1		12		82	81	15	71	
3.1	2479	6020	1	2	4	1	1	6	1	1		12		62	77	9	26	
3.1	2479	6021	1	2	1	1	1	2	2	1		1		70	57	12	39	
3.1	2479	6022	1	2	4	1	1	6	1	1		12		93	72	12	58	
3.1	2479	6023	1	2	1	1	1	1	1	1		9	1	109	112	97	199	2.1
3.1	2479	6024	1	2	4	1	1	2	1	1		2	2	80	45	10	26	8.2
3.1	2479	6025	1	1	1	1	1	3	1	1		4	1	74	86	15	87	3.1
3.1	2479	6026	1	1	4	1	1	2	2	1		9	7	88	92	14	68	1.7
3.1	2479	6737	1	2	1	1	1	2	1	1		1		60	30	6	9	
3.1	2479	6738	2	5	1	1	1	2	1	1		12		58	94	12	51	
3.1	2479	6739	1	1	1	1	1	6	2	1		12		60	57	15	42	
3.1	2479	6741	1	1	1	1	1	5	2	2	7	12		98	115	21	293	
3.1	2479	6742	1	2	4	1	1	1	2	1		12		63	58	12	37	
3.1	2479	6743	1	1	1	1	1	3	1	1		12		77	90	14	95	
3.1	2479	6744	2	1	1	1	1	2	1	1		1		88	65	15	70	
3.1	2506	6028	1	1	1	1	1	4	1	1		12		71	101	20	118	
3.1	2506	6029	1	1	1	1	1	6	2	1		12		80	102	15	115	
3.1	2506	6030	1	1	1	1	1	1	2	1		4	1	63	103	13	82	3
3.1	2506	6031	1	1	1	1	1	3	2	1		3	1	65	73	15	61	2.7
3.1	2506	6032	1	5	4	1	1	6	2	1		12		79	114	15	110	
3.1	2506	6033	1	1	1	1	1	2	1	2	5	12		88	78	23	176	
3.1	2506	6034	2	1	1	1	1	5	2	1		4	3	124	101	20	225	3.7
3.1	2506	6035	1	1	1	1	1	6	2	1		1		67	144	15	113	
3.1	2506	6036	1	2	1	1	1	3	1	1		1	7	72	72	13	60	
3.1	2506	6037	1	2	1	1	1	2	1	1		3	6	84	115	14	131	2.4

3.1	2506	6038	2	1	1	1	1	3	1	1			1		47	47	14	27	
3.1	2506	6039	1	1	1	1	1	6	2	1			1		63	79	15	67	
3.1	2506	6040	1	2	1	1	1	5	2	1			12		64	73	13	53	
3.1	2506	6041	1	2	4	1	1	6	4	1			12		76	73	10	46	
3.1	2506	6745	1	1	1	1	1	6	2	1			12		73	84	16	86	
3.1	2506	6746	2	2	1	1	1	5	2	1			12		67	98	10	69	
3.1	2611	6060	1	2	1	1	1	4	1	1			12		45	55	7	12	
3.1	2612	6263	1	1	1	1	1	6	1	1			12		71	119	19	137	
3.1	2612	6264	2	1	1	1	1	6	1	1			1		70	59	19	52	
3.1	2612	6265	2	1	1	1	1	2	1	1			12		125	160	20	421	
3.1	2612	6266	1	1	1	1	1	2	1	2	3		12		129	148	21	317	
3.1	2612	6748	1	2	1	1	1	3	1	1			4	1	56	93	16	79	3.3
3.1	2612	6749	1	1	1	1	1	6	2	1			12		95	141	18	240	
3.1	2613	6062	1	2	1	1	1	5	1	1			3	1	67	79	8	40	2.1
3.1	2613	6063	1	1	4	1	1	6	2	1			12		72	58	10	40	
3.1	2613	6064	1	1	1	1	1	6	1	1			12		75	75	15	75	
3.1	2613	6159	1	2	4	1	1	6	2	1			12		48	62	9	23	
3.1	2613	6751	1	1	1	1	1	6	2	1			12		62	65	14	45	
3.1	2613	6752	2	1	3	1	1	2	1	1			1						
3.1	2616	6753	1	2	1	1	1	3	1	1			12		71	84	14	75	
3.1	2616	6754	1	1	4	1	1	6	2	1			12		85	65	17	89	
3.1	2620	6256	1	1	1	1	1	6	2	3	5	5	12		64	94	15	79	
3.1	2620	6257	1	1	1	1	1	3	1	1			1		100	77	19	126	
3.1	2627	6195	1	5	1	1	1	2	1	1			12		85	117	11	81	
3.1	2627	6196	2	1	5	3	3	7	4	1			12						
3.1	2627	6197	1	1	1	1	1	1	1	3	9	9	12		96	51	13	63	
3.1	2627	6198	1	1	1	1	1	1	1	1			9	3	97	82	14	95	7
3.1	2627	6199	1	1	1	1	1	4	1	1			12		102	109	15	139	
3.1	2627	6200	2	2	1	1	1	3	1	1			1		118	174	19	350	
3.1	2627	6201	2	1	1	1	2	2	1	1			5	6	108	72	21	132	3.7
3.1	2627	6202	1	1	1	1	1	6	1	1			1		72	99	17	105	
3.1	2627	6203	1	1	1	1	1	6	2	1			1		77	75	17	72	
3.1	2627	6204	1	5	4	1	1	6	2	1			12		73	95	17	74	
3.1	2627	6205	1	2	5	1	1	2	4	1			12						
3.1	2627	6206	1	1	1	1	1	3	1	1			4	1	119	100	20	264	
3.1	2627	6207	1	1	1	1	1	1	1	1			4	2	91	116	20	268	3

3.1	2627	6245	1	2	1	1	1	4	1	1	1		98	36	10	32	
3.1	2627	6246	1	1	1	1	1	2	2	1	12		66	69	11	42	
3.1	2627	6247	1	1	5	1	1	5	1	1	12						
3.1	2627	6248	1	2	1	1	1	6	2	1	1		90	67	14	79	
3.1	2627	6249	2	2	1	1	1	4	1	1	12		142	75	16	144	
3.1	2627	6250	1	2	4	1	1	3	2	1	12		87	87	13	101	
3.1	2627	6251	1	1	5	1	1	4	6	1	4	1					
3.1	2627	6252	1	2	1	1	1	2	1	1	4	7	94	64	12	68	1.8
3.1	2627	6756	2	2	1	1	1	3	2	1	3	4	69	102	15	95	5.6
3.1	2627	6757	1	2	2	1	1	2	4	1	1						
3.1	2627	6758	1	1	1	1	1	2	2	1	12		70	53	12	47	
3.1	2627	6759	1	1	1	1	1	2	2	1	12		115	62	18	135	
3.1	2627	6760	1	5	1	1	1	6	4	1	12		101	88	19	115	
3.1	2627	6761	1	1	1	1	1	2	2	1	12		60	105	10	77	
3.1	2627	6762	1	1	1	1	1	6	2	1	12		47	63	14	31	
3.1	2627	6763	2	1	1	1	1	5	2	1	1		100	74	17	88	
3.1	2627	6764	2	1	1	1	1	3	1	1	1		95	82	15	72	
3.1	2627	6765	1	5	1	1	1	2	1	1	12		85	90	18	107	
3.1	2627	6766	2	2	1	1	1	4	1	1	4	1	106	100	14	119	4.6
3.1	2627	6767	1	1	1	1	1	5	1	1	3	1	87	108	19	174	2.6
3.1	2627	6768	2	5	5	3	3	7	4	1	12						
3.1	2627	6769	1	1	4	1	1	6	2	1	12		77	92	17	103	
3.1	2627	6771	2	1	1	1	1	2	1	1	12		58	64	8	26	
3.1	2627	6772	2	2	1	1	1	4	1	1	1		63	55	11	21	
3.1	2627	6773	1	1	1	1	1	6	1	1	3	1	83	137	15	154	3.1
3.1	2629	6774	2	5	1	1	1	6	2	1	12		83	98	14	87	
3.1	2630	6775	1	1	4	1	1	6	7	1	12		72	102	16	86	
3.1	2630	6776	1	5	1	1	1	4	1	1	12		64	104	14	74	
3.1	2630	6777	1	5	1	1	1	6	2	1	12		80	98	25	127	
3.1	2630	6778	2	1	1	1	1	2	1	1	12		63	79	18	82	
3.1	2630	6779	2	1	1	1	1	6	1	1	12		117	85	39	487	
3.1	2634	6352	1	5	1	1	1	6	2	1	1		49	64	12	31	
3.1	2634	6353	1	1	1	1	1	2	2	1	12		59	56	7	31	
3.1	2634	6354	1	5	4	1	1	3	2	1	12		67	116	13	67	
3.1	2634	6355	1	2	1	1	1	2	2	1	1		119	81	17	154	
3.1	2634	6780	1	2	5	1	1	2	2	1	12						

3.1	2634	6781	2	1	4	1	1	6	2	1	1		86	82	29	116	
3.1	2635	6208	1	2	2	3	3	7	4	1	12						
3.1	2635	6209	2	1	5	1	1	3	1	1	12						
3.1	2635	6210	1	1	1	1	1	3	1	1	12		114	114	25	300	
3.1	2635	6211	2	1	1	1	1	1	1	1	1		108	108	19	234	
3.1	2635	6212	1	5	1	1	1	2	2	1	12		81	111	22	169	
3.1	2635	6213	1	1	5	1	1	2	1	1	12						
3.1	2635	6214	1	1	1	1	1	5	1	1	4	7	65	106	14	77	3.8
3.1	2635	6215	2	2	3	1	1	2	1	1	12						
3.1	2635	6219	1	1	1	1	1	6	2	1	12		66	60	13	43	
3.1	2635	6220	1	1	4	1	1	3	2	1	3	3	73	92	18	122	9
3.1	2635	6221	1	1	1	1	1	3	2	1	12		83	84	14	105	
3.1	2635	6222	1	1	1	1	1	2	1	1	12		63	68	8	32	
3.1	2635	6223	1	2	4	1	1	6	1	1	12		61	88	13	58	
3.1	2635	6298	2	1	1	1	1	2	2	1	12		58	104	17	92	
3.1	2635	6299	1	2	1	1	1	2	2	1	1		92	47	11	49	
3.1	2635	6782	1	1	1	1	1	6	2	1	12		83	86	19	133	
3.1	2635	6783	1	1	1	1	1	6	2	1	12		50	73	7	19	
3.1	2635	6784	2	2	1	1	2	5	1	1	1		65	60	18	59	
3.1	2635	6785	1	2	5	1	1	4	4	1	12						
3.1	2636	6224	1	2	4	1	1	2	1	1	12		77	72	13	60	
3.1	2636	6225	1	1	1	1	1	3	1	1	3	3	73	98	15	97	3.6
3.1	2636	6226	1	1	1	1	1	2	1	1	1		91	86	22	140	
3.1	2636	6227	1	1	1	1	1	3	1	1	4	5	69	84	15	77	3
3.1	2636	6228	1	1	1	1	1	4	1	1	4	7	150	65	23	197	2
3.1	2636	6229	1	2	1	1	1	2	1	1	1		86	64	13	67	
3.1	2636	6230	1	1	1	1	1	3	1	1	12		76	90	15	98	
3.1	2636	6231	1	5	1	1	1	3	1	1	12		73	71	17	89	
3.1	2636	6235	1	1	1	1	1	4	1	1	12		80	100	11	70	
3.1	2636	6236	1	1	1	1	1	6	2	1	12		71	81	20	98	
3.1	2636	6237	1	2	1	1	1	6	2	1	12		79	116	22	146	
3.1	2636	6238	1	2	1	1	1	4	1	1	12		92	67	11	47	
3.1	2636	6241	2	1	1	1	1	4	1	1	12		113	89	14	142	
3.1	2636	6242	1	1	1	1	1	2	1	1	12		61	94	15	83	
3.1	2636	6243	1	1	1	1	1	2	2	1	1		82	101	18	132	
3.1	2636	6253	1	2	1	1	1	1	1	1	1		47	49	7	13	

3.1	2636	6254	1	2	1	1	1	2	2	1			9	1	56	92	8	41	1.9
3.1	2636	6255	1	2	1	1	1	2	1	1			12		64	64	9	28	
3.1	2636	6262	1	2	1	1	1	6	1	1			12		125	64	28	178	
3.1	2636	6407	1	1	1	1	1	6	2	1			12		89	128	18	153	
3.1	2636	6430	1	2	1	1	1	6	2	1			3	1	66	107	15	90	2.5
3.1	2636	6470	2	1	1	1	1	4	1	1			1		91	107	12	92	
3.1	2636	6471	1	1	1	1	1	3	1	1			12		80	97	17	114	
3.1	2636	6472	1	1	1	1	1	6	2	1			1		123	63	20	118	
3.1	2636	6514	1	1	4	1	1	4	4	1			12		99	99	17	151	
3.1	2636	6540	1	2	4	1	1	6	1	1			12		87	160	18	260	
3.1	2636	6541	2	1	1	1	2	2	1	1			12		117	64	17	153	
3.1	2636	6542	1	1	1	1	1	2	1	1			12		65	66	11	36	
3.1	2636	6543	1	2	1	1	1	3	1	1			1		92	74	16	111	
3.1	2636	6544	1	2	1	1	1	1	2	1			1		89	70	16	113	
3.1	2636	6545	1	2	1	1	1	6	1	1			1		99	120	21	255	
3.1	2636	6546	1	2	1	1	1	6	1	1			12		126	111	22	235	
3.1	2636	6547	1	2	1	1	1	1	1	1			10	9	79	111	15	139	1
3.1	2636	6548	1	2	1	1	1	6	2	1			12		86	118	13	118	
3.1	2636	6549	1	1	4	1	1	3	2	1			12		62	91	15	78	
3.1	2636	6550	1	1	4	1	1	6	1	1			12		73	110	13	85	
3.1	2636	6551	1	1	4	1	1	5	1	1			12		75	60	12	53	
3.1	2636	6559	1	1	1	1	1	3	1	1			10	1	114	150	25	384	2
3.1	2636	6560	1	2	1	1	1	1	1	1			4	7	100	65	16	96	1.4
3.1	2636	6561	1	1	1	1	1	6	2	1			3	7	87	102	14	135	1.7
3.1	2636	6562	2	1	3	1	1	2	4	1			12						
3.1	2636	6563	2	1	1	1	1	1	1	2	3		12		76	100	15	130	
3.1	2636	6564	1	2	1	1	1	6	2	1			3	1	77	95	13	80	2.9
3.1	2636	6565	1	2	4	1	1	5	1	1			12		58	85	11	42	
3.1	2636	6566	1	1	1	1	1	4	1	1			12		80	78	19	107	
3.1	2636	6567	1	2	1	1	1	6	2	3	7	7	12		118	98	29	325	
3.1	2636	6789	2	1	1	1	1	6	4	1			12		83	71	18	96	
3.1	2636	6790	1	1	3	1	1	6	1	1			12						
3.1	2636	6791	1	5	1	1	1	6	2	1			1		95	54	22	89	
3.1	2636	6792	2	2	4	1	1	2	1	1			12		155	136	18	264	
3.1	2638	6175	1	5	1	1	1	6	1	1			12		63	53	15	45	
3.1	2638	6323	1	2	1	1	1	4	1	1			1		40	56	8	19	

3.1	2638	6324	2	5	1	1	1	3	1	1			12		46	57	10	23	
3.1	2638	6325	1	1	1	1	1	2	2	1			12		48	62	7	18	
3.1	2638	6326	1	2	4	3	3	3	1	1			10	7	57	84	11	54	2.1
3.1	2645	6828	3	2	1	1	2	3	1	1			4	5	99	71	22	122	2.5
3.1	2652	6341	1	4	4	1	1	6	1	1			12		79	75	13	66	
3.1	2667	6473	1	1	1	1	1	1	1	1			4	3	100	108	21	255	3.7
3.1	2685	6603	2	4	1	1	1	6	2	1			1		146	155	22	555	
3.1	2685	6604	1	2	1	1	1	3	1	3	9	9	12		109	130	19	307	
3.1	2700	6385	1	1	1	1	1	6	2	1			9	1	115	127	28	470	2.6
3.1	2700	6386	2	2	4	1	1	1	1	1			4	3	72	94	11	68	4.4
3.1	2703	6348	1	1	2	1	1	4	4	1			12						
3.1	2703	6349	1	1	4	1	1	3	1	1			12		96	115	17	189	
3.1	2703	6350	1	1	1	1	1	3	1	1			12		81	119	20	184	
3.1	2703	6409	1	1	1	1	1	2	6	1			12		115	137	27	401	
3.1	2703	6411	2	5	1	1	1	4	1	1			12		114	99	27	184	
3.1	2703	6412	1	2	1	1	1	6	2	1			1		81	60	8	36	
3.1	2703	6413	1	1	1	1	1	2	1	1			3	1	69	88	12	71	3.1
3.1	2703	6415	1	1	1	1	1	4	2	1			12		59	71	8	35	
3.1	2703	6416	1	1	1	1	1	3	1	1			3	1	59	88	10	55	3.9
3.1	2703	6417	1	2	1	1	1	2	1	1			12		104	108	15	121	
3.1	2703	6418	1	5	1	1	1	6	2	1			3	1	85	136	18	188	3.6
3.1	2703	6436	1	2	1	1	1	5	1	1			4	5	190	75	25	337	2.6
3.1	2703	6437	1	5	1	1	1	1	1	1			12		88	93	20	162	
3.1	2703	6438	1	5	1	1	1	6	2	1			12		75	70	13	53	
3.1	2703	6439	1	5	1	1	1	6	2	1			12		85	84	18	118	
3.1	2703	6440	1	1	1	1	1	3	2	1			12		57	84	11	35	
3.1	2703	6441	2	5	1	1	1	6	2	1			12		61	69	12	37	
3.1	2703	6442	1	2	1	1	1	3	2	1			12		59	72	6	22	
3.1	2703	6443	1	2	1	1	1	1	1	1			3	1	82	140	15	172	2.2
3.1	2703	6447	2	2	4	1	1	3	2	1			12		86	98	14	84	
3.1	2703	6510	2	1	1	1	1	6	2	1			12		76	91	14	77	
3.1	2703	6511	1	1	1	1	1	4	1	1			12		145	75	28	266	
3.1	2703	6513	1	2	1	1	1	6	2	1			12		123	143	17	317	
3.1	2720	6449	1	2	1	1	1	2	1	1			2	5	44	58	7	17	2.8
3.1	2734	6468	1	1	1	1	1	3	1	1			12		55	74	14	56	
3.1	2735	6474	1	2	5	1	1	3	4	1			12						

3.1	2735	6475	1	2	1	1	1	2	1	1		12		72	93	11	63	
3.1	2735	6476	2	5	1	1	1	6	1	1		12		88	59	16	72	
3.1	2735	6477	1	5	1	1	1	6	2	1		1		90	63	17	90	
3.1	2735	6478	1	1	1	1	1	3	1	1		12		76	75	13	63	
3.1	2735	6479	1	1	1	1	1	6	2	1		12		57	66	17	49	
3.1	2735	6480	1	5	1	1	1	6	1	1		12		43	73	8	21	
3.1	2735	6481	1	1	1	1	1	3	1	1		2	1	86	99	20	174	3
3.1	2735	6570	1	1	4	1	1	6	2	1		12		82	104	14	86	
3.1	2735	6571	1	1	1	1	1	1	1	1		4	7	49	81	11	55	1.9
3.1	2735	6572	1	1	4	1	1	6	2	1		12		57	79	8	35	
3.1	2735	6573	1	1	4	1	1	3	1	1		12		88	78	17	101	
3.1	2735	6574	1	2	1	1	1	3	1	1		3	1	62	89	15	76	2
3.1	2735	6575	1	1	1	1	1	6	2	1		10	7	71	111	16	124	1.6
3.1	2735	6576	1	1	1	1	1	6	2	1		12		109	118	22	236	
3.1	2735	6577	1	1	1	1	1	5	1	1		12		70	97	14	83	
3.1	2735	6641	1	5	1	1	1	6	2	1		1	3	75	59	12	49	3.7
3.1	2735	6642	1	1	1	1	1	1	2	1		12		57	99	17	89	
3.1	2735	6643	1	1	1	1	1	6	2	1		12		83	69	17	74	
3.1	2735	6644	1	1	3	1	1	2	1	1		10	1					
3.1	2735	6645	2	5	1	1	1	2	1	1		4	1	85	77	15	88	3.4
3.1	2735	6646	1	1	4	1	1	1	1	1		12		84	52	8	29	
3.1	2735	6647	2	1	1	1	1	2	3	1		1		76	52	16	55	
3.1	2735	6648	2	1	5	1	1	6	4	1		12						
3.1	2735	6649	1	1	1	1	1	6	2	1		12		70	97	14	74	
3.1	2735	6650	1	1	1	1	1	6	2	2	1	1		97	160	24	386	
3.1	2735	6829	2	2	4	1	2	4	2	1		12		58	85	9	34	
3.1	2735	6830	1	1	1	1	1	3	1	1		10	7	70	86	17	66	1.8
3.1	2735	6831	1	1	4	1	1	6	4	1		10	5	123	109	21	228	3
3.1	2739	6512	2	5	1	1	1	6	1	1		12		76	97	16	108	
3.1	2739	6516	1	2	1	1	1	6	1	1		1		102	111	17	152	
3.1	2754	6578	1	2	1	1	1	5	1	1		1		80	73	15	78	
3.1	2769	6515	1	2	1	1	1	3	1	1		1		43	85	8	24	
3.1	2769	6553	1	1	4	1	1	4	1	1		12		79	77	10	59	
3.1	2769	6654	1	2	1	1	1	1	1	1		12		97	75	12	75	
3.1	2769	6655	2	2	1	1	1	6	2	1		12		92	100	33	302	
3.1	2769	6656	1	2	1	1	1	4	1	1		3	3	76	76	13	81	3.3

3.1	2769	6657	1	2	5	3	3	7	4	2	1		12						
3.1	2769	6658	1	2	1	1	1	2	2	1			12		71	101	25	134	
3.1	2769	6659	1	2	1	1	1	2	1	1			12		67	62	17	64	
3.1	2774	6670	1	2	1	1	1	5	1	1			4	1	86	65	13	69	10
3.1	2777	6606	1	1	4	1	1	6	2	1			9	1	62	77	17	84	4
3.1	2777	6607	2	1	1	1	1	6	2	1			12		80	110	14	96	
3.1	2777	6608	1	2	4	1	1	4	1	1			12		67	66	12	50	
3.1	2777	6660	1	2	3	1	1	3	1	1			12						
3.1	2784	6669	2	2	1	1	2	2	1	2	2		12		99	88	20	117	
3.1	2792	6808	1	1	1	1	1	6	1	3	5	7	1		108	120	33	550	
3.2	2604	6340	1	1	1	1	1	6	1	1			12		117	74	16	146	
3.2	2604	6359	1	1	1	1	1	2	1	1			4	7	76	67	17	82	1.4
3.2	2608	6102	1	5	1	1	1	1	1	1			4	7	96	127	19	255	1.7
3.2	2609	6232	1	2	1	1	1	6	1	1			4	7	110	104	16	179	1.6
3.2	2609	6233	1	5	1	1	1	6	2	1			1		58	94	23	102	
3.2	2609	6234	1	1	1	1	1	4	1	1			9	7	60	76	13	57	1.6
3.2	2609	6300	1	5	1	1	1	6	2	1			12		112	96	16	127	
3.2	2609	6301	1	2	4	1	1	6	1	1			12		70	91	11	63	
3.2	2609	6302	1	1	1	1	1	6	2	2	3		12		92	150	33	410	
3.2	2609	6303	1	1	1	1	1	3	1	1			12		72	92	13	88	
3.2	2609	6304	1	5	1	1	1	3	1	1			12		61	88	12	67	
3.2	2609	6305	1	5	1	1	1	6	2	1			12		65	105	14	87	
3.2	2609	6306	1	5	1	1	1	6	2	1			12		83	84	18	139	
3.2	2609	6307	1	5	1	1	1	3	1	1			12		68	89	13	78	
3.2	2609	6308	1	1	4	1	1	6	2	1			12		80	86	19	139	
3.2	2609	6309	1	2	1	1	1	4	1	1			12		61	50	10	24	
3.2	2609	6310	1	1	4	1	1	6	2	1			10	5	82	78	15	79	2.1
3.2	2609	6311	1	5	1	1	1	1	1	3	1	1	12		100	108	13	144	
3.2	2609	6319	1	5	1	1	1	6	2	1			12		79	119	21	137	
3.2	2609	6320	1	1	1	1	1	6	2	1			12		87	119	19	188	
3.2	2689	6314	1	2	1	1	1	1	2	1			12		79	44	10	34	
3.2	2689	6315	1	5	1	1	1	6	1	1			12		93	85	14	69	
3.2	2689	6316	1	1	1	1	1	3	1	1			2	2	41	65	9	24	3
3.2	2689	6317	1	5	5	1	1	6	1	1			12						
3.2	2689	6318	1	1	1	1	1	3	6	1			12		59	85	16	79	
3.2	2689	6322	1	2	1	1	1	6	2	1			9	1	88	107	21	186	4

3.2	2689	6552	1	1	4	1	1	4	1	1			12		85	108	15	125	
3.2	2691	6342	1	5	1	1	1	2	1	1			4	7	71	122	11	90	1.9
3.2	2692	6343	1	1	1	1	1	2	2	1			12		44	82	7	21	
3.2	2694	6347	1	2	1	1	1	2	2	1			1		49	47	9	22	
3.2	2697	6345	1	1	1	1	1	3	1	1			3	1	64	100	18	94	2
3.2	2697	6346	2	1	1	1	1	2	6	3	1	1	6	1	135	133	28	550	4.2
3.2	2702	6351	1	2	1	1	1	5	1	1			12		30	43	8	8	
4.1	2288	5959	1	5	2	3	3	7	4	1			12						
4.1	2288	5960	2	2	1	1	1	6	2	1			12		88	112	17	163	
4.1	2288	6335	1	1	1	1	1	6	2	1			4	1	127	135	20	353	2.6
4.1	2288	6357	1	1	4	1	1	6	2	1			12		81	91	18	87	
4.1	2528	5931	1	1	1	1	1	6	2	1			12		105	105	15	139	
4.1	2528	5932	1	2	1	1	1	2	1	1			3	1	91	94	12	79	2.9
4.1	2528	5933	1	1	1	1	1	6	1	1			4	7	94	70	13	65	1.6
4.1	2528	5934	1	1	1	1	1	5	2	1			12		112	74	12	86	
4.1	2528	5935	1	5	1	1	1	6	1	1			12		54	71	13	39	
4.1	2528	5936	1	1	1	1	1	3	6	1			2	7	83	64	13	73	1.4
4.1	2528	5937	2	2	1	1	1	3	1	1			1		74	74	12	62	
4.1	2528	5937	1	2	1	1	1	5	1	1			9	5	85	105	14	96	2.2
4.1	2528	5938	2	2	4	1	1	2	6	1			2	1	75	87	14	75	3.6
6.1.1	596	5956	1	1	1	1	1	4	1	1			12		47	64	9	28	
6.1.1	596	5957	2	1	1	1	1	3	1	1			4	5	82	96	13	91	1.6
6.1.1	596	5958	1	1	1	1	1	6	2	1			12		80	97	14	106	
6.1.1	2024	6260	1	5	1	1	1	4	1	1			12		71	51	13	31	
6.1.1	2296	6735	2	1	1	1	1	3	1	1			1		55	75	10	29	
6.1.1	2296	6736	1	1	1	1	1	6	2	3	7	7	12		102	162	30	558	
6.1.1	2716	6405	1	2	1	1	1	6	1	1			12		51	102	14	71	
8.2.2	2167	5083	1	1	1	1	1	6	2	2	9		12		92	111	38	398	
9	2001	4245	1	1	1	1	1	3	2	2		3	12		58	76	12	47	
9	2006	4975	1	1	4	1	1	3	2	1			2	1	114	89	25	242	2.7
	977	4021	1	1	1	1	1	3	1	3	7	9	12		190	190	42	1478	
	2450	5713	1	1	1	1	1	4	1	1			12		79	68	10	37	
	2450	5714	1	1	1	1	1	2	1	1			12		92	65	16	75	

TOFTS NESS, SANDAY: COARSE STONE ASSEMBLAGE

Introduction

The coarse stone assemblage numbers 531 pieces and is sub-divided into five main groups:

Skaill knives: these are flakes from beach cobbles which have been detached by throwing the parent cobble against an anvil. The resultant flake normally has a characteristic crushed scar on the proximal end.

Worn cobbles: these are cobbles which have required no modification to the original shape prior to use. They are distinguished through the presence of wear traces, the location and type of which have been used to define sub-types.

Flaked blanks: these are cobbles or blocks of stone which have been modified prior to use, usually through flaking, in order to produce distinctive tool shapes. They include bifacially flaked cobbles, flaked sandstone bars and ard points.

Stone discs: these are flat slabs which have been chipped around the edges to shape them into a disc.

Miscellaneous: these include ground stone axes; a "grinder" similar to that from the Knap of Howar; and stone mortars.

Each group and artefact type will be examined separately below and then all the information will be combined in an examination of context and phase.

Skaill Knives T=189

The skaill knives are present throughout phases 1 to 6 but over half of these flakes occur in phases 1 and 2. The most informative analysis comes from a comparison of the physical attributes of the flakes between phases though there are some problems of interpretation associated with the relatively small numbers of flakes in particular categories.

Raw Materials

The majority of the flakes are made on the local sandstones which can be sub-divided into two main categories of grey micaceous sandstone (43%) and black micaceous sandstone (48%). A further 6% were too abraded or burnt to distinguish. Other material types occur in very small quantities and include quartzite and amphibolite. Throughout the phases there is a subtle differentiation in the selection of grey and black sandstones: in phase 1 and 2 just over half of the flakes were made on grey sandstone whilst those from phases 4 and 6 include only 20-30% made on grey sandstone.

Size and Shape

By weight the complete flakes range from 10g to 613g although over 80% of the total weigh less than 160g. The smaller flakes tend to be most numerous in phases 1, 2 and 3 from which an average of 67% weigh less than 80g whilst from phases 4 and 6 only about one third of the flakes are in this weight category. There is also a trend for more flakes to occur in larger weight categories in these later phases. In shape the skaill knife is a flake which tends to be broader than long thus providing a long working edge which is located opposite the thicker proximal end. The majority of the flakes do conform to this

shape although those from later phases tend to be rather more elongated. This was tested against material type and it was found that it was those flakes made on black sandstone which tended to be longer than broad, thus the different shape patterns identified between the phases may be accounted for by the greater use of black sandstone in later phases. It is possible that the physical structure of the black sandstone may cause either a different cobble shape to be produced to those of grey sandstone and thus the possibilities for different flake shapes, or that the material itself flakes in a different manner to grey sandstone and produces more elongated shapes.

Retouched Flakes

Thirteen of the flakes have been retouched around the edge prior to use. In most cases this retouch is quite random in nature, serving either to thin or steepen parts of the original flake edge (4142, 3151). It is also possible that the retouch may actually be reflaking in order to sharpen the edge which has been dulled through use though this was difficult to observe. More specific types of retouch are seen on (5486 and 2704) where bifacial flaking around the distal end and sides have not only altered the original edge angle but have also caused alteration in the flake outline plan giving them a more angled outline. This particular type of retouch is seen on other flakes from the sites of Skara Brae and Links of Noltland

.

In shape these flakes are similar to the rest of the assemblage but by weight none are less than 80g (the most common flake weight category) and half of the flakes which weigh over 200g have been retouched. There is thus a tendency for the selection of larger flakes for retouching.

Wear/Edge damage

Only 23% of the flakes were identified as having some form of macroscopic edge damage. This wear comprises mainly the dulling of an edge, sometimes with associated flaking, and in a few cases there are flakes with areas of polishing and striations on parts of the edge. None of the pieces appear to have been heavily worn and the most common type of edge damage was for light unifacial or bifacial flaking. The wear is most commonly located on the distal edge (in general the location of the finest edge angle) and on one or both faces.

No distinctive types of wear were associated with particular flake shape or size categories and neither was the presence of wear confined to any phase.

Discussion

Skaill knives are tools which are quickly and easily produced (Petrie 1867) and which require little further modification prior to use. The function of these flakes has not been fully examined but an experimental study of their use in butchery practices suggests that they are ideal tools for such work (Clarke 1990). These flakes are most numerous in the midden deposits of Grooved Ware domestic sites eg Skara Brae, Links of Noltland, and Pool as well as Tofts Ness. The presence of Skaill knives from the bronze age and iron age deposits at Tofts Ness is of interest although they have also been found in quantity on the early iron age siteon the Calf of Eday and two Skaill knives areassociated with iron age deposits from Pierowall Quarry. At Tofts Ness there do appear to be differences in the selection of size and materials for these flakes between the neolithic and later phases and this may suggest that the functions to which the Skaill knives were put may have changed through time.

Stone discs (T=14)

The stone discs come from all phase of the site. Eight are made on shale and the rest are of finely bedded micaceous sandstone, one of which has pebble cortex on one face. The use of shale predominates in phase 6.

Five of the pieces are large fragments and could not be measured, but of the rest, the sandstone discs range from 84mm to 138mm in diameter and the shale discs from 130mm to 225mm in diameter. Allof the discs have been bifacially chipped and the size range of the thickness (11mm to 30mm) is constant throughout the phases.

Only two of the discs have evidence for burning and this is on the larger discs from phase 6 and follows the pattern of burnt edges on one or both faces.

When these discs are compared in material, manufacture and size to those from Pool then they are most similar to those which have been identified from the neolithic deposits.

Worn cobbles (T=152)

The assemblage of worn cobble tools is large and rather diverse in nature. In order to avoid too many narrow categories of wear which may not be meaningful and which are also difficult to assess, the wear patterns have been divided into four broad groupings according to type and location of wear:

A. Facially pecked cobbles: Those cobbles with pecking on one or both faces.

B. Facially pecked and faceted: Those cobbles with pecking on one or both faces and faceted wear on one or both ends and/ or sides.

C. Faceted cobbles: Those cobbles with faceted wear on one or both ends and/ or sides.

D. Plain cobbles: Those cobbles with more random types and location of wear.

Within each of these categories there are broad distinctionsbetween shape, size, material and extent of wear. These will be examined below.

A. Facially pecked cobbles (T=21)

The majority of these are made on sandstone (t=13) and the rest are of quartz or quartzite. By weight the cobbles range from 103g to 886g, whilst by shape there is a tendency for the selection of either elongated oval cobbles which are all heavier than 530g (1288) or for flattish sub-circular cobbles all of which are less than 550g (2198). The latter shape category includes most of the quartz and quartzite cobbles.

In general, the areas of pecking on the faces are quite lightly worn but in plan this pecking varies from a spread through to circular or linear indentations. The pecking also varies in depth and this variety of wear patterns is evident even on individual cobbles (2564, 3159). The pecked areas tend to occur in single discrete locations on one or both faces, but on four examples there are two discretely pecked areas on one face (3159). In addition to the wear on the faces, four of the cobbles have light pecking on the ends or around parts of the perimeter (2198).

These cobble tools are present in quantity in phases 1 to 3 and in particular all those which were made of quartz and quartzite occur in phases 1 and 2. The original cobble shape also appears to have been a selection factor as the rounder cobbles, more often than not of quartz, are dominant in phases 1 and 2 whilst the elongated sandstone cobbles occur mainly in phases 3, 4 and 6 and 7.

B. Facially pecked and faceted cobbles (T=37)

The majority of these are made on sandstone (t=27) and the rest are of quartz or quartzite. By weight the cobbles range from 100g to 1348g but, barring two large cobbles from phase 3 all of the cobbles from phases 1 to 5 are less than 672g whilst those from phase 6 are all heavier than 637g. The shape categories are more diverse than in type A and the cobbles also tend to be broader and thicker. The areas of pecking on the faces appear in some cases to be quite heavily worn and are as diverse in plan as those of type A. There are, however, more pieces with double areas of pecking (t=16) on one or both faces (1177, 1174).

The wear present on the ends or sides of the cobbles is again very diverse in character and varies from heavily pecked irregular facets through to single facets which are flat or curved and even double facets on one end which form a ridge (1177, 3709). One piece (2434) has a lightly curved facet on one end whilst the opposite end has three areas of faceting which are not continuous. In phases 1 and 2 this faceting is located on one end only whilst in later phases there is a greater tendency for both ends or an end and a side to have been worn. Only four cobbles have additional heavy flaking from the abraded end and these are all from phase 6.

These cobble tools are present throughout phases 1 to 6 but certain differences between phases may be noted. First, quartz and quartzite are present mainly in phases 1 to 4 (t=8) and, as in type A, the use of sub-circular cobbles is more common to the earlier phases. As noted above, apart from two large cobbles in earlier phases, those from phase 6 are consistently heavier than the rest. Similarly, the areas of facial pecking tend to be more heavily worn in the latest phase.

C. Faceted cobbles (T=47)

The majority of these cobbles are of sandstone (t=34) and there are also quartz and quartzite (t=10), granite (t=2) and one cobble of amphibolite. By weight they range from 60g to 3132g and, whilst those cobbles from phases 3 and 4 are amongst the smallest and largest, those from phases 6 and 7 cluster in the medium weight range (400g to 1100g). In shape the majority of the cobbles tend to be longer than broad although a few cobbles of a rounder shape are present. The characteristics of the faceting are similar to those in type B, although there is a greater number of cobbles which have additional heavy flaking from the abraded ends (t=11). and these are amongst the largest cobbles (5755). The wear is more commonly confined to a single end only (2859, 4797) and this is particularly apparent in phases 6 and 7. Only one piece exhibits extensive wear with broad ridged facets extending around the sides of the piece (4916).

These cobble tools are only present in phase 3, 4 6 and 7. The majority (t=29) occur in phases 6 and 7 and are differentiated by size and wear patterns from those of the earlier phases.

D. Plain cobbles (T=47)

The majority of these cobble tools are made on sandstone (T=27) whilst quartz and quartzite are present in small quantities in phases 1 to 5. These cobbles are characterised by pecked areas and/ or flaking on the ends and/ or sides which is random in nature and is not localised enough to form discrete wear patterns. By weight they range from 33g to 1899g although just over half weigh less than 500g. The shapes of the cobbles are also

quite diverse. These tools are present throughout phases 1 to 7 and there is no immediate pattern of weight or shape between phases.

There are an additional nine pieces which are flakes from hammerstones. These were most probably detached through use as all the proximal ends have evidence of faceting which has been truncated by the flaking. Four of these flakes are of sandstone,three are of quartzite and two are of quartz and they occur in phases 2, 3, 4 and 6 although they are most numerous in the latter two phases. One flake (2180) appears to have been re-used as a skaill knife as there is light unifacial flaking around the distal edge.

A further 25 cobbles were collected on site and these show no signs of having been utilised. They are present from all phases and range from small pebbles of jasper to larger cobbles of andstone.

Discussion

From the above examination of wear patterns on the cobble tools it is apparent that, although four broad groupings can be observed, there is a reasonable amount of variation within each type. Such variability may be evident for three main reasons:
First, it is not clear from the evidence at which stage in its use cycle the tool is at. Thus a cobble which is extensively worn and which may exhibit developed ridged faceting and twin areas of pecking on one face may have had a similar function to one which has only the beginnings of a facet being produced on one end. Here, it is interesting to note that those pieces with with twin areas of pecking on a face more often than not also have abraded ends. Likewise the patterns of linear and round facial pecking may just be developed forms of the more random pecking which can be observed on other cobbles or even on another part of the same cobble. Also, many of the tools classified as plain hammerstones may simply be undeveloped forms of types A to C. A second reason for such variation will be the original shape of the cobble where, for example, an end that is broadly curved will probably exhibit more extensive abrasion than an end which is more isolated. Different materials too will also determine the wear patterns: a quartz cobble is more likely to exibit a smooth facet because of its physical structure whereas a more coarsely grained sandstone is likely to have more irregular wear patterns. Finally the variation within the type groups may also be attributed to different functions which may be as diverse as stone knapping and grinding.

Given the problems of assessing wear patterns it is still possible to observe differences between the phases by other means and this may also help to elucidate function. For this an assumption is made that the original choice of the cobble blanks was made on the basis of the type of work to be done, and that the variables of material, shape and size (all of which are measurable) are important factors which contribute to the selection process. These three variables are summarised from the evidence presented above. Over 72% of the cobble tools are made on sandstone whilst those of quartz and quartzite account for over 20% of the rest. Although through all phases the use of sandstone dominates, the quartz and quartzite cobbles are more commonly used in phases 1and 2 (40%) and 3 and 4 (27%) (cf. 13% in phase 6 and 7). These quartz cobbles are also amongst the smallest of all the tool types and tend to be of a round shape. The sandstone cobbles have a much larger size range and are more diverse in shape, being round to oval and elongated oval in plan. When lengths of the complete cobbles are planned it is apparent that there are size selection processes by phase. Thus in phases 1 to 4 the majority are less than 100mm long

and there is also asignificant number of cobbles greater than 180mm in length. This pattern is reversed for phase 6 and 7 where the majority cluster between 100mm and 180mm in length. By tool type there are also broad differences between phases where types A and B are more common in phases 1 to 4 and type C occurs only in phases 3 and 4 and 6 and 7. However, when the context of each type is examined it can be seen that not only are there differences of wear patterns between phases but that the selection requirements for the original cobbles also change. The function of these tool types is difficult to assess.
Very little experimental replicative work has been carried out on the identification of the wear patterns produced through different tasks although it should be noted that forms of facial pecking and faceting similar to those cobbles from the earlier phases are common to cobbles which were used for bipolar knapping (Callahan 1987). The use of larger cobbles in the later phases mitigates against their use as knapping tools although there real function is not known.

Flaked Blanks
The flaked blanks comprise three distinct categories: bifacially flaked cobbles; flaked sandstone bars; and ard points. Each group is examined separately below.

Bifacially flaked cobbles (T=33)
These are cobbles which have been flaked bifacially around part of the circumference prior to use. They may be subdivided into two groups on the basis of the original shape of the blank.

Group A:
This is the largest group, comprising 26 of the flaked cobbles.The majority of these tools are made on sandstone but there are eight of quartz and quartzite. They form a discrete group as regards shape and size as they are a flat round to flat oval in shape and by weight the majority (t=20) cluster between 300g and 600g. By size the majority (t=18) cluster between 80mm to 115mm long and 75mm to 100mm wide.

On all the cobbles the circumference has been flaked bifacially in order to create a more acute edge angle. There are, however, differences within this group in the amount of flaked edge and also the extent of flaking over the faces. In four cases the primary cortex of the cobble has been completely removed from one face by flaking from around the entire circumference; whilst the opposite face has just been flaked from the edge (5487). The rest of the cobbles have had from one quarter to four-fifths of the circumference flaked and on over half of these pieces the flaking from the edge has removed up to half of the cortex from one or both faces (1178, 5387). There is a discrete sub-group of eight pieces in which the bifacial flaking is confined to the edge and does not extend over the face of the cobbles. In most of these cases the edge flaking is restricted to up to half of the total circumference and is located along the "longest" side (5650, 5644).

In most cases the flaked edge appears to have been subsequently worn through use leaving traces of use-wear. This wear varies from a light rounding and abrasion of the flaked edge (5487,1178) to heavy faceting which has presumably destroyed the original edge angle (5644, 5650). In some cases, the use to which the cobble was put may have caused some unintentional flaking from the edges but there are very few cases where the abrasion is actually truncated by flaking and it is most common for the abrasion to occur over the

original flake scars. Two of the flaked cobbles also exhibit areas of pecking on one or both faces similar in nature to the facial pecking of the group A cobble tools (1542).

Group B.
Six of these flaked cobbles are made on sandstone and one is of quartz. Two are elongated oval cobbles and the rest are broad, flattish pieces which are the largest of all the flaked cobbles (four weigh over 1000g). The two oval cobbles have simply had one flake removed from either face at one end and this modified edge does not appear to have been used. The other five cobbles have been flaked bifacially from one or both ends (4804, 5434) and, as in group A, there is additional rounding and abrasion on the flaked edge. Two pieces also have a discrete spread area of pecking on one face (5434).

Discussion
These tools are present in phases 1 to 6 but are most numerous and standard in shape and size in phases 3 and 4. Their function is obscure but undoubtedly the need for a suitable flaked edge on a cobble was of importance. As yet there are very few comparable artefacts from other sites although four bifacially flaked cobbles were found during excavations at Skaill.

Flaked stone bars (T=68)
The flaked sandstone bars are blocks of sandstone which have been flaked to form a long sub-rectangular shape. Two main types of parent block have been used: cobble blanks and tabular blanks and there were an additional three pieces for which the parent blank could not be identified.

A: Cobble blanks (t= 22)
These are flaked bars of which the original blank is either along flake from a sandstone cobble, a split cobble or a whole cobble. The blank is then flaked bifacially around the edges to outline the shape. In some cases the blank has been thinned with additional flaking on the cortical face and this may remove most of the cortical surface. In two cases, a complete cobble has been flaked around the edges to shape, and as these were already flat in cross-section they did not have to be split. Seven of the flaked bars are made on black micaceous sandstone and the rest are of grey micaceous sandstone.

There are only eight complete pieces and these range from 160mm to 270 mm with one being 410mm long. In width the majority are between 80mm to 100mm and none are less than 50mm wide. In most cases the cross-section is asymmetrical in shape with one side always being thicker than that of the opposite edge. In shape they are sub-rectangular to a tapering rectangle and most are between 2 to 3 times longer than wide. Pecking is present on only one piece and this is down both sides and quite heavy. The majority are between 20mm to 40mm thick. The morphology of the ends varies in character but is most commonly squared or gently curved and often has an asymmetrical plan.

Eight of the tools have evidence for some form of use wear. Thisis generally in the form of rounding of the edges and is located particularly on an end and/ or down one side. Three of these pieces also exhibit areas of smoothing and striations on one face at the worn end and one piece also appears to have been flaked through use from one end. Four pieces, two of which also have use wear, have distinctive discrete areas of rounding and polishing on opposite sides located towards the middle of the piece. On one piece the breakage has

truncated this wear and on another piece, which is of a spatulate shape, the wear coincides with the narrowest point. This suggests that these areas of smoothing were produced by some form of hafting.

B: Tabular blanks (T=43)
The parent block used for these is a natural tabular cobble of laminated material. These already have flat cross-sections and in general all that is needed is to flake around the edges to shape the piece. The majority (T=37) exhibit cortical material on both faces and the remainder have cortex left on only one face. There are nine complete bars and these cluster between 230mm and 270mm long with two pieces up to 330mm in length. They are thus longer than the group A tools and even the broken fragments cluster in a higher length range than those of type A. They are also wider than group A with the majority being between 90mm and 120mm wide. Just over half have an asymmetrical cross-section and in some cases the thicker opposite edge has been created by leaving the natural flat edge of the slab unflaked. They are rectangular to a tapering rectangle in shape and most are 2 to 3 times longer than wide. The thickness range of 20mm to 40mm is the same as that for the group A tools.

Only seven pieces have evidence for use wear and this is generally located at one end causing rounding of the flaked edge and sometimes areas of smoothing and striations on one face.When the wear does occur down the sides it is generally confined to one side in particular.

Discussion
The flaked sandstone bars occur in phases 2 to 6 but are particularly numerous in phases 3 and 4. Between these two phases there is a definite contrast of the occurrence of types with those bars made on split pebbles dominating in phase 3 and those made on laminated materials being dominant in phase 4 though some of these are associated with wall deposits which may suggest an earlier use. This contrast between tool form in the middle phases at Tofts Ness may suggest either a different function for each type or else a change in the material extraction strategies between phases. The function of these tools is obscure as no experimental replicative work has been done but they are normally associated with the presence of ard points eg at Kebister and Scord of Brouster on Shetland and Skaill and Calf of Eday, Orkney and it is probable that they are linked to arable practices.

Ard points (T=26)
Ard points are a distinctive class of artefact the characteristics and function of which are well documented by Sian Rees (1979, 1986). Those from Tofts Ness conform to the general type and a summary of their main features (following Rees 1979) is given below.

All of the tools are made on micaceous sandstones and these are mainly grey sandstones, although some fine black sandstones were selected. On nine of the pieces there is remnant cortical material on one or both faces indicating the selection of naturally worn slabs of sandstone for at least some of the blanks. Only six of these tools are complete and the rest are broken laterally with 19 working ends and one butt end surviving. The cross-section of the tools ranges from almost round through to a flat oval and this latter shape category includes most of those pieces which were made on sandstone slabs. The complete points range in length from 175mm to 355mm and all have one pointed or rounded working end whilst the butt end is roughly flaked and varies in shape from tapering (4843) to squared

(5003) or rounded. The morphology of the broken working ends is mainly pointed (5478, 1444) though in three cases the end is gently rounded and these are amongst the pieces with the flattest cross-section (5567). Two pieces are of interest. Here, the worn working end and parts of one face appear to have been reflaked to form a squared end (5478). This suggests that the tool may have been reworked in order to form the worn working end into a squared butt end for replacement in the ard.

Two of the tools exhibit no wear on the pointed end and these may be considered as roughouts. One of these (1577) exhibits heavy pecking on the sides and on one face at the end and its location suggests that not only may the tools have been pecked to roughen the stone for fixing in the mortise but that also the pecking functioned to reduce the flake scars and uneven surface overother parts of the tool thereby strengthening the tool.

The rest of the tools have been worn to varying degrees and in most cases they exhibit the classic worn upper face and U-shaped wear at the tip on the lower face (4843, 5567). On five pieces there is evidence for repecking on an already worn face suggesting that they had been turned when the original tip became less functional (1444, 5478).

The ard points occur in phases 3 to 7 although the majority (t=16) come from phase 4. The majority (t=14) come from rubble and wall contexts and again these are mainly in phase 4 and there is one that has been reused for a drain lining in phase 4/6. The only stratified tool from phase 6 is actually the most questionable ard point, it being very flat in cross-section with unclassical wear marks. It may indeed be a flaked sandstone bar.Only eight ard points come from stratified layers suggesting that the main use of these tools was during phases 3 and 4.

Miscellaneous Artefacts

There are a further 15 objects which include 6 polished axes or fragments of polished stone, one piece of edge-ground sandstone,one possible roughout for a polished artefact, one grinder similar to that from the Knap of Howar, three mortars/ hollowed stones, one notched flagstone, one "smoothing" stone and one belemnite fossil.

Of the three axes, two are made from black micaceous sandstone and one is of an as yet unidentified green stone. The latter from phase 2 (3740) is a particularly fine miniature axe with a triangular plan. The other two axes are more rectangular in plan and larger (2046 phase 7, 2373 phase 1). In addition two small flakes from polished axes of black micaceous sandstone were found from phase 4 (5241, 5667). A mace-head fragment was recovered from a cleaning layer in phase 6 (4470) whilst another partially worked amphibolite cobble from phase 1 (2292) may be a roughout for a mace-head or perforated object.

From phase 6.4 there is an abraded piece of sandstone on which one end has been ground smooth on both faces to form a distinctive edge (3021). Of interest from phase 2 is a fragment of a domed cobble with a flat base which is very similar to those 'grinders' identified from Knap of Howar (Ritchie 1983, pp). Of the three hollowed stones the one from phase 2 is made on a rounded cobble with a round-based hollow and such objects are often found in neolithic deposits. The other two hollowed stones from phases 6.4 and 7 are made on sandstone blocks and have shallow, flat hollows. Such objects are comparable to those from the iron age at Pool.

Discussion

There follows below a summary of the artefact types present in each phase. A most interesting pattern is produced when the three major groups of Skaill knives, flaked blanks and cobble tools are compared quantitively by phase and in order to illustrate this the percentages of each of the three groups are prepared from the total number of artefacts from the three groups (table 2).

Phase 1 is dominated by Skaill knives (65%) and cobble tools(33%) and there is also one stone disc, an axe and a possible roughout for a polished stone artefact. The cobble tools include facially pecked cobbles and facially pecked and faceted cobbles in almost equal quantities as well as a few plain cobble tools. Just over 40% of these worn cobbles are made on quartz and the rest are of sandstone and it appears that rounded cobble shapes have been selected from both material types. The majority (60%) of the Skaill knives are directly contexted to the middens or tips whilst the cobble tools are most likely to be found in other types of deposits.

Phase 2 is also dominated by Skaill knives (80%) whilst cobble tools comprise only 14% of the total. The worn cobble tool types are the same as those in phase 1 and the proportions are roughly similar as is the proportion of quartz cobbles selected.
One mortar, a polished axe and a "Knap of Howar" grinder are present as well as a bifacially flaked cobble and three flaked sandstone bars. Once again 60% of the Skaill knives occur in direct midden deposits and in fact a similar proportion of the whole assemblage comes from these types of contexts as oppose to only 43% in phase1.

Phase 3 is dominated by flaked blanks (38%) which include all three types although the flaked sandstone bars are most numerous and, of these, it is those made on cobble blanks which are most numerous (81% of the total). Cobble tools account for 37% of the assemblage and here all types are represented with the facially pecked and faceted cobbles being most numerous. The use of sandstone is now much more common than that of other material types. Skaill knives comprise only 25% of the total and there is one stone disc present. Middens and layers are the most common contexts of deposition and both types have similar proportions of the assemblage (38%).

As in the preceding phase, phase 4 is dominated by flaked blanks (63%) of which flaked sandstone bars are the most numerous though the highest proportion of all three types are found in this phase. Over 90% of the flaked sandstone bars are made on tabular blanks as compared to the common use of cobble blanks in the preceeding phase. Just 19% of the assemblage is cobble tools of which all types are represented but the majority are faceted cobbles. Skaill knives comprise 18% of the assemblage and there are 6 stone discs and two fragments from a polished artefact. Middens and other layers account for well over half of the contexts with coarse stone whilst walls and rubble deposits contain another third of which the majority (66%) is made up of ard point and flaked sandstone bars.

Phase 5 has a very small assemblage and the majority (47%) are flaked blanks of which all three types are present although flaked sandstone bars made on cobble blanks are most common. Cobble tools comprise 35% of which only the facially pecked and faceted cobbles and plain cobbles are present. There are four skaill knives and one piece of notched flagstone.

Phase 6 has an interesting assemblage. When all the subphases are combined it can be seen to be dominated by cobble tools (55%) of which all types are present although the faceted cobbles are most numerous. The majority of the cobble tools from this phase can be differentiated from those of the preceding phases by virtue of weight as most of them cluster between 600g and 1400g as compared to those from earlier phases which cluster between 100g to 700g with a few much heavier outliers. Skaill knives are more numerous here than in phases 3 and 4 (37%) whilst flaked blanks of which all three types are present account for only 8%. There are five stone discs, a mace-head fragment, a piece of edge-ground sandstone and a hollowed stone block. When the assemblage is examined by sub-phase certain differences may be discerned although in some cases the numbers present are too small to make any definite statement.

Phase 6.1 has a slightly higher proportion of Skaill knives (48%) than cobble tools whilst in phase 6.2 there are equal quantities of both. Phase 6.3 has a higher proportion of cobble tools than Skaill knives and in phase 6.4 the dominance of cobble tools is more fully defined (66%).

The presence of Skaill knives continuing into the Iron Age is of interest and alongside this is the additional presence of large laminated stone discs which are more commonly associated with neolithic deposits.

Phase 7 is dominated by cobble tools of which the majority are faceted cobbles and there is one ard point. In these respects it is very similar to the assemblage from phase 6.3. There is also one "smoothing" stone, one hollowed stone block and one polished axe.

TOFTS NESS, SANDAY: COARSE STONE CATALOGUE

Stone Discs

1, 1122, 4935
Laminated, bifacially chipped. 170 x 150 x 19.

3, 114, 1189
Micaceous sandstone, bifacially chipped. 83 x 83 x 12.

4, 1741, 5272
Micaceous sandstone, bifacially chipped, half surviving. 115mm diameter, 13mm thick

4, 1785, 5402
Micaceous sandstone, bifacially chipped. 106 x 99 x 16.

4, 1812, 5509
Laminated, one face with pebble cortex, bifacially chipped. 130 x110 x 23.

4, 1863, 5649
Pebble cortex on both faces, bifacially chipped. 138 x 138 x 16.

4, 1867, 5711
Laminated, bifacially chipped, fragment. 14mm thick.

4, 1903, 5696
Laminated, bifacially chipped, fragment. 21mm thick.

6, 939, 4498
Laminated, bifacially chipped, fragment. 14mm thick.

6.1, 903, 4654
Micaceous sandstone, bifacially chipped, fragment, burnt around edges on both faces. 16mm thick.

6.2, 807, 4590
Micaceous sandstone, bifacially chipped, fragment, burnt around edge on one face. Diameter >220mm, thickness 12mm.

6.3, 678, 2114
Laminated, bifacially chipped. 136 x 128 x 13.

6.4, 630, 2191
Laminated, bifacially chipped, fragment. 12mm thick.

US, 3781
Made from a sandstone flake with cortex on one face, bifacially chipped. 135 x 127 x 17.

Hammerstone flakes
All these flakes have areas of abrasion on the proximal end which suggests that they have been detached during use from a cobble tool.

2, 194, GF
Secondary flake of quartzite. 50 x 48 x 16.

3, 119, GF
Secondary flake of quartzite. 91 x 80 x 22.

4, 1744, 5405
Primary flake of sandstone. 112 x 55 x 17.

4, 1766, GF
Primary flake of quartzite. 26 x 47 x 7.

4, 1852, 5609
Primary flake of sandstone. 54 x 68 x 12.

4, 1905, 5698
Secondary flake of sandstone. 62 x 79 x 14.

6, 612, 2180
Primary flake of sandstone. Possibly re-used as a skaill knife.64 x 68 x 23.

6, 858, 4226
Secondary flake of quartz. 34 x 64 x 15.

6.1, 816, 4161
Secondary flake of quartzite. 64 x 45 x 12.

Miscellaneous artefacts

1, 18, 2373
Ground stone axe of ?black micaceous sandstone. The sides are straight and almost parallel and exhibit some heavy pecking. The butt end has been heavily bifacially flaked and the opposite end is lightly damaged. The grinding and polishing has not removed all of the surface irregularities.
130 x 68 x 34, 455g.

1, 28, 2292
Oval-shaped cobble of amphibolite with a broad area of pecking down each side and on both faces a small area of pecking, circular in plan, made off-centre towards the narrowest end.Possible roughout for a mace-head or other perforated object.
106 x 66 x 41, 534g.

2, 1104, 3740

Very fine miniature axe of an unidentified green material, triangular in plan. Polished all over with bevelled sides. Small amount of flaking at narrow butt end.
41 x 38 x 10, 22g.

2, 1111, 3951
Fragment of a cobble of fine black micaceous sandstone. The base is very smooth and flat and forms a distinctive break from the round sides. There is some light localised pecking on part of the base. The rest of the cobble is domed and there are patches of heavy pecking on the surface. Very similar in form to those from Knap of Howar, Papa Westray.
Broken length 87mm, height 51mm.

2, 17, 1767
Rounded cobble of abraded sandstone, very abraded. An oval-shaped hollow has been formed on the upper face and has sloping sides and a flattish base.
127 x 111 x 50, hollow: 95 x 70 x 20 deep. 778g

4, 1734, 5241
Flake from a ground object of fine black micaceous sandstone.The flake has been removed from the working end of what was probably quite a fine axe.

4, 1744, 5667
Flake from a ground object of fine black micaceous sandstone. The flake has been removed from what appears to have been the edge of an axe.
21 x 34 x 5.

5, 1740, 5527
Natural slab of black sandstone, quite abraded. A wide and deep notch has been worked from one side.
155 x 90 x 17, notch 38 x 15, 316g

6, 1534, 4470
Fragment of a mace head with parallel, straight-sided perforation.
width 37, thickness 21, diameter of hole 37.

6.4, 651, 3021
Flat piece of very abraded yellow sandstone. The broad end has been ground on both faces to form a distinctive curved edge with an acute edge angle.
110 x 52 x 25, 178g.

6.4, 534, 3050
Fragment of an irregular-shaped block of sandstone with a flat base. A steep-sided, flat-based hollow has been formed on one face, truncated by breakage.
no measurements.

7, 581, 2046

Ground stone axe of ?fine black micaceous sandstone. The sides are slightly curved and bevelled. The butt end is unifacially flaked.
85 x 53 x 24, 164g.

7, 572, 2102
Sub-rectangular block of sandstone with a flat base. A circular hollow has been made in the centre of one face with steep sides and a flat base.
155 x 140 x 68, hollow 86 x 86 x 15 deep.

7, 607, 2061
Large oval cobble with one smooth concave face. ?Possible grinder/ smoother.
230 x 113 x 58, 2127g.

Cleaning, 1103, 3476
Belemnite fossil, unworked.

TOFTS NESS, SANDAY: COARSE STONE/ FLAKED SANDSTONE BARS

1	2	3	4	5	6	16	17	18	19	22	35	36	37	38	39	40	41	42	43	44	45	46
Phase	Layer	F No	Type	Mat	Sur	ML	MW	MTh	Wgt	Sh	F Loc	C S	Dist	Prox	Peck	P Loc	Smoo	S Loc	Stri	S Loc	Wear	Type
0	0	5757	11	2	4	243	102	22	874	13	45	5	9	9	2		2		2		2	
2	236	1995	11	2	1	258	84	31	926	15	23456	1	3	3	2		2		2		1	1
2	244	2370	11	2	1	230	96	20	623	15	2345	6	4	5	2		1	15	1	1	1	2
2	244	2384	11	1	2	112	85	35	361	15	234567	1	5	9	2		2		2		2	
3	114	1082	11	2	1	167	81	22	311	14	1	6	3	3	2		2		2		2	
3	126	1332	11	2	6	96	91	22	308	14	45	5	9	9	2		2		2		2	
3	114	1091	11	1	2	105	82	37	440	14	2456	1	3	9	2		2		2		2	
3	125	1250	11	2	1	183	64	10	170	14	2345	5	4	1	2		2		2		2	
3	126	1333	11	2	2	76	56	14	81	14	2456	6	2	9	2		2		2		2	
3	119	1252	11	2	2	156	64	32	396	14	1	6	4	9	2		2		2		1	34
3	124	1169	11	2	2	110	89	23	267	14	24567	6	3	9	2		2		2		2	
3	137	1313	11	1	6	141	86	32	480	15	456	1	9	9	2		2		2		2	
3	119	1161	11	2	1	410	100	43	2017	15	1	1	5	5	2		2		2		2	
3	191	1623	11	1	2	141	88	27	485	14	2456	1	4	9	2		2		2		2	
3	144	1247	11	1	1	200	80	28	557	15	23456	1	3	3	2		2		2		1	1
3	6	1297	11	2	2	63	72	16	82	14	1	6	3	9	2		2		2		2	
3	106	843	11	1	4	153	74	21	271	15	1	6	3	9	2		1	34	2		2	
3	144	1289	11	1	2	129	82	23	344	15	2456	6	3	9	2		2		2		1	1
3	6	832	11	1	1	222	105	30	787	15	23456	6	2	1	2		1	1	2		1	1
3	112	1065	11	1	2	120	75	21	233	14	2456	6	3	9	2		1	1	2		1	1
4	1744	5388	11	2	1	255	111	34	1289	15	23456	6	3	3	2		2		2		2	
4	1755	5524	11	5	6	300	99	42	2287	15	45	1	9	9	2		2		2		2	
4	1744	5683	11	2	1	193	105	31	775	15	1	6	3	1	2		2		2		2	
4	1742	5369	11	5	1	233	97	25	836	14	2345	6	4	4	2		2		2		2	
4	1763	5525	11	2	2	245	123	35	1787	15	45	5	7	9	2		2		2		2	
4	1812	5495	11	2	2	250	135	31	1572	14	245	6	3	9	2		2		2		2	
4	1736	5583	11	2	2	245	108	25	1035	15	2456	6	4	9	2		2		2		1	1
4	1740	5529	11	5	2	185	99	27	621	15	45	6	7	9	2		2		2		2	
4	1751	5511	11	2	4	350	107	36	1920	15	245	5	7	9	2		2		2		2	
4	1744	5244	11	2	2	165	107	26	706	15	2456	6	4	9	2		2		2		2	
4	1812	5722	11	2	2	225	150	24	1103	15	245	5	3	9	2		2		2		2	
4	1744	5437	11	2	2	255	104	38	1322	15	245	1	3	9	2		2		2		2	
4	1714	5240	11	2	4	270	106	31	1366	15	24567	6	4	9	2		2		2		1	1

4	1760	5533	11	5	2	325	116	44	2182	15	245	5	3	9	2		1	13456	1	13456	1	2
4	1735	5476	11	5	2	235	110	42	1164	15	2456	6	7	9	2		2		2		2	
4	1736	5584	11	2	1	270	96	39	1324	14	23456	1	3	5	2		2		2		2	
4	1751	5582	11	2	2	170	110	34	877	14	24567	6	4	9	2		2		2		2	
4	1763	5520	11	1	2	240	120	31	1243	15	245	6	7	9	2		2		2		2	
4	1742	5348	11	2	1	265	110	22	1052	15	2345	5	6	3	2		1	1	2		1	134
4	1742	5349	11	1	2	285	123	40	2438	14	45	6	2	9	2		2		2		2	
4	1767	5503	11	5	2	183	95	33	721	15	245	6	3	9	2		2		2		2	
4	1855	5638	11	5	1	252	100	37	1136	15	23456	6	4	4	2		2		2		2	
4	1799	5578	11	2	4	71	138	19	225	14	2	6	9	9	2		2		2		2	
4	1735	5474	11	2	1	328	116	29	1702	15	2345	6	3	1	2		2		2		2	
4	1826	5573	11	2	1	315	98	27	997	15	24567	6	7	3	2		2		2		2	
4	1720	5113	11	2	2	95	77	23	206	14	2456	6	3	9	2		2		2		1	2
4	1712	5743	11	1	2	285	99	48	2025	15	245	5	5	9	2		2		2		2	
4	1714	5238	11	2	2	198	99	41	1142	14	2456	1	3	9	2		2		2		2	
4	1853	5621	11	2	2	190	95	13	361	15	245	5	3	9	2		2		2		2	
4	1735	5248	11	2	4	258	79	27	779	13	2345	6	4	10	2		2		2		2	
4	1888	5709	11	2	4	293	117	25	1237	15	24567	6	5	9	2		1	56	1	56	1	1
4	1840	5586	11	2	4	318	100	38	1678	13	23456	6	1	9	2		2		2		2	
4	1735	5247	11	2	2	240	109	28	1154	14	245	5	4	9	2		1	134	1	1	1	2
4	1896	5717	11	2	4	260	113	20	871	13	245	6	5	9	2		2		2		2	
4	1903	5697	11	2	2	132	95	28	335	14	1	6	3	11	2		2		2		2	
4	1886	5692	11	2	5	98	82	22	161	14	2456	6	3	9	2		2		2		2	
4	1767	5510	11	2	2	147	100	31	430	14	2456	6	5	9	2		2		2		2	
4	1842	5642	11	1	1	175	91	36	708	15	23456	1	1	5	2		2		2		2	
4	1840	5590	11	2	4	240	135	15	761	16	2345	5	3	9	2		2		2		2	
4	1722	5183	11	2	2	150	101	31	626	14	2456	6	2	9	2		1	6	1	6	1	1
4	1855	5631	11	5	2	210	107	33	991	15	245	6	3	9	2		2		2		2	
5	3	19	11	1	2	180	80	34	740	17	3456	1	4	9	1	34	2		2		1	3
5	4	50	11	5	2	155	85	47	732	15	1	1	2	9	2		2		2		2	
5	118	1352	11	2	2	88	50	27	163	12	245	1	3	9	2		2		2		2	
5	110	1059	11	1	2	94	71	33	317	14	2456	1	3	9	2		2		2		1	1
5	4	40	11	5	2	105	69	27	239	14	24567	6	1	9	2		2		2		2	
6.1	576	2131	11	5	2	177	73	34	558	15	245	1	5	9	2		2		2		2	
6.3	717	2888	11	2	2	195	89	18	538	14	245	6	2	9	2		2		2		2	

ARD POINTS

0	0	4942	12	1	1	240	70	45	1182	6	1	1	7	3	1	3456	1	13456	1	13456	1	3
3	12	1577	12	1	3	217	58	43	711	6	1	2	7	9	1	456	2		2		1	3
3	191	1614	12	1	2	101	61	37	286	17	1	1	7	9	1	345	1	3456	1	5	1	3
3	12	1444	12	1	5	187	70	45		6	1	2	7	9	1	3456	1	1345	1	1345	1	3
4	1736	5250	12	1	2	150	68	32	309	17	5	1	7	9	1	35	1	1346	1	6	2	
4	2023	5739	12	2	2	210	82	47	1058	6	1	1	7	9	1	34	1	13456	1	3456	1	3
4	1735	5478	12	1	2	180	71	57	973	5	1	2	9	9	1	3456	1	4	1	4	2	
4	1714	5171	12	1	2	280	79	44	1373	17	1	2	7	9	2		1	34	2		1	3
4	1714	5236	12	2	2	180	102	43	979	17	1	1	9	9	2		1	356	1	356	2	
4	1533	4646	12	5	2	205	92	36	964	17	1	1	7	9	2		2		2		1	3
4	1735	5246	12	1	2	170	73	51	816	6		2	7	9	1	34	1	7	1	7	1	3
4	2002	5718	12	2	2	195	96	40	896	17	1	1	3	9	2		1	3456	1	34	1	3
4	1755	5603	12	1	2	237	89	59	1716	6	1	2	7	9	1	3	2		2		2	
4	1741	5371	12	2	2	124	65	37	368	17	1	1	7	9	2		1	1345	2		1	3
4	1711	5146	12	1	1	355	102	54	2560	17	1	1	7	10	1	5	1	346	1	346	1	3
4	1714	5234	12	2	2	180	72	28	506	17	13	5	1	9	2		1	1346	2		1	3
4	1821	5517	12	2	2	149	67	45	670	15	2467	2	1	9	1	34	1	345	2		1	3
4	1744	5414	12	1	2	162	90	58	996	6		2	7	9	1	5	1	345	2		1	3
4	1887	5712	12	2	2	175	86	64	1304	6	1	2	1	9	2		1	345	2		1	3
4	1827	5738	12	1	2	235	83	42	1172	17		1	7	9	1	5	1	5	2		2	
4.6	1637	5737	12	1	1	305	94	48	2104	17	1	1	7	11	1	34	1	345	2		1	3
5	1694	5003	12	1	1	238	75	40	1235	14	1	1	1	11	1	345	2		2		1	3
6	1703	5025	12	1	1	175	80	29	688	15	2345	6	3	1	1	34	1	34	2		1	3
6.1	659	5567	12	2	2	145	87	46	682	17	1	2	5	9	2		1	345	1	345	1	3
6.1	552	4843	12	1	1	341	90	70	2580	6	1	2	7	3	1	345	1	1346	1	1346	2	
7	501	2122	12	1	2	156	74	50	891	6	23	2	1	9	1	456	2		2		1	3

TOFTS NESS, SANDAY: COARSE STONE/ SKAILL KNIVES

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	21
Phase	Layer	Find no.	Type	Mat	Sur	MOD	Plat	Outl	EM	Ret	Pos 1	Pos 2	E D	Pos ED	ML	MW	MTh	Wgt	TP:UP
0	1103	3480	1	2	1	1	1	6	1	1			12		104	67	21	122	
0	1103	3476	1	1	1	1	1	3	2	1			12		34	59	12	23	
0	11	469	1	5	1	1	1	3	2	1			1		59	88	18	86	
0	1103	3476	3	2	1	1	2	3	1	1			1		37	39	9	10	
0	11	468	2	2	1	1	1	4	1	1			12		93	91	14	142	
0	318	3345	1	1	1	1	1	4	1	1			12		82	48	13	54	
1	410	3257	1	2	1	1	1	6	2	1			12		63	77	13	57	
1	1110	4027	1	1	1	1	1	4	1	1			3	1	72	90	13	69	2
1	1046	4958	1	1	1	1	1	6	2	1			1		87	73	18	129	
1	1046	4955	1	1	1	1	1	4	1	1			1		78	77	13	77	
1	1046	4957	1	1	1	1	1	4	1	1			12		50	72	8	34	
1	1046	4866	1	1	1	1	1	2	1	1			4	1	126	91	16	211	2
1	1046	4956	1	1	1	1	1	5	1	1			3	1	80	94	22	149	3
1	1046	4954	1	2	1	1	1	3	1	1			3	1	55	102	13	87	3
1	84	3336	1	1	4	1	1	6	2	1			12		74	121	16	142	
1	27	1946	1	5	1	1	1	2	1	1			12		62	81	12	65	
1	32	2423	1	1	1	1	1	4	1	1			1		37	75	8	25	
1	32	2722	1	1	1	1	1	2	1	1			1		65	91	14	92	
1	32	2984	1	2	1	1	1	2	1	1			1		37	49	6	12	
1	32	2947	1	1	4	1	1	2	1	1			12		57	92	11	57	
1	32	2949	1	1	1	1	1	5	2	1			12		67	67	11	57	
1	32	2474	1	1	1	1	1	3	1	1			3	5	42	55	10	20	2
1	32	1936	1	1	1	1	1	2	1	1			3	6	58	80	8	35	2
1	1037	4788	1	2	1	1	1	5	1	1			1		33	45	6	11	
1	1121	4560	2	2	1	1	1	2	1	1			1		46	58	18	18	
1	1121	4779	1	2	1	1	1	6	1	1			1		36	66	10	25	
1	1121	4521	1	2	1	1	1	4	1	1			1		71	76	13	63	
1	1121	4554	1	2	1	1	1	2	1	1			1		29	36	8	10	
1	1121	4641	1	2	1	1	1	3	1	1			12		44	111	9	44	
1	1121	4556	1	5	1	1	1	6	2	1			12		43	62	9	26	
1	31	3161	1	1	1	1	1	1	2	1			1		65	118	12	128	
1	60	3152	1	2	1	1	1	3	1	1			1		47	74	10	38	
1	60	3151	1	2	1	1	1	1	1	2		1	12		66	102	13	88	

1	1123	4760	1	2	1	1	1	2	1	1			12		66	65	9	45	
1	1123	4937	1	5	4	1	1	2	2	1			12		67	99	10	64	
1	1123	4926	2	1	1	1	1	3	1	1			9	6	105	132	20	291	2
1	1024	4933	1	1	1	4	1	5	1	1			3	7	49	80	15	53	2
1	54	3099	1	2	1	1	1	4	1	1			3	7	83	116	16	144	2
1	434	3423	1	5	1	1	1	6	1	3	4	7	12		59	82	18	100	
1	28	2279	1	2	1	1	1	2	1	1			12		59	94	11	64	
1	28	1960	1	1	1	1	1	6	1	1			12		55	118	15	102	
2	1009	3716	1	2	1	4	1	1	1	1			12		86	71	13	92	
2	19	1972	1	1	1	1	1	1	1	1			4	1	64	88	16	96	3
2	19	2375	1	2	1	1	1	4	1	1			1		49	51	7	21	
2	19	1973	1	1	3	1	1	3	1	1			12						
2	227	2519	1	1	1	1	1	2	1	1			12		89	110	14	166	
2	227	2565	1	2	1	1	1	4	1	1			12		42	48	7	17	
2	227	3167	1	1	3	3	3	4	1	1			12						
2	1111	4013	1		1	1	1	3	1	1			12		42	61	10	29	
2	1111	3946	2	2	1	1	1	3	1	1			3	3	107	68	16	140	5
2	1104	3718	1	2	2	1	1	7	4	1			12						
2	1104	3717	1	1	1	1	1	6	1	1			3	7	71	96	12	96	2
2	1104	3842	2	1	1	1	2	6	5	1			2	3	47	130	29	166	2
2	1020	3805	1	2	1	1	1	1	1	1			4	5	72	103	15	130	2
2	1013	3911	1	1	2	1	1	2	4	1			12						
2	1013	3970	1	2	1	1	1	2	1	1			1		37	46	10	21	
2	1013	3912	1	2	1	1	1	2	1	1			1		41	55	7	21	
2	1013	3804	1	1	1	1	1	6	1	1			1		36	77	12	30	
2	1007	3689	1	2	1	1	1	4	1	1			3	1	36	45	7	15	3
2	1006	3954	1	1	1	1	1	5	1	1			12		81	70	12	61	
2	1006	3953	1	1	1	1	1	2	5	2	2	8	1		162	95	24	511	
2	296	2834	1	1	1	1	1	2	2	1			12		85	73	13	79	
2	262	2700	1	2	1	1	1	4	1	1			12		44	45	7	18	
2	262	2517	2	2	1	1	1	4	1	1			12		89	99	15	121	
2	262	2990	1	1	5	1	1	6	2	1			12		56	84	24	117	
2	262	2797	2	1	1	1	1	3	1	1			12		56	105	17	87	
2	262	2484	1	2	1	1	1	2	1	1			1		58	67	16	72	
2	258	2510	1	1	1	1	1	2	1	1			1		71	54	8	35	
2	223	2965	1	1	1	1	1	5	2	1			12		84	108	21	194	

2	223	2701	1	2	1	1	1	1	1	1			1		85	143	19	291	
2	220	1846	1	1	1	1	1	4	1	1			12		47	75	9	39	
2	220	1794	1	1	1	1	1	3	1	1			12		69	110	16	126	
2	220	1988	1	1	1	1	1	4	1	1			1		49	77	10	41	
2	220	1843	1	2	1	1	1	4	3	1			1		68	91	10	68	
2	220	2967	1	2	1	1	1	2	1	1			1		77	87	5	102	
2	210	2828	1	1	1	1	1	3	3	1			1		42	77	11	43	
2	210	2698	1	2	1	1	1	2	1	1			1		40	51	8	17	
2	210	2697	1	2	1	1	1	3	1	1			3	3	50	90	10	60	7
2	33	2956	1	1	4	1	1	6	2	1			12		58	71	11	44	
2	33	2957	1	1	1	1	1	4	1	1			1		79	89	11	76	
2	33	2567	2	1	1	1	1	4	1	1			1		40	66	8	23	
2	33	2958	2	1	1	1	1	5	2	1			1		85	66	15	95	
2	33	2955	1	2	1	1	1	4	1	1			1		43	54	8	22	
2	17	1663	1	1	1	1	1	2	4	1			12		65	45	8	28	
2	17	1729	1	1	4	1	1	6	2	1			12		62	104	15	100	
2	17	1694	1	1	1	1	1	4	1	1			3	7	83	57	11	57	2
2	5	1124	1	2	1	1	1	6	1	2	9		12		100	81	31	191	
2	16	3325	1	2	1	1	1	2	1	1			4	7	65	71	10	52	2
2	16	1601	1	2	1	1	1	4	1	1			2	3	39	64	1	25	6
2	1114	4211	2	1	1	1	1	4	1	1			1		43	69	9	31	
2	1114	4129	1	2	1	1	1	4	1	1			1		72	72	9	45	
2	1114	4134	2	2	1	1	2	6	2	1			1		43	47	22	43	
2	1114	4149	1	1	1	1	1	5	1	1			1		47	53	6	19	
2	1114	4179	1	1	1	1	1	3	1	1			12		83	77	10	80	
2	1114	4209	1	1	1	1	1	4	1	1			12		92	78	18	130	
2	1114	4182	1	1	4	1	1	3	1	1			12		74	73	15	78	
2	1114	4565	1	2	1	1	1	4	1	1			12		48	52	6	18	
2	1114	4142	1	1	1	1	1	3	1	3	5	5	12		71	110	16	138	
2	300	2971	1	1	1	1	1	4	1	1			4	1	69	111	10	102	3
2	229	2695	1	2	1	1	1	4	1	1			12		55	74	9	38	
2	229	2441	1	1	1	1	1	6	1	1			12		92	128	13	139	
2	167	3140	1	2	1	1	1	4	1	1			12		62	61	10	39	
2	167	2916	1	2	4	1	1	4	1	1			12		63	108	8	60	
2	167	1708	1	1	1	1	1	1	1	1			12		86	58	13	68	
2	167	3139	1	2	1	1	1	3	1	1			12		55	71	12	38	

2	131	1680	1	5	1	1	1	4	1	1			12		48	58	9	26	
2	131	1491	1	9	1	1	1	2	1	1			3	1	57	76	18	91	2
2	29	1880	2	1	1	1	1	3	1	1			1		73	76	15	97	
2	25	2961	2	8	1	1	1	6	1	1			1		50	85	20	96	
2	25	2706	1	2	1	1	1	2	1	1			10	1	78	76	14	95	4
2	25	2704	2	2	1	1	1	6	1	3	5	6	12		121	90	22	254	
3	6	1336	2	1	1	1	1	5	3	1			1		40	63	14	40	
3	6	1306	1	2	1	1	1	2	1	1			12		44	78	12	41	
3	6	1305	1	2	4	1	1	2	1	1			12		58	93	7	27	
3	6	1304	2	2	4	1	1	3	1	1			12		48	83	13	52	
3	6	1412	1	2	2	3	3	7	4	1			12						
3	124	1733	1	2	1	1	1	1	1	1			2	2	49	64	9	30	2.1
3	126	1171	1	2	1	1	1	6	1	1			3	1	66	111	14	98	3.4
3	137	1312	1	2	1	1	1	3	2	1			12		47	90	17	76	
3	144	1236	1	1	1	1	1	4	1	1			3	1	47	86	10	46	3
3	188	1483	2	2	1	1	1	3	1	1			10	7	79	96	10	90	2.9
3	188	1484	1	2	1	1	1	4	1	1			2	5	65	57	10	36	2
3	181	1464	2	1	1	1	1	3	1	1			12		53	63	45		
3	215	2522	1	1	1	1	1	3	1	1			3	1	75	127	13	116	4
3	6		1	6	1	1	1	5	1	1			12		52	65	22	70	
3	6		1	1	1	1	1	5	1	1			12		47	62	15	38	
3	215	1905	1	1	1	1	1	6	1	1			12		71	83	13	94	
4	1734	5581	3	5	1	2	2	6	1	1			1		66	33	10	23	
4	1862	5733	1	2	4	1	1	4	2	1			12		76	78	10	67	
4	1744	5251	1	2	1	1	1	3	1	1			4	1	32	63	7	17	3
4	1744	5687	1	2	3	3	3	3	1	1			12						
4	1744	5420	1	2	1	1	1	3	1	2	5		12		155	120	22	613	
4	1719	5316	1	2	1	1	1	2	1	1			1		52	76	10	41	
4	1719	5320	1	1	1	1	1	2	2	1			9	7	98	80	13	123	2
4	1709	5090	1	2	1	1	1	2	1	3	1	1	12		132	103	24	371	
4	1709	5067	1	2	1	1	1	1	1	1			12		72	93	16	111	
4	1735	5328	2	5	1	1	1	5	1	1			12		94	115	24	271	
4	1714	5182	1	1	3	1	1	5	2	1			3	1					
4	2024	5742	1	1	1	1	1	5	1	1			12		52	86	14	70	
4	1750	5766	1	2	1	1	1	2	2	1			1		56	28	7	15	
4	1750	5765	3	2	3	1	2	1	1	1			12						

4	1631	5557	2	2	1	1	1	6	5	3	4	4	1		113	120	27	353	
4	1588	4920	1	1	1	1	1	6	2	1			12		113	113	12	231	
4	1813	5554	2	5	1	1	1	3	2	1			12		115	138	23	381	
4	1741	5301	1	2	1	1	1	6	5	2	1		12		111	54	24	204	
4	1722	5303	1	2	1	1	1	1	1	1			12		87	142	16	191	
4	1722	5307	1	2	1	1	1	2	1	1			3	5	103	63	14	90	3
4	1708	5230	1	2	1	1	1	4	1	1			3	3	50	44	9	27	5
4	1766	5486	1	1	1	1	1	6	1	3	7	7	12		110	126	25	385	
5	110	1062	2	1	3	1	1	1	1	1			12						
5	4	593	1	1	4	1	1	2	1	1			4	1	41	70	8	31	3
5	9	707	1	5	1	1	1	2	1	1			9	1	48	63	11	35	4
60	1703	5020	1	2	1	1	1	4	1	1			12		85	132	11	147	
60	1703	5021	1		1	1	1	2	2	1			1		40	47	9	19	
60	1703	5222	1	5	2	3	3	7	1	1			12						
60	1535	4474	1	2	1	1	1	4	2	1			1		86	82	9	67	
60	1516	4448	2	2	1	1	1	2	1	1			1		65	50	10	33	
60	1500	4425	1	2	4	1	1	2	1	1			1		99	72	12	107	
60	925	4330	2	1	1	1	1	3	2	1			4	1	64	89	14	89	4
60	892	3782	1	2	4	1	1	4	2	1			12		62	61	8	28	
60	892	3783	1	2	1	1	1	4	1	1			12		73	76	13	89	
60	780	3788	1	2	2	3	3	6	4	1			12						
61	814	4588	1	2	1	1	1	2	1	1			2	1	43	53	7	16	3
61	814	4431	2	1	1	1	1	4	1	1			12		66	74	12	47	
61	834	4445	1	1	1	1	1	3	1	1			9	1	71	91	15	93	3
61	1623	4910	1	2	1	1	1	5	2	1			12		97	69	15	129	
61	573	4801	1	1	1	1	1	6	4	2	5		12		104	55	15	116	
61	573	4802	1	1	1	1	1	3	1	1			12		69	104	16	106	
61	916	4999	1	1	1	1	1	6	2	1			12		75	86	16	99	
61	816	4249	1	4	5	4	3	7	4	1			12						
61	841	4471	1	2	4	1	1	3	1	1			12		59	68	11	44	
61	1543	4714	1	2	4	1	1	5	2	1			12		102	83	11	93	
62	809	4336	1	2	1	1	1	4	2	1			3	3	44	73	11	37	5
62	971	4376	1	2	1	1	1	4	2	1			12		53	133	10	68	
62	857	3860	2	1	1	1	1	3	1	3	1	1	12		100	120	23	283	
62	829	4102	1	1	1	1	1	6	2	1			3	1	87	111	20	163	2
63	785	3758	1	1	1	1	1	3	2	1			12		58	55	11	37	

63	678	2907	1	1	1	1	1	6	2	1	1		103	134	21	353		
63	678	3544	2	2	1	1	1	6	2	1	1		128	95	24	279		
63	678	3738	1	1	3	1	1	4	1	1	12							
64	594	2893	2	2	1	1	1	4	1	1	4	6	57	98	15	81	2	
64	701	2253	1	1	1	1	1	6	2	1	12		93	114	18	205		
64	704	3752	1	2	1	1	1	4	1	1	4	1	77	75	14	80	2	
64	734	4284	2	2	1	1	1	3	1	1	1		39	44	10	16		
64	697	2885	1	2	1	1	1	4	1	1	1		73	88	15	106		
64	879	3800	1	2	1	1	1	5	1	1	4	1	106	65	15	101	11	
64	502	2037	1	1	3	1	1	4	1	1	12							
64	743	4584	1	2	1	1	1	1	1	1	12		89	51	6	84		
64	594	2894	1	2	1	1	1	2	1	1	1		112	103	12	130		

TOFTS NESS, SANDAY: COARSE STONE/ WORN COBBLES

1	2	3	4	5	6	16	17	18	19	22	23	24	25	26	27	28	29	30	31	32	33	34
Phase	Layer	F.No	Type	Mat	Sur	ML	MW	MT	W	Sh	Fac	no.	loc.	area	nat	Peck	loc.	type	dist	Flak	loc.	type
1	31	3158	5	6	1	87	67	41	340	3	2					1	56	2	2	2		
1	410	3069	5	9	1	76	63	50	347	2	2					1	56	1	2	2		
1	54	2564	5	1	1	230	73	26	627	3	2					1	3456	2	2	2		
1	31	3159	5	1	1	115	76	70	886	7	2					1	3456	2	2	2		
1	31	2376	5	1	1	109	82	42	558	3	2					1	13456	3	2	2		
1	36	2563	5	5	1	93	83	38	427	3	2					1	7	1	2	2		
1	1046	4953	5	9	1	79	60	28	208	3	2					1	156	1	2	2		
1	426	3297	5	1	1	70	48	21	103	3	2					1	345	2	2	2		
2	19	2709	5	9	1	89	69	58	542	2	2					1	156	2	2	2		
2	131	1764	5	5	1	88	79	52	507	20	2					1	7	1	3	2		
2	19	2710	5	9	1	74	70	49	355	4	2					1	15	3	2	2		
2	5	1500	5	1	1	155	62	46	659	7	2					1	56	2	2	2		
3	119	1098	5	5	3					21	2					1	135	2	2	1	1	1
3	6	1294	5	5	1	180	70	34	686	21	2					1	5	2	3	2		
3	126	1334	5	5	3					21	2					1	56	1	2	2		
3	6	1288	5	1	1	145	55	44	530	7	2					1	356	2	2	2		
4	1645	4839	5	8	1	81	37	25	135	2	2					1	56	2	2	2		
4	1844	5664	5	1	1	141	69	41	677	3	2					1	3456	2	2	2		
6.4	643	2198	5	9	1	84	65	35	277	3	2					1	7	1	2	2		
7	575	2902	5	9	1	75	57	45	286	2	2					1	125	3	2	1	1	3
7	607	2062	5	1	3					7	2					1	135	2	3	2		
0	318	3358	6	9	1	65	51	29	144	3	1	2	12	4	2	2				1	12	3
0	0	3442	6	1	1	126	95	49	943	3	1	2	12	15	2	1	34	2	3	2		
3	106	1029	6	1	1	70	58	32	173	2	1	2	12	3	3	2				2		
3	126		6	9	1	88	59	32	227	20	1	1	123	6	1	2				1	5	2
3	119	1249	6	10	1	63	63	56	305	4	1	3	1	12	2	2				2		
3	6	1443	6	1	1	121	95	60	1132	3	1	2	12	40	2	1	2	2	3	2		
3	112	1066	6	1	2					3	1	1	1	6	3	2				2		
4	1879	5591	6	1	1	151	112	46	1274	3	1	1	1	2	2	1	2	2	3	2		
4	1786	5374	6	6	1	95	66	54	514	2	1	4	12	25	2	2				2		
4	1765	5754	6	1	1	250	104	78	3132	6	1	1	1	45	3	1	2	1	2	1	1	1
4	2059	5755	6	1	1	200	81	66	1551	2	1	2	12	3	3	1	56	3	1	1	12	1
4	1862	5643	6	6	1	103	63	29	318	3	1	1	1	3	3	1	2	1	2	1	2	2

4	1714	5235	6	1	1	178	84	62	1634	14	1	1	1	1	3	2				1	12	1
4	1631	5372	6		1	118	93	63	1056	3	1	1	1	15	2	1	2	2	2	2		
4	1748	5287	6	1	1	103	52	42	325	2	1	2	12	5	3	1	3	1	2	1	1	2
4	1701	5149	6	6	1	72	72	51	321	7	1	1	1	22	1	2				2		
4	1792	5444	6	1	1	285	85	74	2927	6	1	1	1	4	3	1	12	1	2	1	1	1
4	1645	4960	6	9	1	50	35	23	60	7	1	1	1	1	2	1	2	3	2	2		
6	900	4361	6	1	1	113	108	75	1335	4	1	1	1	20	2	2				2		
6	858	4796	6	1	1	132	84	38	646	3	1	1	1	4	2	1	2	2	2	1	2	2
6	586	2043	6	1	1	128	72	44	601	3	1	1	1	5	1	1	2	3	2	2		
6	883	3792	6	6	1	119	70	50	603	7	1	1	1	6	2	1	2	1	2	1		
6	858	4797	6	1	1	124	70	45	622	3	1	2	1	8	1	2				2		
6	532	2104	6	1	1	137	66	51	522	7	1	1	1	3	2	2				1	1	3
6	858	4231	6	1	1	157	65	45	783	6	1	2	12	8	1	2				2		
6.1	816	4304	6	1	1	100	93	45	602	20	1	2	1	12	2	1	2	2	3	2		
6.1	1507	4916	6	6	1	112	101	58	979	7	1	4	12	64	2	2				2		
6.1	576	2132	6	1	1	158	86	55	1168	2	1	1	1	15	3	1	23	1	2	1	2	1
6.1	994	4420	6	1	1	140	65	54	805	6	1	3	12	15	2	2				2		
6.2	958	4384	6	1	1	105	81	46	613	3	1	2	1	14	2	2				1	2	1
6.2	571	4499	6	6	1	105	77	49	581	3	1	3	12	22	2					2		
6.3	823	3683	6	1	1	142	97	50	1106	3	1	2	12	28	1	2	3	2	2	1	1	2
6.3	731	3501	6	1	1	175	65	49	942	6	1	2	1	18	3	2				1	12	1
6.4	851	3907	6	1	1	175	73	64	1252	6	1	2	12	18	2	2				1	1	2
6.4	703	4301	6	1	1	158	78	73	1186	7	1	1	1	18	2	1	236	1	2	1	2	1
6.4	680	2201	6	1	1	133	88	55	948	3	1	2	1	12	1	1	2	3	2	2		
6.4	584	2203	6	1	1	155	76	62	1077	2	1	2	12	5	2	2				1	1	1
6.4	502	3448	6	1	5						1	1	3	10	2	1	56	3	1	2		
6.4	639	2097	6	1	1	146	87	47	866	3	1	1	1	6	1	2				1	2	1
6.4	734	3508	6	1	1	106	62	45	475	7	1	1	1	9	3	2				2		
6.4	595	2859	6	1	1	122	68	67	863	6	1	1	1	16	2	2				2		
7	607	2063	6	1	1	106	60	55	498	2	1	2	1	8	1	2				2		
7	583	2050	6	11	5					7	1											
7	572	2135	6	1	1	142	95	53	1014	3	1	1	1	10	2	1	2	3	2	2		
7	581	2055	6	1	1	110	83	46	606	3	1	3	12	28	2	2				2		
7	501	2124	6	6	1	124	99	52	954	3	1	2	1	12	1	1	2	2	2	2		
7	501	2123	6	10	1	130	86	60	963	3	1	4	1234	20	2	2				1	1	1
1	31	2327	7		1	150	88	51	1014													

1	28	1961	7		1	60	36	34	113	9													
2	220	1842	7	1	1	117	32	23	126	18													
2	210	2817	7	4	1	57	47	19	69	3													
3	126	1588	7		1	60	60	55	255	4													
3	155		7	1	1	68	44	24	85	9													
3	177	1411	7	5	3					3													
3	6	1293	7	2	3					15													
3	163	1860	7	1	1	71	58	26	120	9													
4	1708	5231	7	5	1	104	34	24	111	18													
4	1587		7	1	1	60	55	30	138	20													
4	1840	5587	7	1	3					13													
5	110		7	6	1	46	35	24	63	2													
5	110	1010	7	1	1	123	36	29	245	13													
6	638	2066	7	1	1	58	50	30	96	3													
6	577		7	1	1	74	62	35	203	9													
6	1703	5024	7		3					7													
6.1	1507	4915	7	9	1	34	30	11	17	3													
6.1	943	4703	7	1	3					6													
6.1	1578	4844	7		1	120	92	54	891	7													
6.3	747	3880	7		1	72	63	28	195	3													
6.3	785		7	1	1	35	27	24	28	2													
6.3	823	3682	7	1	1	50	40	20	51	9													
6.4	502	3748	7	1	1	34	31	24	39	7													
6.4	502	2085	7		1	33	29	24	34	7													
1	32	2950	8	1	5						1					1							
1	31	3160	8	1	1	57	47	35	142	2	1	1	1	2	2	1	2356	2	2	2			
1	72	3148	8	4	3					3	1	1	1	2	1	1	5	1	2	2			
1	62	2105	8	1	1	225	75	62	1875	6	1	1	1	3	2	1	23456	2	2	2			
1	31	3157	8	9	1	105	65	53	568	7	1	1	1	2	1	1	356	1	2	2			
1	32	2951	8	9	1	68	46	20	100	3	1	1	1	1	2	1	56	3	2	1	2	2	
2	1013	3955	8	1	1	64	50	35	169	2	1	1	1	1	2	1	5	1	2	2			
2	25	2344	8	9	1	76	47	38	196	2	1	2	1	2	2	1	356	2	2	2			
3	115	1174	8	1	1	160	71	58	1140	6	1	2	12	30	2	1	3456	1	2	1	1	3	
3	122	1177	8	9	1	97	74	51	542	3	1	4	12	30	1	1	356	2	2	2			
3	163	1850	8	1	1	92	72	52	513	2	1	1	1	26	3	1	56	1	3	2			
3	233	2434	8	9	1	98	79	61	672	2	1	3	1	9	2	1	56	2	2	2			

3	6	1287	8	1	3					7	1	1	1	1	2	1	56	2	2	2		
3	12	1445	8	6	1	101	73	46	521	3	1	2	12	18	2	1	3456	2	2	1	1	2
3	127	1892	8	1	1	95	83	49	541	3	1	2	123	16	3	1	56	2	2	1	1	2
3	191	1517	8	1	1	105	40	34	244	7	1	1	1	1	2	1	23456	2	3	1	1	3
4	1735	5249	8	1	1	95	58	34	268	7	1	2	1	4	2	1	356	3	3	2		
4	1840	5585	8	9	1	99	60	50	496	7	1	3	12	22	2	1	35	2	2	1	12	2
4	1840	5588	8	9	1	75	65	34	245	3	1	2	12	6	2	1	56	2	2	2		
5	118	1016	8	6	1	102	78	51	605	3	1	2	12	4	2	1	56	2	2	2		
5	110		8	6	1	83	71	54	413	2	1	3	123	15	2	1	56	3	2	2		
5	102	386	8	2	1	106	75	50	595	3	1	2	34	30	3	1	156	1	2	1	12	2
6	1512	4600	8	1	1	105	96	60	808	7	1	3	14	36	1	1	56	2	2	1	1	2
6	858	4227	8	1	1	145	73	61	998	7	1	2	12	30	3	1	56	1	2	2		
6	610	2196	8	1	3					3	1	1	1	6	2	1	56	1	2	2		
6	858	4412	8	5	1	121	72	48	637	3	1	3	12	14	3	1	56	1	2	2		
6.1	913	4268	8	1	1	162	76	45	849	7	1	1	1	15	2	1	23456	1	3	2		
6.1	816	4712	8	1	1	208	61	45	785	21	1	1	1	6	2	1	5	2	2	1	2	1
6.1	573	4899	8	1	1	129	104	62	1348	3	1	4	1234	98	2	1	56	1	2	2		
6.2	857	3894	8	1	3					3	1	1	1	18	1	1	345	1	2	1	1	3
6.3	785	4635	8	1	1	111	103	42	722	20	1	2	12	15	1	1	345	2	3	1	12	3
6.4	594	2892	8	1	1	123	85	50	817	3	1	3	1	18	1	1	2345	2	3	2		
6.4	542	4221	8	1	2					2	1	1	1	20	3	1	3456	1	2	2		
6.4	683	3001	8	1	1	175	69	66	1291	7	1	2	12	15	2	1	56	2	2	1	2	1
6.4	502	2002	8	1	1	131	76	54	724	7	1	4	12	15	2	1	3456	1	2	2		
6.4	879	3909	8	1	1	139	106	39	874	3	1	2	12	7	1	1	5	3	3	1	12	1
8	500	2119	8	1	1	160	84	41	954	3	1	2	14	14	2	1	356	2	2	2		
0	1103	3476	9	9	1	59	41	40	189	9	2					1	12	3	2	2		
0	0	5539	9	8	1	62	54	25	158	3	2					1	123	2	3	2		
1	50	2960	9	1	1	77	55	46	223	7	2					1	123	3	3	2		
1	86		9	6	1	44	31	23	47	2	2					1	1	3	2	2		
1	1032	4900	9	9	1	43	36	19	33	7	2					1	1234	3	3	1	1234	3
1	410	3170	9	6	1	89	88	78	834	1	2					1	7	2	3	2		
2	1009		9	6	5						2					1				2		
2	1013	4073	9	9	1	42	35	27	46	9	2					1	12	3	2	2		
2	25	2705	9	1	1	62	60	48	236	4	2					1	3456	3	3	2		
2	210	3142	9	2	1	173	75	36	719	3	2					1	1	2	2	1	1	2
2	196	1990	9	1	1	125	43	39	288	21	2					1	7	1	1	2		

2	204	2340	9		1	64	56	54	266	4	2
3	106		9	6	1	67	60	51	289	4	2
3	106		9	1	1	46	41	28	72	9	2
3	119		9	6	5						2
3	114	1151	9	2	5					23	2
3	119	1246	9	2	3					21	2
3	6	1413	9	1	5						2
3	106	845	9		1	79	74	46	398	9	2
4	1802	5660	9		1	93	84	67	681	7	2
4	1725	5245	9	9	1	57	31	22	60	2	2
4	1742		9	6	5						2
4	1818	5580	9		5					9	2
4	2059	5761	9	1	1	151	50	37	421	21	2
4	1841	5653	9	1	1	190	89	48	1422	14	2
4	2017	5720	9	4	3					12	2
5	1704	5220	9	9	1	67	42	33	126	7	2
5	118	1353	9	4	5					9	2
5	4	38	9	1	1	100	23	19	75	18	2
6	1652	4945	9		1	106	63	47	601	9	2
6	1535	4469	9	1	1	132	57	28	351	21	2
6	1703	5221	9	1	1	100	24	21	81	18	2
6	858	4798	9		1	48	41	27	89	3	2
6	921	4661	9	1	3					6	2
6	1652	4939	9	2	1	215	80	39	950	15	2
6.1	986	4775	9	1	1	87	26	20	64	18	2
6.2	909	4842	9	1	3					3	2
6.3	823	3696	9	5	1	123	69	47	439	9	2
6.3	823		9	6	1	80	37	34	151	21	2
6.3	731	3502	9	4	5					9	2
6.4	597	4266	9	1	1	190	145	40	1899	3	2
6.4	592	2904	9	1	1	145	48	23	286	14	2
6.4	879	3915	9	1	3					7	2
6.4	643	2197	9	1	3					3	2
6.4	592	2905	9	1	3					6	2
7	575	2903	9	1	1	170	40	31	352	21	2
7	575	2887	9	1	1	99	96	40	558	10	2

1	5	3	3	2			
1	7	2	3	2			
1	1234	3	2	2			
1				2			
2				2			
1	3	2	2	1	3	2	
1	35	2	2	2			
1	1234	1	3	2			
1	1234	1	3	2			
1	1	3	2	2			
1				2			
1	1	1	3	2			
1	1234	3	2	2			
2				1	23	2	
1	1	3	2	2			
1	12	3	2	2			
1	1	3	2	2			
1	3	2	2	1	1	3	
1	1234	1	3	1	1	2	
1	13	3	2	1	1	3	
1	123	3	3	2			
1	56	2	2	2			
1	1	1	2	1	1	2	
2				2			
1	34	1	3	2			
2				1	1	1	
1	13	2	2	2			
1	12	3	2	2			
1	13	1	3	2			
1	1234	2	1	1	1	2	
2				1	2345	1	
1	1	3	2	2			
1	1	3	2	2			
2				1	1	1	
1	3	3	3	2			
1	1234	2	3	2			

Flaked Cobbles

Phase	Layer	F.No	Type	Mat	Sur	ML	MW	MT	W	Sh	Fac	no.	loc.	area	nat	Peck	loc.	type	dist	Flak	loc.	type	TP:FP
1	1048		4	9	1	125	108	83	1210	2	2					1	5	3	3	1	1234	1	1.7
2	5		4	9	1	91	78	44	399	2	2					1	123	2	3	1	12345	2	1
2	1114	4195	4	2	1	112	86	59	735	2	2					1	3	1	3	1	1234	1	2.1
3	106	844	4	9	1	78	70	51	326	7	1	1	12346	25	1	1	5	2	2	1	6	1	1
3	119	1067	4	9	1	73	70	51	340	2	2					1	1234	1	3	1	1234	1	1.5
3	119		4	9	1	75	56	37	188	1	1					1	1234	2	3	1	1234	1	1
3	122	1178	4	1	1	91	83	37	309	3	2					1	34	2	3	1	12345	1	2.4
3	126	1182	4	2	1	87	79	40	285	7	2					1	4	2	2	1	34	1	1.4
3	126	1542	4	1	1	88	82	51	514	7	1	1	1	9	1	1	23456	1	3	1	1	1	2
3	963	4643	4	1	1	97	95	37	384	3	2					2			1	1	345	1	1
4	1842	5644	4	1	1	94	95	45	575	3	1	1	1	12	2	2				1	1	1	2.3
4	1841	5613	4	1	1	94	88	36	445	3	1	1	3	2	2	1	3	2	3	1	3	1	2.1
4	1745	5262	4	1	1	125	113	29	529	3	2					2				1	3	1	3
4	1766	5487	4	1	1	107	78	41	429	7	2					1	34	2	3	1	12345	1	1
4	1862	5782	4	1	1	111	99	33	526	3	1	1	3	1	2	1	3	2	3	1	3	1	2.5
4	1744	5387	4	6	1	83	76	45	372	3	2					2				1	123	1	1.8
4	1842	5650	4	1	1	104	86	39	522	3	1	3	3	2	2	1	3	2	3	1	3	1	2.3
4	1744	5373	4		1	69	51	30	146	7	1	1	3	9	1	2				1	356	1	2
4	1751	5535	4	1	1	154	119	46	1285	14	2					2				1	1234	1	1.3
4	1862	5747	4	1	1	96	80	32	366	3	1	1	1	2	1	2				1	1235	1	1.7
4	1744	5674	4	1	1	125	100	47	776	3	1	1	1	4	2	1	34	2	3	1	23	1	1.6
4	1714	5239	4	1	3					3	2					2				1	1	1	
4	1744	5428	4	1	1	113	94	39	610	3	2					2				1	12	2	2.8
4	2017	5721	4	1	1	103	82	35	451	3	1	2	14	4	2	1	3	2	3	1	123	1	1.8
4	958	4803	4	2	1	150	97	46	1002	3	2					2				1	14	1	2.8
4	1744	5434	4	1	1	137	91	55	1030	7	2					1	5	3	2	1	12	1	3.8
4	1725	5577	4	1	1	120	68	41	399	7	2					2				1	1	1	2
4	1714	5237	4	1	1	107	101	31	525	3	1	1	3	2	2	1	12	2	3	1	123	1	1.3
4	1840	5589	4	1	1	99	85	33	453	3	1	1	1	1	1	1	12	2	2	1	1	1	3.2
4	958	4804	4	1	1	127	85	43	735	3	1	1	1	1	2	2				1	1	2	4.8
4	1725	5472	4	6	1	93	79	46	522	7	1	1	3	10	1	1	2	2	2	1	3	1	4.6
5	102		4	9	1	70	45	35	154	2	2					2				1	13	1	2.2
6.4	713	2785	4	1	1	127	55	32	367	21	2					2				1	1	2	

SKARA BRAE: COARSE STONE

Ann Clarke

Rockville Lodge

By Kingston

North Berwick

EH39 5JN

July 1995

The report and catalogue cover the coarse stone assemblages from the excavations at Skara Brae during 1972, 1973 and 1977 as well as the stone artefacts from the earlier excavations at this site. The assemblages from the 1970s excavations are examined in detail by artefact type and then artefacts from the earlier excavations are discussed. The discussions of the artefact types is brief and the interested reader is referred to Clarke 1995 for more comparative detail. The function and context of the assemblages are then examined and the final sections discuss the chronology and comparisons with other sites.

1970s Excavations

1. Artefact Type

1.1 Flakes

The flake assemblage is the largest component of the coarse stone assemblage at the site and is composed of Skaill knives and debitage. The Skaill knife is a specific type of flake which has been detached from a sandstone beach cobble by throwing the cobble at an anvil (Clarke 1995, Petrie 1868). These flakes are normally the primary flakes of the original cobble (they retain all of the cobble cortex) although secondary and inner flakes are occasionally used. The program of wet-sieving recovered 1500 stone flakes in addition to the 1400 flakes recovered by hand. Amongst this total was a significant number of small flakes and a cut-off point was chosen at which those flakes with dimensions of less than 40mm and less than 20mm were lumped together without further measurement. These small flakes are termed flake debitage and

those larger than 40mm are termed Skaill knives. This cut-off point reflects closely the artefactual recovery methods as only a small fraction of the Skaill knives were found during wet-sieving compared to all of the debitage. The separation of Skaill knives and debitage carries the implication that it was only the larger flakes, the Skaill knives, which were made intentionally for use and although some Skaill knives could strictly be defined as debris because they show no signs of use it is interesting to note that in the context with the single largest numbers of Skaill knives (T1, layer 2) there were no flakes less than 40mm in size. This suggests that the division of the flake assemblage by size does indeed reflect differing deposition strategies around the site.

1.1.1 Skaill knives (T=1407)

All of the Skaill knives have been made from cobbles of the local micaceous sandstone, mainly the grey sandstone though some black micaceous sandstone is present. The flakes are in a fresh condition although there is a significant component of those from T3 and T4 which are abraded, perhaps because of soil conditions or from being exposed for a length of time after deposition. Unfortunately, a large proportion of the flake assemblage bears fresh edge damage because many of the flakes were bagged in batches rather than singly. This has caused fresh breakage or re-flaking on parts of the original edge. In many cases, therefore it was not possible to determine the presence or extent of the use-wear.

Skaill knives are produced by throwing the cobble hard at an anvil stone; this manufacturing method was first noted by

Petrie (Petrie 1868). The resultant flake most often has a characteristic crushed scar on the proximal end indicating the force of the blow needed to detach the flake. The term Skaill knife was given by Childe after the discovery of many of these flakes at his excavations at Skara Brae on the Bay of Skaill (Childe and Paterson 1929).

Over three-quarters of the flakes are primary ie. they retain all of the original cobble cortex over the dorsal face; a significant proportion are secondary, with only partial cortex, and there are a few inner flakes (table 1). These secondary and inner flakes tend to be amongst the smallest Skaill knives and most were recovered from wet-sieving. A plot of the flake sizes from T2, layer 13 illustrates the general size and shape trends for Skaill knives (fig 1): they tend to be round to squat in shape and, with the exception of a few outliers, have maximum dimensions of less than 120mm.

Only 35 flakes have been modified around the edge after manufacture (table 2). In many cases this takes the form of light unifacial flaking from the dorsal face although a third of the pieces are bifacially flaked. The retouch is most commonly present on one or both sides, presumably to reduce the thicker edge angle here. Occasionally the distal end is modified whilst one flake has been retouched around the whole edge. Steep edge retouch is confined to only two flakes. One flake from T4 has been bifacially retouched on the distal end to form a distinctive point. There is a tendency for these retouched flakes to be amongst the largest pieces (fig 1).

Edge damage was recorded in an attempt to assess the number of flakes which were actually used. Since many of the flakes were subject to post excavation damage the percentage of used flakes is not as high as that recorded at other sites. Only 152 flakes had clear evidence for edge damage; 95% had either unifacial or bifacial flaking, about half of which had additional rounding on parts of the edge (table 3). These used flakes have a scattered size range but it is perhaps significant that most have dimensions larger than 60mm (fig 1).

The use of Skaill knives must have been confined to the working of fairly pliant substances since the micaceous sandstone is itself a soft rock. Experimental work using Skaill knives as butchery tools has demonstrated their efficiency in such work (Clarke 1990) and has also produced similar wear patterns on a comparable size range to those from archaeological contexts. Although the full functional repertoire of these flakes has not been tested it is likely that butchering was the main processing activity with which the Skaill knives were involved. Very recent excavation outside the Guardianship area of the site uncovered a thin midden with Skaill knives and butchered bone in close association (C. Richards pers comm).

1.1.2 Flake Debitage (T=1500)

The debitage is all of grey sandstone. Over 60% of the flakes have maximum dimensions of less than 20mm and this size

distribution is reflected in the flake types with the majority being tiny inner flakes (table 1). In recent experimental reproduction of Skaill knives it was noted that a large amount of debitage was created by the action of throwing the cobble against an anvil. Much of this debris had just a small nick on the edge to indicate the point of removal, or else did not have a detachment scar at all. This is in contrast to the 'powdery' crushed scar seen on those larger flakes which have been detached at the point of impact. The debitage from the site shows similar detachment characteristics indicating that it was produced incidentally through the shattering of a cobble. It is probable then that this debitage was formed as a direct result of manufacturing Skaill knives.

1.2 Flaked Cobbles (T=6)

These are made on cobbles of grey or black sandstone and there is one of quartzite. They have been deliberately flaked around part of the circumference in order to form a sharp edge with an acute edge angle. Two of the cobbles have been flaked unifacially on one or both ends and the rest have been flaked bifacially on the ends and/ or sides. Only one cobble has evidence for edge damage over the flaked edge and this is in the form of a narrow band of faceting on one end. This and one other piece have additional wear in the form of an area of pecking in the centre of one face.

1.3 Cobble Tools (T=27)

The cobble tools are made on cobbles which have not been modified prior to use; it is the patterns of wear which have been produced through the use of the tool which define the artefact type.

The most numerous cobble tool type is that defined as a plain hammerstone (PH). These are often elongated in form and usually bear areas of pecking, particularly on the ends. Three quarters of these hammerstones are quite heavily flaked on the ends too. The rest of the cobble tools have more specific wear patterns in the form of faceting (F), facial pecking (FP) or a combination of both (FFP). These pieces tend to be formed on cobbles which are a flat oval in shape and are usually smaller than the plain hammerstones. The wear patterns: facial pecking and end faceting, are very similar to those which have been produced on hammerstones used in experimental knapping (Callahan 1987). In addition to the worn cobbles, a further 46 cobbles were found which bore no trace of use-damage. The lack of wear traces on these cobbles suggests that though they were brought onto the site, they remained unused. Alternatively, the large number of these unworn cobbles in comparison to those with wear traces may suggest that they were used in certain processing activities which did not damage the surface of the piece.

1.4 Worked Laminated Material (T=190)

These are thin slabs of laminated shale or sandstone which have been chipped around the circumference to shape. Three-

quarters of these pieces are broken and it was not possible to determine the original dimensions or shapes of these from the fragments. Instead the surviving outline of the pieces has been used to determine the classification. The majority, 56%, have a curved outline (C) and a further 39% are more angled in outline though often forming an arc. A few pieces are right-angled (RA), denticulate (D) or even lobate (L) in plan (table 5).

Of the pieces which are complete, these show a wide size range from 70mm to 300mm in diameter with the majority less than 150mm (fig 6). Most are sub-circular to oval in shape with curved or angled outlines. Two pieces are rectangular in shape.

Most of the pieces in this assemblage, including those with curved and angled outlines, can be termed stone discs. Many of these most probably functioned as pot lids either as covers for cooking pots or else as storage. There is very little evidence on the discs from this site for the presence of heat damage around the edges of the discs which would indicate that the disc had been used as an overhanging pot lid whilst the container was over a fire. This is in contrast to the assemblage from the Grooved ware site at Pool which indicated a clear tendency for the larger discs to have been used in this way (Clarke 1995).

Given the large size of many of the fragments, and the evidence from the size range of the complete discs, there

seems to be a tendency for the smaller discs (<150mm) to survive breakage. This may indicate a difference in function between the large stone discs and the smaller ones. It is possible that, given their weight (several fragments weigh over 1 kilogramme), many of the largest discs were not used as covers for free-standing pots. Instead, they may have been used over buried pots or else as a form of paving within houses or over the midden surface itself.

1.5 Incised Stone (T=20)

Many of these pieces are small shale fragments which bear light random incisions on one face. Several larger shale fragments have a more obvious pattern normally comprising lozenges or a diamond chequer-board pattern some sections of which may be hatched, two of these pieces are incised on both faces.

Incised decoration has also been applied to the dorsal face of a Skaill knife. On this piece the decoration comprises a fine sequence of lozenges and triangles.

1.6 Other Artefacts (T=10)

A small number of other artefactual types are present. The most obvious pieces include a small bifacially hollowed slab, a radially grooved slab, a complete chisel-type axe and a flake from a polished axe, a bifacially ground 'knife', two

handled pieces, a sculpted stone, a piece of haematite, and a lobate-
shaped piece of shale. These are examined in more detail later.

2. Artefacts From Earlier Excavations

The coarse stone assemblage formed from the collections of the earlier excavations shows three major differences in composition to that from the excavations in the 1970s (table 6) and these are in part due to the incomplete collection strategy at the expense of artefacts such as the Skaill knives, cobble tools and stone discs and also the greater extent, and therefore larger potential assemblage, of the earlier excavations. First, there is a gross under-representation of Skaill knives and stone discs although there are references to their abundance on site in the reports (Childe and Paterson 1929, 266 and 273; Petrie 1868, 213 and 215). Secondly, there is a considerable number of pieces, particularly the mortars, sculpted pieces and a few miscellaneous artefacts which are not paralleled in the 1970s excavations. Finally, a few pieces from this collection may be attributed to iron age or later activity on the site.

2.1 Artefact type

Most of the hollowed stones are termed mortars and these are made on cubic, triangular or multi-sided shaped blocks of sandstone. They have single cupped hollows worked on one face, in two cases a shelf or a protuberance is incorporated. Several of the mortars appear to have been completely altered to a yellow colour by heating, whilst others bear traces of

red pigment, possibly powdered haematite, in the hollow. It is these traces which suggest the functional name of 'mortar', whilst Childe also calls these paint pots (Childe 1931). Childe has noted too the resemblance of the pentagonal and hexagonal stone mortars to those 'paint pots' made of whale bone vertebrae (Childe 1931).

The perforated objects found include three stone beads and five of jet as well as two weights and a perforated wedge-shaped stone. It is likely that these latter three (HA 24, 25, 683) are a product of later iron age activity as there is no evidence from other neolithic or bronze age sites for the production of perforated objects other than beads and mace-heads.

The incised stone differs from that found in the 1970s excavations in that there are no incised shale fragments represented. Instead, the fine incised decoration appears in the centre of a broken lobate-shaped piece, and on a ground stone 'knife'. Some slabs of flagstone have also been subject to pecked linear decoration on the face and edge.

One incised piece is quite different to the rest being described as a flagstone slab on which three pecked cup-marks with close set grooves radiating from them have been worked (HA 696). This, although unseen, may be similar to that piece with a single cup-mark and radiating grooves found in T2 layer 13 (Cat no. 141). It is not certain whether the former piece is the same as that described by Childe as '... a flat

slab stone with radiating incisions converging into a pit marking - the latter probably containing oil - for sharpening bone needles etc..' and which was found in a cell of the entrance passage to chamber 4 (Childe 1929 235). This description implies only one pit and groove set and therefore is most similar to that from the recent excavations.

The pieces of ground stone are varied in nature. Two have been ground deliberately to shape: one, a small disc, has been ground all over and on the other the two faces of a naturally bored pebble have been ground in addition to some polishing on the sides. One rectangular piece of siltstone (HA 152) may be an iron age piece as it most closely resembles a fine whetstone. Grinding also occurs on two cobbles as a result of the tools use.

Four pieces are handled objects. One (HA 677) is finely worked to produce a double-headed form whilst three others are made on tabular material one cleaver-like and the others with wide heads from asymmetrical shoulders.

Only one piece of sculpted stone was found during the recent excavations at the site and this is in contrast to the large number from the earlier excavations. These include ten stone balls which are either plain, incised, or intricately carved with raised knobs and ridges. The remaining pieces may be broadly divided into those with spikes and those with bulges. The four with spikes are quite different from each other and include a mushroom-shaped piece, a highly decorative triple-

pointed object, a spiked fragment and a curious elongated piece with pointed ends and raised 'mouldings' encircling the piece towards either end. The three bulged pieces are rougher in execution than the spiked pieces and the bulges tend to be formed by encircling grooves.

Amongst the miscellaneous pieces are an undecorated lobate-shaped piece, a slab of tabular sandstone with seven widely-spaced blunt 'teeth' along the longest edge and a group of pieces which although being different from each other are all shaped by grinding into curious pointed objects.

3. Assemblage Function and Context

The coarse stone assemblage from the 1970s excavations is dominated both by Skaill knives and the debitage derived from their manufacture. Totals from each trench (figs 2-5) indicate that in T1 Early and T2 the flake debitage is most numerous whilst Skaill knives are dominant in T1 Late. The smaller proportion of debitage in T1 Late is in part due to its complete absence in the large midden of layer 2 which incidentally contained the largest numbers of Skaill knives of any layer. The same grouping by trench is seen in the distribution of the laminated pieces as the broken unworked fragments form the most significant component from T1 Early and T2 whilst in T1 Late there is a larger proportion of worked pieces. The cobble tools, in contrast have a more even distribution between trenches.

The distribution of artefacts by context type indicates that the great majority of the artefacts in each trench are found in the middens (figs 2-4). A large proportion of artefacts from the sand contexts in T1 Late are in fact derived from layer 34, which is described as having dollops of midden in it and it is likely that the artefacts derive from this material rather than the sand direct. Outwith the midden-type contexts there are too few other context types and relatively few artefacts in each of the trenches as to make any broad analysis of their distribution.

Between the various midden contexts there are some differences in artefactual content which may point to the differing uses of the middens. Firstly, it is only a few of the midden layers which contain large numbers of stone artefacts: T1 Early 55 and 68; T1 Late 2, 10, 32, 32A; T2 13 all have >100 artefacts and of these one layer from each trench dominates (T1 2, 68, T2 13) (figs 7-9). With the exception of T1, 2 the assemblages from those midden layers with >100 artefacts are characterised by a large component of flake debitage and broken unworked laminated fragments as well as a greater number of Skaill knives. This suggests that the midden surfaces were being used for the manufacture and use of Skaill knives. That the fragmented laminated stone occurs in the same contexts with evidence for the production and use of Skaill knives may suggest an association between the two; perhaps the stones were used as a hard surface on which butchering, or other processing activities using Skaill

knives, took place. Alternatively the stone may be associated with other types of working on the midden surface.

Flake debitage and broken laminated stone are barely present in the other midden layers suggesting that the use of Skaill knives was confined to particular working areas. Only one large midden T1, layer 2 has no debitage and in turn there is a larger proportion of worked laminated fragments here. The contrast in assemblage composition with the other middens is quite marked, even with T1, layer 10 an associated midden. Certainly there is no evidence that the Skaill knives were manufactured in T1, layer 2 and although the Skaill knives contain a proportion of retouched and used pieces it is possible that these flakes were not used **in situ** but deposited in a different manner to the other middens. A comparison with the rest of the material culture from this layer may resolve this problem.

From the evidence of the stone tools it appears that many of the middens have been used as surfaces for working areas and it is likely that butchering was the most common processing activity. This raises questions about the proximity of the butchery areas to the settlement; whether they occurred close to, or further away from the particular houses which were in use during the various phases.

There is one collection of stone artefacts which are distinguished by fine workmanship and these are from the floor of H12 (T1, layer 41). They include the decorated

Skaill knife, a fine chisel-type axe, and a ground stone knife. The association of these with a number of other interesting artefact types suggests a deliberate deposit.

4. Site chronology

The assemblage from the 1970s excavations shows little contrast between the various phases of the site and this suggests that there were no great chronological differences in the use of the most common coarse stone tools. In all phases Skaill knives are dominant and cobble tools are present in more or less equal numbers. Only the small amount of worked laminated material present in T1 Early suggests a chronological difference as at Pool, on Sanday, the stone discs also dominated in the latest phase of the site.

Likewise, with the other less common artefact types, there is little evidence for their discrete occurrence by phase. Instead, one midden layer T2, layer 13 has perhaps the most interesting collection with 15 incised pieces, mainly shale fragments but including the radially grooved slab; a piece of sculpted stone and a handled object. This latter piece is of interest as, although it is broken, it most closely resembles the 'head' of a handled club which are common to late neolithic and bronze age Shetland.

Other elements in the assemblage may point to later activity. One lobate object found in T4, 8 and a cleaver from T4b, 3 are found in bronze age contexts in Shetland at Sumburgh,

Jarlshof and Kebister. Two other lobate objects, one decorated, from the earlier excavations at Skara Brae and are uncontexted so it is impossible to conclude as to whether they represent a later Grooved ware element.

Unfortunately, the artefacts collected from the earlier excavations cannot be used to identify chronological phases of use. There is some evidence for the presence of iron age material, most notably the perforated pieces whilst the early excavations also produced evidence for activity on site dating to later than the main Grooved ware settlement. Re-occupation levels were noticed in H1 and H7, and the area S of the Market place had a sequence of loose middens and sand associated with a series of walling though it was not clear whether these could be associated with the re-occupation of the houses (Childe 1931b, 62-63). A group of stone objects were recovered from these later layers S of the Market place, amongst stones apparently fallen from the walls c and d and in loose midden flush with the top of wall d (ibid 109). They include three handled objects, three carved objects, two objects with spikes and encircling grooves and a pear-shaped stone ground to shape. Childe has suggested that all may be considered as a single group perhaps derived from undiscovered activity associated with period 4. Certainly none of these artefacts have comparisons with Grooved ware material and indeed, with the exception of the handled pieces, none have comparisons from prehistoric Orkney and Shetland.

There is a growing body of evidence which points to later activity on Grooved ware sites. Physically this takes the form of a series of walling as at Links of Noltland and Pool, peripheral to the main site, as well as the walls c and d and possibly Trench 4 at Skara Brae. At the former sites the stone artefacts associated with these phases are simply Skaill knives and cobble tools but at Skara Brae the stone is of a distinctive nature showing elements of Shetland bronze age as well as forms not found elsewhere.

4.2 Intra-site comparisons

The assemblage from Skara Brae is characterised by a large flake component with, at least in the later phase, a significant number of stone discs. In this respect it is most similar to the Grooved ware site at Pool and, in the absence of detailed information, the midden phases at Rinyo. Links of Noltland and the neolithic site at Tofts Ness have also produced large numbers of Skaill knives. In contrast, flake debitage is less common at other sites. It is certainly present at Links of Noltland which had similar excavation techniques to Skara Brae but at Pool and Tofts Ness it is absent. Although no wet-sieving was carried out at these latter two sites the lack of debitage from the production of Skaill knives compares with the lack of evidence for flint-working (B Finlayson pers comm) suggesting that the middens were used in a different manner on these Sanday sites.

Certain of the less common artefact types occur at other sites and these include mortars and ground cobbles from Pool

and Barnhouse; and bifacially hollowed stones from Knap of Howar and Tofts Ness. Plain stone balls have been found at Rinyo and Barnhouse and from Rinyo a mushroom-shaped piece may bear comparison to that found at Skara Brae. Other sculpted pieces have been found from the latest phase at Pool and these take the form of spiked objects.

The Orcadian pottery sequence developed by Ann MacSween based on the sequence at Pool can be compared with the presence of the stone artefact types from Orkney (MacSween 1992). There appears to be almost no correlation with ceramic style and stone artefact type; only the dominance of Skaill knives in the assemblage coincides with the use of plastic and grooved ornamentation in the ceramics. However, large numbers of Skaill knives are also associated with the development and use of midden deposits and these are dominant at Pool associated with the presence of incised ware. Although there are 'type-sites' such as Barnhouse and Knap of Howar for the rest of the less common stone artefact types the use of these pieces continues throughout the various phases of ceramic style from their point of introduction. That specific artefacts of coarse stone cannot generally be associated with developments in Grooved ware style is perhaps unsurprising: at the Orcadian neolithic site of Tofts Ness, which to all intents and purposes has a similar stone assemblage to the other neolithic sites the pottery is not Grooved ware but instead more closely resmbles ceramics from Shetland (MacSween pers comm).

Table 1: Flake types

	Primary	Secondary	Tertiary
Skaill knives	1102 (79%)	243 (17%)	60 (4%)
Debitage:			
20mm-40mm	96 (6%)	194 (13%)	302 (20%)
<20mm	18 (1%)	121 (8%)	770 (51%)

Table 2: Skaill knife distribution by trench

	Total	No wear	CD wear	Wear	Retouched	Debitage
T1	1032	567	363	108	20	834
T2	251	127	100	24	12	661
T3	27	7	16	4	1	2
T4	89	40	33	16	2	4
Tot	1405	741	512	152	35	1501

Table 3: Wear types

Rounded	1
Unifacially flaked	46
Bifacially flaked	24
Denticulate	1
Crushed	1
Rounded and unifacially flaked	29
Rounded and bifacially flaked	46

Table 4: Cobble tool types by trench

	PH	F	FP	FFP	Unused
T1	8	2	2	2	36
T2	6	2	1	1	9
T3	1	1			1
T4			1		
Total	15	5	4	3	46

Table 5: Worked laminated material shapes by trench

	C	A	RA	D	L	UF
T1	88	64	2	4	2	378
T2	15	11	1			146
T3	2					
T4	1					1
Tot	106	75	3	4	2	525

Table 6: Artefacts from the earlier excavations

Skaill knives	30
Cobble tools	16
Flaked cobbles	2
Stone discs	18
Hollowed stones	22
Perforated pieces	8
Incised and carved	8
Axes	18
Ground stone	5
Handled	4
Sculpted	17
Haematite	2
Lobate	1
Misc	19

SKARA BRAE: COARSE STONE CATALOGUE

The entries are ordered by Trench; Layer; Find Number (given during post excavation work) for those artefacts found during the 1970s excavations. The artefacts from earlier museum collections are listed using the accession numbers: BM (British Museum); RMS (Royal Museum of Scotland); SB museum (Skara Brae site museum); and Stromness museum. The catalogue number is given first in the entry. Where the artefact has not been seen by me this is noted and the museum catalogue entry used. The typed catalogue entries for the Skara Brae material at the Royal Museum of Scotland stop at HA 700. There are four further hurriedly pencilled entries HA 701-704 which do not actually match the objects which have these numbers. For this reason those pieces with catalogue numbers HA 701 and onwards have been omitted from this catalogue.

Several of the entries contain references to artefact illustrations which occur in the published texts by Childe: SB (Skara Brae: a Pictish Village in Orkney, 1930); PSAS (Proceedings of the Society of Antiquaries of Scotland).

The dimensions recorded are ML (maximum length in millimetres); MW (maximum width in millimetres); MT (maximum thickness in millimetres); W (weight, in grammes); D (depth in millimetres); Dia (diameter in millimetres).

COBBLE TOOLS

1. 1; 1; 29
Unused sandstone cobble.
ML 84; MW 75; MTh 38; W 378g.

2. 1; 2; 26
Plain hammerstone. Sub-oval sandstone cobble. Light area of pecking on both ends and an area of smoothing on one face.
ML 215; MW 53; MTh 45; W 812g.

3. 1; 2; 70
Unused cobble.
ML 75; MW 44; MTh 33; W 150g.

4. 1; 2; 87
Plain hammerstone. Flat oval sandstone cobble, broken. Areas of heavy pecking on ends, sides and one face. Flaking present on unbroken end.
No measurements; W 1179g.

5. 1; 2; 88
Faceted and facially pecked hammerstone. Flat oval sandstone cobble. Single heavily worn facet on either end. Single areas of light pecking on both faces and one side.
ML 140; MW 93; MTh 71; W 1470g.

6. 1; 10; 25
Unused sandstone cobble.
ML 55; MW 40; MTh 33; W 104g.

7. 1; 10; 43
Unused sandstone cobble.
ML 100; MW 53; MTh 20; W 173g.

8. 1; 13; 27
Unused sandstone cobble.
ML 105; MW 87; MTh 59; W 770g.

9. 1; 14; 28
Unused sandstone cobble.
ML 68; MW 63; MTh 54; W 320g.

10. 1; 21; 89
Plain hammerstone. Oval sandstone cobble. Medium flaking on one end.
ML 77; MW 56; MTh 40; no weight.

11. 1; 22; 30
Unused sandstone cobble.
ML 46; MW 44; MTh 30; W 86g.

12. 1; 22; 79
Unused sandstone cobble.
ML 68; MW 27; MTh 20; W 57g.

13. 1; 26; 74
Unused cobble.
ML 43; MW 36; MTh 28; W 52g.

14. 1; 29; 53
Unused sandstone cobble.
ML 114; MW 105; MTh 52; W 952g.

15. 1; 32; 46
Unused sandstone cobble.
ML 56; MW 43; MTh 41; W 139g.

16. 1; 32; 47
Facially pecked hammerstone. Flat oval sandstone cobble. Areas of pecking on both faces and also on sides.
ML 144; MW 97; MTh 64; W 1294g.

17. 1; 32A; 51
Plain hammerstone. Sub-oval sandstone cobble. Area of medium pecking on one end.
ML 56; MW 40; MTh 38; W 126g.

18. 1; 32A; 52
Unused sandstone cobble, broken.
No measurements; W 500g.

19. 1; 37; 33
Facially pecked hammerstone. Oval sandstone cobble. Areas of heavy pecking over whole of piece, especially twin areas on both faces.
ML 136; MW 83; MTh 61; W 1020g.

20. 1; 39; 54
Unused sandstone cobble.
ML 59; MW 46; MTh 31; W 128g.

21. 1; 41; 39
Unused sandstone cobble.
ML 67; MW 32; MTh 17; W 57g.

22. 1; 44; 40
Unused sandstone cobble.
ML 77; MW 51; MTh 45; W 248g.

23. 1; 50; 56
Unused cobble.
ML 53; MW 52; MTh 43; W 158g.

24. 1; 50; 86
Unused sandstone cobble.
ML 60; MW 56; MTh 41; W 187g.

25. 1; 51; 34
Plain hammerstone. Sub-round sandstone cobble. Areas of medium pecking around ends and sides.
ML 45; MW 42; MTh 32; W 78g.
26. 1; 51; 35
Faceted hammerstone. Oval cobble of sandstone. Single smooth facet pecked on one end. Some light pecking on either side.
ML 72; MW 31; MTh 24; W 77g.

27. 1; 51; 36
Unused sandstone cobble.
ML 83; MW 53; MTh 30; W 184g.

28. 1; 51; 37
Unused sandstone cobble.
ML 90; MW 45; MTh 29; W 178g.

29. 1; 51; 38
Unused sandstone cobble.
ML 107; MW 50; MTh 23; W 191g.

30. 1; 52; 55
Unused sandstone cobble.
ML 104; MW 95; MTh 49; W 763g.

31. 1; 55; 78
Unused cobble.
ML 46; MW 44; MTh 40; W 107g.

32. 1; 59; 45
Unused sandstone cobble.
ML 81; MW 70; MTh 60; W 488g.

33. 1; 64; 41
Unused sandstone cobble.
ML 111; MW 49; MTh 24; W 213g.

34. 1; 65; 31
Faceted and facially pecked hammerstone. Oval sandstone cobble. Single heavy facet pecked on one end. Heavy pecking spread over most of the cobble including faces.
ML 116; MW 88; MTh 82; W 1184g.

35. 1; 65; 32
Unused sandstone cobble.
ML 57; MW 48; MTh 28; W 113g.

36. 1; 65; 77
Unused cobble.

ML 48; MW 34; MTh 28; W 61g.

37. 1; 66; 42
Unused sandstone cobble, abraded.
ML 73; MW 52; MTh 49; W 241g.

38. 1; 68; 18
Faceted hammerstone. Sub-oval sandstone cobble. Smooth, double facets on either end form ridge.
ML 121; MW 63; MTh 43; W 504g.

39. 1; 68; 19
Unused sandstone cobble, burnt.
ML 73; MW 58; MTh 50; W 293g.

40. 1; 68; 20
Unused sandstone cobble.
ML 179; MW 61; MTh 34; W 669g.

41. 1; 68; 21
Plain hammerstone. Flat oval sandstone cobble. Heavily pecked on both ends and one side. Heavy flaking also on one end.
ML 148; MW 89; MTh 43; W 862g.

42. 1; 68; 22
Plain hammerstone. Sub-oval sandstone cobble. Medium flaking on one end.
ML 108; MW 62; Mth 43; W 399g.

43. 1; 68; 23
Plain hammerstone. Flat oval sandstone cobble, burnt. Heavy flaking on both ends.
ML 144; MW 72; MTh 38; W 543g.

44. 1; 68; 64
Unused cobble.
ML 67; MW 46; MTh 31; W 140g.

45. 1; 68; 65
Unused sandstone cobble.
ML 69; MW 37; MTh 26; W 85g.

46. 1; 68; 66
Unused cobble.
ML 53; MW 38; MTh 31; W 89g.

47. 1; 68; 67
Unused sandstone cobble.
ML 74; MW 33; MTh 24; W 83g.

48. 1; 68; 68
Unused sandstone cobble.
ML 66; MW 34; MTh 19; W 65g.

49. 1; 68; 69
Unused cobble.
ML 38; MW 32; MTh 23; W 36g.

50. 1; 68; 91
Unused cobble.
ML 81; MW 61; MTh 18.

51. 2; 11; 72
Unused cobble.
ML 63; MW 57; MTh 47; W 265g.

52. 2; 12; 59
Faceted hammerstone. Oval sandstone cobble. Two medium facets pecked on one end. Medium pecking on opposite end.
ML 65; MW 28; MTh 24; W 68g.

53. 2; 13; 1
Plain hammerstone. Flat oval sandstone cobble. Medium pecking and flaking on both ends.
ML 170; MW 76; MTh 31; W 705g.

54. 2; 13; 2
Unused sandstone cobble.
ML 135; MW 88; MTh 73; W 1211g.

55. 2; 13; 3
Plain hammerstone. Flat oval sandstone cobble. Light pecking and heavy flaking on both ends.
ML 147; MW 71; MTh 49; W 639g.

56. 2; 13; 4
Unused sandstone cobble.
ML 81; MW 57; MTh 54; W 355g.

57. 2; 13; 5
Unused sandstone cobble.
ML 96; MW; 73; MTh 38; W 404g.

58. 2; 13; 6
Unused sandstone cobble.
ML 84; MW 23; MTh 20; W 63g.

59. 2; 13; 7
Faceted hammerstone. Elongated oval sandstone cobble. Two facets pecked on one end. Light pecking on opposite end.
ML 71; MW 30; MTh 22; W 77g.

60. 2; 13; 8
Unused sandstone cobble.
ML 79; MW 39; MTh 27; W 124g.

61. 2; 13; 9
Plain hammerstone. Sub-round sandstone cobble. Heavy flaking on both ends.
ML 205; MW 80; Mth 69; W 1665g.

62. 2; 13; 10
Faceted and facially pecked hammerstone. Sub-oval sandstone cobble. Single, heavily pecked facets on either end. Areas of heavy pecking on one side and end and over both faces.
ML 130; MW 96; MTh 63; W 1139g.

63. 2; 13; 11
Plain hammerstone. Oval cobble of sandstone. Lightly pecked over most of exterior.
ML 108; MW 93; MTh 66; W 956g.

64. 2; 13; 12
Plain hammerstone. Oval sandstone cobble. Light pecking and flaking on one end.
ML 108; MW 85; MTh 55; W 764g.

65. 2; 13; 14
Unused sandstone cobble.
ML 141; MW 80; MTh 55; W 955g.

66. 2; 13; 85
Facially pecked hammerstone. Flat oval sandstone cobble. Both faces have twin areas of heavy pecking. Some pecking on both sides.
ML 121; MW 88; MTh 59; W 988g.

67. 2; 15; 44
Unused sandstone cobble.
ML 65; MW 46; MTh 32; W 148g.

68. 2; 17; 57
Unused cobble, broken.
No measurements; W 891g.

69. 2; 17; 58
Plain hammerstone. Oval cobble of sandstone, broken. Areas of medium pecking on both ends.
No measurements; W 881g.

70. 3; 8; 50
Plain hammerstone. Flat oval sandstone cobble. Areas of medium pecking and heavy flaking on both ends.
ML 215; MW 140; MTh 76; W 3121g.

71. 3B; 5; 75
Unused cobble.
ML 61; MW 34; MTh 24; W 68g.

72. 3F; 9; 49
Faceted hammerstone. Flat oval sandstone cobble. Single facet worked on one end.
ML 135; MW 71; MTh 39; W 628g.

73. 4A; 9; 73
Unused cobble.
ML 77; MW 73; MTh 49; W 364g.

74. 4A; 10; 71
Facially pecked hammerstone. Irregular-shaped sandstone cobble. Medium pecked area on one face. Area of smoothing with visible striations on opposite face.
ML 117; MW 73; MTh 73; W 759g.

75. RMS HA 6
Faceted hammerstone. Oval sandstone cobble. Large single facets on either end of cobble, heavily worn. Some additional pecking on faces and sides.
ML 142; MW 103; MTh 69; W 1580g.

76. RMS HA 9
Faceted hammerstone. Flat oval sandstone cobble. Single facet located at either end. A shallow notch has been formed on one side by pecking.
ML 115; MW 64; MTh 25; W 287g.

77. RMS HA 10
Faceted hammerstone. Flat oval sandstone cobble. Single light facet located at either end.
ML 105; MW 62; Mth 23; W 229g.

78. RMS HA 11
Fragment of sandstone cobble. Facets from grinding all round edge of and both faces smoothed with slight polish. ?pounder/ grinder.
No measurements; W 459g.

79. RMS HA 643
?Anvil stone. Large tabular piece of volcanic rock. Row of heavy pecking down centre of each face. Some heavy flaking and bashing on either end.
ML 235;1 MW 79; MTh 49.

80. RMS HA 644
Facially pecked hammerstone. Elongated oval cobble of sandstone. Extensive area of pecking on one face and some pecking on sides and one end.
ML 195; MW 77; MTh 43.

81. RMS HA 645
Facially pecked hammerstone. Flat oval cobble of sandstone. Twin areas of pecking on each face.
ML 140; MW 78; MTh 37; W 617g.

82. BM 1938 1-1.180
Elongated oval cobble of sandstone. Broken down length. One end is flaked and the other lightly pecked. The unbroken face has widespread pecking and battering and striations are visible which run around the middle of the piece as if for hafting.
ML 200; MW 75; MTh 56.

83. SB Museum no number
Large irregular shaped lump of ?volcanic rock. Patches of deep pecking on ends and sides.
ML 180; MW 96; MTh 77.

84. SB museum no number
Facially pecked hammerstone. Elongated oval cobble of black micaceous sandstone. Discrete areas of pecking on either face towards one end.
ML 141; MW 48; MTh 33.

85. SB museum no number
Facially pecked hammerstone. Irregularly shaped cobble of black sandstone. Areas of deep pecking down centre of both faces.
ML 200; MW 77; MTh 48.

86. SB museum no number
Facially pecked hammerstone. Flat oval sandstone cobble. Discrete area of heavy pecking on either face. Some light pecking on ends.
ML 108; MW 76; MTh 55.

87. SB museum no number
Facially pecked hammerstone. Oval sandstone cobble. Twin areas of pecking on both faces.
ML 118; MW 87; MTh 50.

88. SB museum no number
Facially pecked hammerstone. Elongated sandstone cobble, broken across width. Twin areas of pecking on both faces. Pecking down one side and flaked at unbroken end.
ML 175; MW 51; MTh 47.

89. SB museum no number
Facially pecked hammerstone. Oval sandstone cobble. Twin areas of pecking on both faces and on sides.
ML 110; MW 49; MTh 35.

90. SB museum no number
Faceted and facially pecked hammerstone. Sub-round cobble of black micaceous sandstone. Broad areas of faceting on either end. Single area of heavy pecking on both faces.
ML 78; MW 76; MTh 60.

FLAKED COBBLES

91. 1; 10; 24
Flat oval sandstone cobble. Bifacial flaking around one end and both sides. Some pecking on unflaked end.
ML 78; MW 62; MTh 20; W 138g.

92. 1; 32; 48
Flat oval sandstone cobble. One flake removed from distal end.
ML 66; MW 86; MTh 23; W 155g.

93. 1; 41; 60
Irregular-shaped quartzite cobble. Bifacially flaked around one end and one side.
ML 72; MW 88; MTh 29; W 229g.

94. 1; 57; 76
Flat oval cobble of sandstone. Unifacial flaking on either end.
ML 80; MW 50; MTh 10; W 63g.

95. 2; 13; 13
Flat oval sandstone cobble. Flaked bifacially on one end. One pecked facet down one side.
ML 105; MW 86; MTh 32; W 447g.

96. 2; 13; 15
Sandstone cobble, broken laterally. Bifacial flaking on surviving end.
No measurements; W 150g.

97. BM 1938 1-1.132
Oval-shaped cobble of sandstone. Flaked bifacially on one end. Lightly pecked on opposite end.
ML 215; MW 94; MTh 75.

98. BM 1938 1-1.133
Irregular shaped cobble of sandstone. Bifacially flaked on broad end and down one side. The cobble narrows at the unflaked end to form a natural 'handle'.
ML 235; MW 113; MTh 38.

FINELY RETOUCHED SKAILL KNIVES

99. 4B; 3
Skaill knife bifacially retouched to form a fine point. The tip does not look worn.
ML 123; MW 112; MTh 17.

100. RMS HA 676 (not seen)
Thin flake, notched on one side.
MW 122.

101. RMS HA 669
Skaill knife with bifacial retouch on distal end forming three deep notches. These notches serve to isolate 2/3 points giving the piece a denticulate outline.
ML 80; MW 84; MTh 17.

HOLLOWED STONES

102. 1; 57
Bifacially hollowed stone. Roughly squared tabular piece of sandstone. Single shallow hollows have been worked on opposite faces. Both hollows are roughly pecked.
ML 50; MW 48; MTh 21; W 56g.

103. RMS HA 26
Mortar. Roughly squared block of sandstone with flat base. Areas of heat damage on exterior. The hollow is worked centrally and is circular in plan with steep sides and a gently curved base. The interior of the hollow also has a sloping protrusion or 'shelf' made towards the top on one part of the circumference.
ML 115; MW 125; MTh 86; W 1161g; hollow ML 68; MW 68; D 40.

104. RMS HA 27
Mortar. Sub-triangular block of sandstone with convex base. Areas of heat damage on the exterior.. Hollow worked centrally and circular in plan. Its interior is heavily pecked and the sides are steep and the base abruptly curved. One of the points of the 'triangle' has been flaked to form a slight protrusion ?thumb grip. This piece may be unfinished.
ML 110; MW 95; MTh 54; W 501g; hollow ML 43; MW 43; D 24.

105. RMS HA 29
Mortar. Sub-triangular block of sandstone with flat base. Yellow in colour due to total heat damage. The hollow is worked centrally and is oval in plan. Its interior is very smooth inside and the sides and the base are gently curved.
ML 101; MW 87; MTh 45; W 262g; hollow ML 68; MW 73; D 35.

106. RMS HA 30
Mortar fragment. Rectangular-shaped block of sandstone with convex base. Yellow in colour due to total heat damage. Fragment only. Hollow worked centrally and oval in plan. The interior is pecked and smoothed and the sides are steep and the base gently curved. Surviving rim and sides have been ground to flat faces.
ML 101; MW 68; MTh 51; W 268g; hollow ML 70; MW 52; D 29.

107. RMS HA 636
Mortar. Sub-hexagonal block of sandstone with flat base. A deep round-base hollow, circular in plan, has been worked in the centre of one face.
ML 121; MW 82; MTh 60; hollow ML 63; MW 55; D 30.

108. RMS HA 637
Mortar. Sub-triangular block of sandstone with flat base. The hollow is circular in plan and is worked off-centre. The interior is roughly pecked and the sides slant towards an abruptly curved base.
ML 123; MW 104; MTh 58; hollow ML 68; MW 68; D 25.

109. RMS HA 638
Mortar. Sub-rectangular sandstone block with flat base. Probable heat damage. Red staining on inside. The hollow is worked centrally and is smooth inside. It is oval in plan and has steep sides with a curved base.
ML 96; MW 60; MTh 60; hollow ML 75; MW 44; D 42.

110. RMS HA 639
Mortar. Sub-triangular block of sandstone with flat base. Red stain inside bowl. The hollow is worked centrally and is oval in plan. It is very smooth inside and the sides are steep with a curved base.
ML 98; MW 86; MTh 60; hollow ML 49; MW 44; D 39.

111. RMS HA 640 (not seen)
Square mortar with powdered haematite in cavity.
PSAS 63 fig 11.1; SB Pl 50.
ML 35; MW 35; MTh 35.

112. RMS HA 641
Sub-rectangular block of sandstone with convex base. Some evidence of heat damage on exterior. A shallow hollow is worked centrally on the broadest face and is oval in plan. Pecking is visible on the steep sides of the hollow whist the base is very flat and smooth.
ML 190; MW 120; MTh 77; W 2747g; hollow ML 115; MW 77; D 15.

113. RMS HA 642 (not seen)
Rectangular mortar with powdered haematite in cavity. From excavations begun in 1861.

ML 101; MW 76; MTh 43.

114. RMS HA 680 (not seen)
Bifacially hollowed stone. Roughly triangular stone with pecked hollow on upper and lower surfaces.
MW 178.

115. RMS HA 681 (not seen)
Oval pebble with pecked hollow on one surface.
MW 135.

116. RMS HA 682 (not seen)
Quadrangular fragment, all edges are breaks except parts of two which have chords of circular perforations.
ML 162; MW 172.

117. BM 1866 8-1.3
Mortar. Sub-rectangular block of sandstone with curved base. The hollow is worked centrally and is oval in plan. The hollow is smooth inside and the sides are almost vertical with a flat bottom.
ML 110; MW 90; MTh 68; hollow ML 70; MW 48; D 34.

118. BM 1938 1-1.82
Mortar. Lozenge-shaped block of sandstone with flat base. The hollow is worked centrally and is oval in plan. It is smooth inside and has steep sides with a curved base.
ML 95; MW 77; MTh 54; hollow ML 70; MW 50; D 34.

119. BM 1938 1-1.83
Sub-pentagonal-shaped block of sandstone with convex base. The hollow is worked centrally and is circular in plan. The sides of the hollow are steep and the base is rough with a large bulbous projection. This projection apparently originally had red pigment on it suggesting that this mortar is not in an unfinished state.
ML 145; MW 125; MTh 92; hollow ML 88; MW 81; D 21.

120. BM 1938 1-1.131 (not seen)
Mortar. Sub-triangular shaped block with shallow oval depression in centre of one face.
ML 350; MTh 275.

121. SB museum 1928.120
Rectangular block of sandstone with convex base. Possibly broken down length. Hollow is worked centrally and is sub-rectangular in plan. Pecking is visible inside the hollow and the sides slant to a gently curved base.
ML 115; MW 80; MTh 46; hollow ML 80; MW 58; D 30.

122. SB museum (no number)
Irregularly-shaped block of sandstone with flat base. Broken. Large hollow, oval in plan worked on sloping upper face.

There is pecking around the sides of the hollow and its base is smooth.
Broken, no measurements.

123. Stromness Museum A255
Mortar. Cubic block of sandstone with flat base. The hollow is circular in plan and worked centrally. Its sides are steep and the base gently curved.
ML 96; MW 87; MTh 56; hollow ML 70; MW 63; D 35.

124. Stromness Museum A262
Mortar. Large, triangular-shaped block of sandstone with flat base. The hollow is circular in plan and worked centrally. Its sides are steep with a curved base.
ML 300; MW 270; MTh 110; hollow Dia 120; D 45.

PERFORATED PIECES

125. RMS HA 24
Weight. Sub-oval piece of laminate siltstone. Broken laterally. Hole made off-centre and pecked from opposite faces to form a biconical section.
Unbroken width 80; MTh 26; W 123g; hole 12mm minimum diameter..

126. RMS HA 25
Weight. Roughly squared piece of sandstone. Partial heat damage. Hole made off-centre and pecked from opposite faces to form a biconical section.
ML 135; MW 107; MTh 64; W 823g; hole 10mm minimum diameter.

127. RMS HA 631
Rectangular slab of flagstone. Broken laterally. A large perforation has been formed towards one end.
ML 200; MW 143; MTh 26; hole L 36; W 27.

128. RMS HA 646-650 (not seen)
Five discoidal jet beads, HA 650 oval rather than circular.
Dia c. 15.

129. RMS HA 651 (not seen)
Square bead of brownish stone.
ML 15.

130. RMS HA 652 (not seen)
Rectangular bead perforated longitudinally and transversely.
SB fig 18; PSAS 62 fig 36.
ML 28; MW 23.

131. RMS HA 653 (not seen)
Discoidal bead of grey stone.

Dia 18.

132. RMS HA 683
Wedge-shaped piece of sandstone. Biconical perforation made off-centre by pecking from both faces. Found in midden on wall between passage F and cell F1. See Childe 1930, 188.
ML 93; MW 87; MTh 73; Dia perforation top 40; bottom 37; middle 12.

INCISED STONE AND CARVED STONE

133. 1; 14; SF 110
Broken fragment of shale with light incisions on both faces. Face quartered and each section filled in with hatching or diamond chequerboard pattern.
ML 140; MW 135; MTh 12.

134. 1; 41; 1028
Skaill knife incised on dorsal face with lozenges and triangles.
ML86; MW 120; Mth 17.

135. 1; 47
Tiny fragment, possibly incised.

136. 1; 62
Two tiny broken fragments of tabular stone with light incisions.

137. 2; 13; SF 78
Broken fragment of tabular stone. Lightly incised lozenges on one face. On opposite face ?concentric lozenges.
ML 107; MW 110; MTh 18.

138. 2; 13
Fragment of tabular stone. Lozenges incised on one face, three being hatched.

139. 2; 13
Small tabular fragment incised on one face with irreguar lozenges.

140. 2; 13
Eleven small fragments with incisions.

141. 2; 13
Radially incised stone. Flat cobble of ?volcanic rock. Possibly pecked or ground to a sub-rectangular shape. On one face ten grooves radiate from a central depression.. The grooves have a V-shaped section and join the edge of the depression which is shallow and flat-based. This appears

identical to that described by Childe from cell in H4 (PSAS 1929, 235) which does not appear in the museum collections, but see Cat no. 146.

142. RMS HA 612 (not seen)
Of ground stone, with two reverse, hatched triangles scratched on one side.
SB 114-15, Pl 52.2 and PSAS 65, fig 23.
MW 76.

143. RMS HA 675
Lobate shaped object with incised decoration. Shale. Broken with two prongs surviving, probably originally four prongs. Shaped by pecking and chipping around the edge. On one face in the centre a lozenge-shaped chequerboard pattern has been incised.
ML 100; MW 85; MTh 25.

144. RMS HA 685
Triangular-shaped piece of tabular siltstone. Three sub-parallel rows of short score marks/ incisions are placed on one face.
ML 57; MW 56; MTh 5.

145. RMS HA 695 (not seen)
Rough lump of buff stone with cross on flat (?dressed) side.
SB pl 52.1
ML 147; MW 104.

146. RMS HA 696 (not seen)
Flagstone slab, now broken into two pieces, on one side one large and two small pecked cup-marks with close-set grooves radiating from them.
ML 510; MW 208; MTh 15.

147. RMS HA 697 (not seen)
Flagstone slab, on both faces wide-spaced parallel lines at slight angle to long axis of slab crossed by oblique wide-spaced parallel lines.
ML 365; MW 155; MTh 23.

148. RMS HA 698 (not seen)
Rectangular slab, lines down one edge.
ML 147; MW 48.

149. RMS HA 699 (not seen)
Rectangular slab of flagstone broken at both ends, longitudinal lozenge pattern on one face and irregular marks on one edge.
SB pl 53.3.
ML 160; MW 43; MTh 20.

AXES

150. 1; 41
Long, narrow, chisel-shaped axe. Fine-grained siltstone, polished or finely ground all over. Butt end is rounded, blade end is slightly curved.
ML 107; MW 35; MTh 26.

151. 4b; 7
Small flake from polished stone axe.

152. RMS HA 1
Sides splay towards blade end. Black micaceous siltstone, ground all over particularly on blade end. A notch has been worked on either side towards the butt end presumably for some form of hafting, breakage here across butt end. Slight faceting down sides. The blade end is finely formed and asymmetrically curved.
ML 130; MW 100; MTh 30.

153. RMS HA 613 (not seen)
Narrow-butted, straight-sided, near rectangular in cross-section.
SB pl 36.
ML 46; MW 30.

154. RMS HA 614 (not seen)
Similar to HA 613 but more lenticular in cross-section.
ML 50; MW 30.

155. RMS HA 615 (not seen)
Similar to HA 614 but of polished brown flint.
ML 84; MW 35.

156. RMS HA 616 (not seen)
Round-butted, near parallel sides, cross-section lenticular with flattened sides.
ML 68; MW 46.

157. RMS HA 617 (not seen)
Similar to HA 616 but oval in cross-section and encircling groove near butt.
ML 155; MW 61.

158. RMS HA 618 (not seen)
Similar to HA 617 but irregular shape.
SB pl 41.2; PSAS 64 fig 24.1.
ML 155; MW 84.

159. RMS HA 619 (not seen)
Near-pointed butt, straight-sided, lenticular in cross-section.

ML 120; MW 64.

160. RMS HA 620 (not seen)
Rounded butt, straight-sided, rectangular in cross-section.
ML 101; MW 64.

161. RMS HA 621 (not seen)
Pointed butt, oval cross-section, adze-type longitudinal section, very crudely made, ?encircling groove near butt.
ML 183; MW 58.

162. RMS HA 622 (not seen)
Square-butted, slightly concave sides, oval cross-section.
ML 142; MW 109.

163. RMS HA 623 (not seen)
Fragment of quartzite.
ML 66.

164. RMS HA 624 (not seen)
About half of axe, straight-sides, oval cross-section.
SB pl 36.
ML 51.

165. RMS HA 625 (not seen)
Butt rounded but damaged, concave sides, oval cross-section.
ML 178; MW 114.

166. RMS HA 626 (not seen)
Fragment of flint axe, reworked.
SB fig 10; PSAS 43 fig 30.4

167. BM 1866 8-1.1
Miniature axe, sides splay towards blade end. Possibly of basalt or amphibolite, ground and polished all over. The broad blade end is nicely formed and the butt end is truncated although polished over the breakage. One face bears areas of deep pecking.
ML 48; MW 42; MTh 17.

168. BM 1866 8-1.2
Broad axe with curving sides, ellipsoid in section. Fine-grained black micaceous sandstone, ground all over. Broken at butt end. The blade end has a slight asymmetrical curve.
ML 133; MW 86; MTh 36.

169. BM 1938 1-1.69
Sides splay towards blade end. Possibly of camptonite, polished. One face is quite battered and flaked from the sides and the blade end removing original polished surface. Opposite face survives. The butt and blade ends are both curved.

ML 106; MW 70; MTh 70.

GROUND STONE

170. 1; 41
Bifacially ground stone. Tabular piece of finely laminated black micaceous sandstone. The piece has been ground bifacially on one edge to form an acute edge angle and a slightly curved outline. Some unifacial grinding down one side. Parts of one face and around the edge opposite the ground end have a high 'polish' which may be due to some form of hafting.
ML 53; MW 46; MTh 6.

171. RMS HA 152
Ground stone. Thin rectangular-shaped piece of micaceous siltstone. Longitudinal striations on both faces and on sides and ends.
ML 59; MW 10; MTh 3; W 4g.

172. RMS HA 654
Small pebble of ?fine-grained black micaceous sandstone/ siltstone. It appears to have been broken laterally to reveal a deep, natural, marine-bored hole. The break has subsequently been ground flat and uni-directional striations are visible here. The opposite end has also been ground to a smooth, curved facet. This and the sides have been polished.
ML 27; MW 24; MTh 18.

173. RMS HA 672
Ground stone disc. Flat, sub-oval piece of siltstone, abraded. Lower face slightly concave, upper face slightly convex. The circumference has been ground to form flat sides.
ML 47; MW 40; MTh 10; W 19g.

174. RMS HA 673
?Grinding stone. Flat rectangular sandstone cobble, broken laterally. One face appears to have been ground to a smooth surface and the junction of this face and one edge is slightly angled.
ML 91; MW 47; MTh 13.

175. RMS HA 684 (not seen)
?Ground stone. Triangular fragment of pebble, one surface smoothed by wear.
ML 48.

HANDLED OBJECTS

176. 2; 13
?'Head' of handled club. This is a fragment of a worked piece of stone. It is a flat sandstone cobble which has been pecked to shape around one end and side to form a regular curved end and straight sides. The opposite end has also been pecked to form shoulders and the knob or 'handle' which would have been formed has been cleanly broken off and then flaked. This resembles closely the head of a handled club which are common in Shetland.
ML 85; MW 61; MTh 36.

177. 4b; 3
'Handled' object. Broken piece of tabular sandstone, abraded and burnt. The piece appears to have been shaped by some pecking to form a short handle which widens out to a large cleaver-like head.

178. RMS HA 677 (not seen)
Handled 'cleaver'. The long handle splays asymmetrically to form double cleaver-like head. Pecked/ ground to shape.
SB pl 39.2; PSAS 64 fig 25.3.
ML 190; MW 155.

179. RMS HA 678 (not seen)
Similar to HA 679 but of tabular sandstone. Handle splays asymmetrically to form wide head. ?damaged.
SB pl 40.1
ML 223; MW 114.

180. RMS HA 679
Handled object. Dense volcanic material, broken diagonally across 'head'. The piece has been pecked all over to form a 'handle' which splays outwards to form a sub-oval shaped head. The broadest edge of the 'head' has been bevelled by grinding on both faces to form an acute edge angle.
ML 230; MW 130; MTh 51; W 1135g.

181. Stromness Museum A255
Cleaver. Tabular sandstone slab bifacially chipped on inner edge to shape handle and cleaver head. Opposite edge is naturally straight.
ML 270; MW at head 130, at handle 50; MTh 16.

SCULPTED STONE

182. 2; 13
?Sculpted stone. Lump of volcanic rock, with white inclusions. The piece has been pecked and ground to form a roughly ovoid shape. One end is shouldered and a groove

running around it isolates a smaller rounded knob. Striations from the working are visible all over the piece.
ML 63; MW 58; MTh 42; W 244g.

183. RMS HA 169 (not seen)
Polished stone ball of basalt with groups of lines incised upon its surface and forming a geometrical pattern.
?SB pl38.4.
Dia c 55.

184. RMS HA 655 (not seen)
Ball of smoothed grey stone.
Dia 71.

185. RMS HA 656 (not seen)
Similar to HA 655, but surface unsmoothed, and top and bottom flattened.
ML 63; MW 81.

186. RMS HA 657 (not seen)
Ball of black stone covered with seven encircling rows of pyramidal knobs.
SB pl 37.1 and 3.
Dia 63.

187. RMS HA 658 (not seen)
Dark stone with central hour-glass perforation, covered with triangular or rounded-triangular knobs in two (at one point three) encircling rows.
SB pl 38.3.
Dia 76.

188. RMS HA 659 (not seen)
Irregularly shaped ball of buff stone, surface covered with 22 knobs of various shapes.
Dia 58.

189. RMS HA 660 (not seen)
Irregularly shaped of grey stone, surface covered by ten knobs, some damaged.
Dia 61.

190. RMS HA 661 (not seen)
Oval grey stone with encircling central groove and a groove at right angles around one end.
SB pl 38.5.
ML 73; MW 53; MTh 53.

191. RMS HA 663 (not seen)
Oval black stone with light speckles, central portion encircled by a band of ridged decoration, two groups of five ridges alternately horizontal and vertical, each end, by

means of two grooves at right angles, formed into four large triangular knobs.
SB pl 37. 2 and 4; PSAS 64 fig 25.2.
ML 91; central dia 63.

192. RMS HA 664 (not seen)
Pointed, of oval transverse section with mushroom-shaped head.
SB pl 41.3; PSAS 64 fig 24.3.
ML 129; Dia of head 66.

193. RMS HA 665 (not seen)
Pointed at both ends with two raised mouldings encircling it (the one near larger end 12mm wide) and a sunken waist between, the smaller end is conical but the larger has a rounded section.
SB pl 41.4; PSAS 64 fig 25.4.
ML 226; dia at mouldings 66 and 48.

194. RMS HA 666 (not seen)
Triple pointed implement, one point being central, and at right angles, to the other two, points are marked off from central decorated areas by carefully executed encircling grooves, the decoration consists of an area of chequer-board pattern on either side with intervening space filled with linear ornament forming no obvious pattern.
SB pl 39.1; PSAS 64 fig 25.1.
ML 106; MW 190; Dia 60.

195. RMS HA 667 (not seen)
Pointed fragment with blunted end, broken at a shallow encircling groove. ?Part of implement similar to HA 664 or 666.
ML 127; Dia 38.

196. SB museum no number
Lump of volcanic rock (speckled white). Encircling grooves around top and bottom form a central bulge. On this bulge there are two rounded knobs formed on either face. Top and base are slightly rounded. Pecked all over to shape.
ML 92; MW 68; MTh 64.

197. SB museum no number
Fragment of sculpted object similar to above. Two encircling grooves form bulges.
ML 70; MW 63; MTh 67

198. SB museum no number
Stone ball, abraded. Pecked all over to a sub-round shape.
ML 72; MW 67; MTh 65.

199. SB museum no number
?stone ball. Sub-spherical cobble of pink granite. Pecked and ground to shape around most of exterior.
ML 70; MW 63; MTh 67.

HAEMATITE

200. 1; 19; SF 116
Shaped lump of haematite. Ground all over to form faceted areas.
ML 55; MW 40; MTh 20.

201. RMS HA 630 (not seen)
Similar to HA 629 but not curved, surface has facets of primary shaping and fine striae left by polishing, section polygonal/ oval.
SB 111 and fig 9; PSAS 65, fig 20.
ML 119.

202. RMS HA 686 (not seen)
Four pieces of haematite with one or more smoothed surfaces.

MISCELLANEOUS

203. 1; 2
Pear-shaped piece of sandstone. Very abraded. Not certain whether it has been deliberately shaped or whether it is natural.
ML 95; MW 57; MTh 41.

204. 1; 42
?Flaked blank. Abraded. Lump of micaceous sandstone which has been flaked roughly around the base and the top. Possibly partially ground on one face.
ML 85; MW 66; MTh 65; W 371g.

205. 2; 13
Small, broken fragment of shale with a small grooved notch on one side.
MTh 6.

206. 4b; 8
Lobate object made on shale. Three lobes have been formed by chipping around the circumference of the piece.
ML 105; MW 95; MTh 10.

207. RMS HA 170
Long rectangular tabular piece of siltstone, broken. A possible curved edge may have been formed down the length or

it may be natural. Described as serrated in Museum catalogue; not so.
ML 263; MW 40; MTh 13.

208. RMS HA 627
Object made on a lump of volcanic rock/ andesite. Shaped by pecking to form a broad waist in the middle. One end is slightly shouldered and opposite end is formed to an oblique point by broad areas of faceting. Upper end resembles the 'club' end of a 'handled club', but the opposite end is quite different.
SB 111, pl. 61.5 and fig 8; PSAS 64 fig 19.
ML 195; MW 70; MTh 64.

209. RMS HA 628
Double-pointed object of sandstone. Abraded. Appears to have been pecked and then ground into shape. One oblique end may be a natural break rather than faceting.
ML 185; MW 63; MTh 57.

210. RMS HA 629
Piece of ?magnetite. Curved and ?polished, not certain whether it is natural or worked. There are, however, multi-directional striations visible over most of the surface of the piece. In museum catalogue as haematite.
ML 122; MW 56; MTh 58.

211. RMS HA 632
Flagstone slab. Flaked bifacially around edges to form a splayed rectangular shape. The broadest end is slightly curved.
ML 123; MW 128; MTh 14.

212. RMS HA 633-635 (not seen)
Roughly rectangular 'implements' of flagstone. HA 635 is more oval in outline.
ML 193, 205, 348; MW 152; 160; 292.

213. RMS HA 662
Sub-rectangular block of sandstone, very abraded. A rough waist has been formed by pecking around the piece towards the narrower end.
ML 103; MW 58; MTh 50

214. RMS HA 668 (not seen)
Roughly triangular piece (of tabular sandstone) with seven widely spaced, short, blunt teeth along the longest edge, one original surface almost completely lost.
SB pl 40.2; PSAS 65 fig 24.
ML 358; MW 147.

215. RMS HA 671
Pear-shaped piece of fine-grained black micaceous sandstone. The piece has been ground all over to shape and multi-directional striations are clearly visible. The pointed end is almost spatulate in section.
SB pl 36; PSAS 65, fig 21.9.
ML 106; MW 69; MTh 54.

216. RMS HA 674 (not seen)
Lobate object. Star-shaped of slate with five arms.
SB pl 52.3; PSAS 65 fig 30.

217. RMS HA 700 (not seen)
Trapezoid slab, one side covered with powdered haematite.
ML 330; MW 304.

218. Stromness museum A255
Notched slab. Triangular-shaped slab of sandstone with curved apex. Single deep notch worked on either side towards broad end.
ML 175; MW 123 (75 at notch); MTh 37.

KEY TO SKAILL KNIFE CATALOGUE

T: trench
L: layer
Cat: catalogue number
Class: class
Mat: raw material
Break: breakage
MOD: means of detachment
Plat: platform type
Outl: outline
EM: Edge morphology
Sec R: secondary retouch
Pos 1: position 1 of Sec R
Pos 2: position 2 of Sec R
ED: edge damage
Pos: position of ED
ML: maximum length
MW: maximum width
MT: maximum thickness
W: weight
TP:UP: ratio of total perimeter to used perimeter
***: Further entry in main catalogue
Pol: with polish

Class: 1. Primary
2. Secondary
3. Inner

Material: 1. Grey micaceous sandstone
2. Black micaceous sandstone
3. Red micaceous sandstone
4. Burnt
5. Abraded
6. Quartzite

Breakage: 1. Complete
2. Lateral
3. Longitudinal
4. Fragment missing
5. Fragment only

Means of detachment: 1. Crushed
2. Percussed
3. Cannot determine
4. Spall

Platform type: 1. Cortical
2. Inner
3. Cannot determine

Outline: 1. Flat
2. Concave
3. Convex
4. Sinuous
5. Stepped
6. Irregular
7. Cannot determine

End morphology: 1. Feather
2. Stepped
3. Hinged
4. Cannot determine
5. Overshot
6. Abrupt

Secondary retouch: 1. Not present
2. Unifacial
3. Bifacial

Position 1 and 2: 1. Distal
2. Proximal
3. Left lateral
4. Right lateral
5. 1&3
6. 1&4
7. 1&3&4
8. 3&4
9. 1&2&3&4

Edge damage: 1. Not present
2. Rounded
3. Unifacially flaked
4. Bifacially flaked
5. Denticulate
6. Crushed and battered
7. Bevelled
8. Snapped
9. 2&3
10. 2&4
12. Cannot determine.

Position Edge damage: as for retouch

T	L	Cat	Class	Mat	Break	MOD	Plat	Outl.	EM	Sec R	pos 1	pos 2	ED	pos	ML	MW	MT	W	TP:UP
1	1	863	3	1	1	2	2	2	6	1			1		44	23	8	7	
1	1	225	1	1	1	1	1	2	2	1			1		51	56	7	22	
1	1	204	1	1	1	1	1	5	2	1			1		41	57	9	23	
1	1	203	2	1	1	1	1	3	2	1			1		45	64	12	28	
1	1	228	1	1	1	1	1	3	1	1			1		41	70	11	36	
1	1	862	1	1	1	1	1	5	1	1			1		48	54	15	36	
1	1	229	1	1	1	1	1	3	1	1			1		48	88	12	49	
1	1	226	1	1	1	1	1	6	1	1			1		52	93	12	56	
1	1	859	2	1	1	1	1	3	1	1			1		75	80	14	63	
1	1	227	1	1	1	1	1	3	1	1			1		59	83	13	64	
1	1	856	1	1	1	1	1	3	1	1			1		87	81	13	108	
1	1	231	1	1	1	1	1	3	1	1			1		67	86	17	115	
1	1	224	1	1	1	1	1	6	2	1			1		71	112	14	130	
1	1	201	1	1	1	1	1	6	5	1			1		85	96	15	131	
1	1	861	2	1	1	1	1	3	1	1			1		77	81	24	133	
1	1	853	1	1	1	1	1	2	1	1			1		78	114	18	177	
1	1	230	1	2	1	1	1	6	1	1			1		96	86	35	293	
1	1	232	1	2	1	1	1	6	5	1			1		120	56	34	310	
1	1	857	1	1	1	1	1	5	1	1			4	1	68	80	14	77	2.9
1	1	858	1	1	1	1	1	5	2	1			4	1	77	103	19	167	2.3
1	1	200	1	1	1	1	1	5	1	1			9	6	54	71	16	61	3.2
1	1	199	1	1	1	1	1	5	1	1			9	4	59	86	23	120	4.8
1	1	855	1	1	4	1	1	1	2	1			10	3	74	118	11	111	6.3
1	1	198	1	1	1	1	1	6	2	1			12		92	133	25	313	
1	1	202	1	1	2	3	3	7	4	1			12						
1	1	205	5	1	2	3	3	7	4	1			12						
1	1	206	2	1	4	3	3	7	4	1			12						
1	1	854	1	1	5	3	3	7	4	1			12						
1	1	860	1	1	5	1	1	3	4	1			12						
1	2	6	1	1	1	1	1	5	2	1			1		60	87	13	70	
1	2	10	1	1	1	1	1	2	1	1			1		81	81	15	126	
1	2	13	1	1	1	1	1	2	1	1			1		94	114	11	140	
1	2	15	1	1	4	1	1	4	2	1			1		88	83	14	103	
1	2	16	1	1	1	1	1	3	1	1			1		73	116	17	178	
1	2	18	1	1	1	1	1	3	2	1			1		47	59	15	48	

1	2	26	1	1	1	1	1	5	1	1	1	84	74	12	86
1	2	37	1	1	1	1	1	2	2	1	1	71	73	12	67
1	2	40	1	1	1	1	1	3	3	1	1	73	153	18	193
1	2	41	2	1	1	1	1	6	2	1	1	48	68	13	39
1	2	42	1	1	1	1	1	3	2	1	1	62	59	12	46
1	2	43	1	1	1	1	1	5	2	1	1	63	112	13	95
1	2	44	1	1	1	1	1	5	1	1	1	82	103	17	191
1	2	46	1	1	1	1	1	2	1	1	1	42	60	7	19
1	2	48	1	1	1	1	1	4	1	1	1	94	76	11	88
1	2	53	1	1	4	1	1	4	3	2	1	45	60	9	26
1	2	55	1	1	1	1	1	5	1	1	1	68	101	19	140
1	2	58	1	1	1	1	1	6	2	1	1	73	120	25	224
1	2	61	1	1	1	1	1	5	1	1	1	54	66	12	41
1	2	66	1	1	1	1	1	4	1	1	1	66	65	13	54
1	2	70	2	1	1	1	1	2	1	1	1	65	71	10	48
1	2	71	1	3	1	1	1	5	1	1	1	78	69	13	63
1	2	72	2	1	1	1	1	4	1	1	1	49	69	8	29
1	2	73	1	1	1	1	1	5	1	1	1	50	81	10	39
1	2	74	1	1	1	1	1	6	2	1	1	57	102	15	96
1	2	79	1	1	4	1	1	5	2	1	1	51	51	9	24
1	2	80	1	1	3	1	1	5	1	1	1				191
1	2	82	2	1	1	1	1	6	1	1	1	69	53	15	43
1	2	88	1	1	1	1	1	1	1	1	1	78	120	18	229
1	2	89	1	1	1	1	1	1	5	1	1	115	136	22	
1	2	92	1	1	1	1	1	5	2	1	1	57	69	13	57
1	2	93	1	1	1	1	1	5	2	1	1	46	80	16	57
1	2	97	1	1	1	1	1	1	1	1	1	87	99	19	208
1	2	102	2	1	1	1	1	4	1	1	1	57	83	19	94
1	2	105	1	1	1	1	1	3	1	1	1	56	91	12	62
1	2	107	1	1	1	1	1	3	2	1	1	62	115	11	76
1	2	109	1	1	1	1	1	3	1	1	1	62	71	12	55
1	2	112	1	1	1	1	1	4	1	1	1	71	105	12	104
1	2	113	1	1	1	1	1	6	1	1	1	61	83	14	72
1	2	114	1	1	1	1	1	6	1	1	1	55	73	20	70
1	2	115	1	1	1	1	1	6	2	1	1	65	104	22	147
1	2	116	1	1	1	1	1	1	2	1	1	61	57	8	31

1	2	120	1	1	3	1	1	5	1	1	1	84	94	18	148
1	2	124	1	1	1	1	1	6	1	1	1	82	119	18	190
1	2	126	2	1	1	1	1	3	1	1	1	86	139	23	256
1	2	129	1	1	1	1	1	5	3	1	1	76	116	15	157
1	2	130	1	1	4	1	1	4	1	1	1	55	80	10	47
1	2	131	1	1	4	1	1	5	1	1	1	68	76	13	55
1	2	132	1	1	1	1	1	3	1	1	1	118	143	35	
1	2	133	1	1	1	1	1	3	1	1	1	87	139	22	281
1	2	135	1	1	1	1	1	5	1	1	1	37	49	9	15
1	2	136	1	1	2	3	3	7	1	1	1				34
1	2	138	1	1	2	3	3	7	4	1	1				52
1	2	141	1	1	1	1	1	3	1	1	1	72	84	13	86
1	2	146	1	1	4	1	1	2	2	1	1	70	64	13	67
1	2	147	1	1	1	1	1	1	1	1	1	93	121	19	244
1	2	148	1	1	1	1	1	1	1	1	1	81	82	13	82
1	2	149	1	1	1	1	1	4	2	1	1	58	45	10	30
1	2	152	1	1	1	1	1	3	1	1	1	79	101	14	123
1	2	154	1	1	1	1	1	2	1	1	1	55	80	10	44
1	2	155	1	1	1	1	1	2	1	1	1	49	43	8	17
1	2	156	1	1	1	1	1	6	2	1	1	126	110	17	191
1	2	158	1	1	1	1	1	3	2	1	1	63	114	14	109
1	2	159	1	1	1	1	1	5	2	1	1	80	98	11	118
1	2	160	1	1	1	1	1	5	1	1	1	50	101	12	65
1	2	162	1	1	3	1	1	5	2	1	1				92
1	2	163	1	2	4	1	1	4	1	1	1	72	93	12	65
1	2	164	1	1	1	1	1	4	1	1	1	88	74	13	74
1	2	167	1	1	4	1	1	3	1	1	1	75	129	19	205
1	2	169	1	1	1	1	1	3	1	1	1	49	65	14	45
1	2	171	1	1	1	1	1	6	1	1	1	83	132	14	171
1	2	176	1	1	2	3	3	7	1	1	1				47
1	2	177	1	1	1	1	1	6	1	1	1	57	71	12	44
1	2	178	1	3	1	1	1	6	5	1	1	117	46	16	101
1	2	179	1	1	3	1	1	6	1	1	1				143
1	2	180	2	1	1	1	1	6	1	1	1	102	56	20	121
1	2	181	1	1	1	1	1	5	1	1	1	48	56	14	35
1	2	1136	1	1	1	1	1	3	1	1	1	48	72	10	41

1	2	1138	1	1	4	1	1	2	1	1	1	97	64	17	114
1	2	1141	1	1	1	1	1	2	1	1	1	66	73	10	52
1	2	1144	1	1	1	1	1	6	2	1	1	72	114	15	145
1	2	1145	1	1	4	1	1	2	1	1	1	42	57	6	16
1	2	1147	1	1	1	1	1	5	2	1	1	42	52	8	15
1	2	1149	1	1	1	4	3	5	1	1	1	69	64	10	45
1	2	1152	1	1	1	1	1	2	2	1	1	62	75	9	43
1	2	1155	1	1	1	1	1	5	1	1	1	54	71	12	43
1	2	1157	1	1	1	1	1	2	1	1	1	56	92	13	68
1	2	1158	1	1	1	1	1	5	1	1	1	70	75	14	72
1	2	1159	1	1	1	1	1	2	1	1	1	61	62	11	41
1	2	1160	1	1	1	1	1	6	2	1	1	62	88	17	94
1	2	1163	1	1	1	1	1	2	2	1	1	58	86	13	78
1	2	1164	1	1	1	1	1	2	1	1	1	55	70	8	29
1	2	1167	1	1	4	1	1	2	1	1	1	102	109	18	205
1	2	1168	2	1	1	1	1	5	1	1	1	76	62	14	66
1	2	1169	1	1	1	1	1	2	1	1	1	84	53	9	38
1	2	1170	1	1	2	3	3	3	3	1	1				
1	2	1171	1	1	1	1	1	1	1	1	1	62	108	13	100
1	2	1172	1	1	1	1	1	2	2	1	1	85	77	14	112
1	2	1173	1	1	1	1	1	2	1	1	1	90	62	11	68
1	2	1175	1	1	1	1	1	2	2	1	1	49	63	10	34
1	2	1176	1	1	1	1	1	2	2	1	1	66	88	9	60
1	2	1178	2	1	1	1	1	2	1	1	1	54	69	8	26
1	2	1179	1	1	1	1	1	2	2	1	1	118	135	23	413
1	2	1180	1	1	1	1	1	5	2	1	1	106	128	18	285
1	2	1181	1	1	1	1	1	6	2	1	1	119	137	25	409
1	2	1203	1	1	1	1	1	5	2	1	1	61	99	16	93
1	2	1204	1	1	1	1	1	6	1	1	1	50	54	11	29
1	2	1205	1	1	1	1	1	2	6	1	1	37	57	9	19
1	2	1206	1	1	1	1	1	3	1	1	1	43	76	10	35
1	2	1207	1	1	1	1	1	5	2	1	1	58	85	14	69
1	2	1208	1	1	1	1	1	2	1	1	1	57	63	12	39
1	2	1209	1	1	1	1	1	4	1	1	1	60	62	10	37
1	2	1210	1	1	1	1	1	5	2	1	1	48	85	9	40
1	2	1211	1	1	1	1	1	4	1	1	1	58	72	10	47

1	2	1214	1	1	1	1	1	2	1	1	1	45	77	9	30
1	2	1217	1	1	1	1	1	4	1	1	1	51	70	8	28
1	2	1224	1	1	1	1	1	2	1	1	1	69	73	8	46
1	2	1225	1	1	1	1	1	6	2	1	1	78	62	12	57
1	2	1228	1	1	1	1	1	2	2	1	1	90	94	13	128
1	2	1229	1	2	1	1	1	2	1	1	1	75	66	10	49
1	2	1230	1	1	1	1	1	2	1	1	1	79	62	13	62
1	2	1239	1	1	1	1	1	3	1	1	1	53	72	13	42
1	2	1241	1	1	1	1	1	1	2	1	1	58	74	12	68
1	2	1243	1	1	1	1	1	1	1	1	1	44	74	8	32
1	2	1246	1	1	1	1	1	1	2	1	1	64	68	10	54
1	2	1247	1	1	1	1	1	6	1	1	1	104	127	20	266
1	2	1253	1	1	1	1	1	4	2	1	1	44	59	11	33
1	2	1255	1	1	1	1	1	2	1	1	1	63	85	10	61
1	2	1260	1	1	1	1	1	4	1	1	1	40	70	11	28
1	2	1261	1	1	1	1	1	6	1	1	1	70	94	13	80
1	2	1262	1	2	1	1	1	4	1	1	1	103	104	15	159
1	2	1263	1	1	1	1	1	5	2	1	1	58	102	18	128
1	2	1270	1	1	1	1	1	2	1	1	1	55	55	8	21
1	2	1271	1	1	1	1	1	2	1	1	1	75	60	9	38
1	2	1272	1	1	1	1	1	5	1	1	1	56	76	14	43
1	2	1275	2	1	1	1	1	6	2	1	1	63	61	13	56
1	2	1277	1	1	1	1	1	2	1	1	1	63	69	10	45
1	2	1279	1	1	1	1	1	5	2	1	1	53	94	13	70
1	2	1282	2	1	1	1	1	2	1	1	1	59	88	11	53
1	2	1284	1	1	1	1	1	2	1	1	1	72	81	10	57
1	2	1285	1	1	1	1	1	2	1	1	1	52	76	13	52
1	2	1286	1	1	1	1	1	3	1	1	1	64	81	11	59
1	2	1287	1	1	1	1	1	6	1	1	1	66	84	10	63
1	2	1290	1	1	1	1	1	4	1	1	1	52	86	11	51
1	2	1292	1	1	1	1	1	6	2	1	1	78	105	15	161
1	2	1297	1	1	1	1	1	4	1	1	1	35	52	9	15
1	2	1298	1	1	1	1	1	3	1	1	1	65	87	13	87
1	2	1304	1	1	1	1	1	4	1	1	1	92	125	20	213
1	2	1308	1	1	3	1	1	3	1	1	1				53
1	2	1312	1	1	1	1	1	6	2	1	1	56	62	10	32

1	2	1314	1	1	1	1	1	6	2	1			1		56	68	12	52	
1	2	1320	1	1	1	1	1	6	2	1			1		65	98	14	91	
1	2	1321	1	1	1	1	1	6	2	1			1		56	83	12	60	
1	2	1322	1	1	1	1	1	1	2	1			1		57	91	9	54	
1	2	1323	1	1	1	1	1	4	1	1			1		89	114	17	166	
1	2	1329	1	1	1	1	1	5	2	1			1		47	45	11	26	
1	2	1332	1	1	1	1	1	3	3	1			1		53	92	14	74	
1	2	1334	2	2	1	1	1	6	2	1			1		60	81	17	96	
1	2	1335	1	1	1	1	1	2	6	1			1		65	52	11	41	
1	2	1337	2	1	1	1	1	1	1	1			1		80	92	11	77	
1	2	1338	1	1	1	1	1	2	1	1			1		50	55	10	28	
1	2	1340	1	1	1	1	1	6	2	1			1		65	85	17	87	
1	2	1343	1	2	1	1	1	6	2	1			1		70	111	20	131	
1	2	1344	1	2	1	1	1	6	2	1			1		72	95	15	87	
1	2	1345	1	1	1	1	1	5	6	1			1		83	43	14	51	
1	2	1347	1	1	1	1	1	2	2	1			1		56	74	13	34	
1	2	1351	1	1	1	1	1	6	1	1			1		44	84	8	26	
1	2	1353	1	1	1	1	1	2	1	1			1		47	67	7	21	
1	2	1354	1	1	1	1	1	2	6	1			1		110	47	13	77	
1	2	1356	1	2	1	1	1	2	1	1			1		83	106	14	118	
1	2	1358	1	1	1	1	1	3	1	1			1		102	60	22	`120	
1	2	1359	1	2	1	1	1	6	2	1			1		88	86	18	117	
1	2	1361	1	1	1	1	1	4	1	1			1		88	59	15	64	
1	2	1362	1	2	1	1	1	3	1	1			1		40	41	9	12	
1	2	1363	1	2	1	1	1	3	1	1			1		41	32	8	12	
1	2	1364	1	1	1	1	1	6	1	1			1		63	45	11	24	
1	2	1365	1	2	1	1	1	6	2	1			1		86	60	14	77	
1	2	1369	1	1	1	1	1	6	2	1			1		82	136	18	199	
1	2	1371	2	1	1	1	2	2	1	1			1		62	65	12	54	
1	2	1374	2	1	2	1	2	2	4	1			1					180	
1	2	1379	1	1	1	1	1	5	3	1			1		60	103	21	139	
1	2	1437	1	1	1	1	1	2	2	1			1		35	50	6		
1	2	1438	1	1	1	1	1	4	2	1			1		35	40	7		
1	2	144	1	1	1	1	1	2	1	3	1	1	2	7	95	90	17	143	1.6
1	2	1268	2	1	1	1	1	3	2	1			2	1	77	100	16	140	2.4
1	2	1	1	1	1	1	1	5	1	1			3	4	108	74	14	117	5.2

1	2	36	1	1	1	1	1	3	1	1			3	1	74	168	15	234	5
1	2	51	1	1	1	1	1	3	2	1			3	1	56	68	13	48	2.7
1	2	56	1	1	1	1	1	4	1	1			3	1	86	108	13	125	2.8
1	2	86	1	1	1	1	1	2	2	1			3	1	91	92	12	118	3.1
1	2	95	2	1	1	1	1	3	1	1			3	1	86	102	20	165	2
1	2	100	1	1	1	1	1	5	1	1			3	1	98	76	17	134	4.6
1	2	118	1	1	1	1	1	1	1	1			3	1	58	70	10	45	2.9
1	2	1166	1	1	1	1	1	6	2	1			3	1	120	127	19	270	2.3
1	2	1182	1	1	1	1	1	4	1	1			3	1	69	107	13	108	
1	2	1233	1	1	1	1	1	2	1	1			3	1	80	88	14	97	3.8
1	2	1242	1	1	1	1	1	2	1	1			3	1	72	77	15	61	1.8
1	2	1276	1	1	1	1	1	3	1	1			3	1	80	87	14	99	2.6
1	2	1301	1	2	1	1	1	6	2	1			3	7	100	165	22	440	1.9
1	2	1341	1	1	1	1	1	3	2	1			3	1	60	124	14	106	2.1
1	2	1375	1	1	1	1	1	2	1	1			3	1	104	83	17	188	
1	2	1378	1	1	2	1	3	7	1	1			3	1				60	
1	2	142	1	1	1	1	1	4	1	1			4	2	93	126	15	194	4
1	2	1222	1	1	1	1	1	6	1	1			4	1	61	94	13	80	2.5
1	2	1313	1	1	4	1	1	6	1	1			4	1	68	88	14	83	2.5
1	2	1325	1	1	1	1	1	6	1	1			4	1	60	105	12	82	2.8
1	2	1333	1	1	1	1	1	3	1	1			4	1	62	69	11	50	2.2
1	2	1373	1	1	2	1	1	3	4	1			4	3				120	
1	2	1376	1	1	3	1	1	2	1	1			4					63	
1	2	150	1	1	1	1	1	5	1	1			5	1	66	75	10	58	4
1	2	12	1	1	1	1	1	6	1	1			9	1	111	85	17	191	3.9
1	2	21	1	1	1	1	1	3	1	1			9	1	56	83	10	52	2.9
1	2	34	1	1	4	1	1	2	1	3	7	7	9	7	86	130	20	200	1.5
1	2	35	1	1	1	1	1	1	2	1			9	1	75	104	12	124	4.5
1	2	67	1	1	1	1	1	3	1	1			9	1	75	117	14	141	1.8
1	2	139	1	2	1	1	1	1	1	1			9	1	117	90	16	183	1.7
1	2	1135	1	1	1	1	1	4	1	1			9	1	111	76	13	156	5
1	2	1154	1	1	1	1	1	5	2	1			9		77	104	16	121	2.1
1	2	1324	1	1	1	1	1	6	1	1			9	6	98	140	19	254	2.9
1	2	1349	1	1	1	1	1	3	1	1			9	1	120	175	28	634	2.9
1	2	2	1	1	1	1	1	1	1	1			10	5	73	60	18	80	2.3
1	2	9	1	1	1	1	1	13	1	1			10	5	93	125	18	203	4

1	2	27	1	1	1	1	1	5	1	1
1	2	29	1	1	1	1	1	3	1	2
1	2	62	1	1	1	1	1	5	1	1
1	2	75	1	1	1	1	1	6	1	1
1	2	98	1	1	1	1	1	6	1	1
1	2	110	1	1	1	1	1	2	1	1
1	2	122	1	1	1	1	1	4	1	1
1	2	166	1	1	1	1	1	2	1	1
1	2	170	1	1	1	1	1	6	1	1
1	2	1240	1	1	1	1	1	4	1	1
1	2	1283	1	1	1	1	1	3	2	1
1	2	1326	1	1	1	1	1	3	1	1
1	2	1346	1	1	1	1	1	2	1	1
1	2	1360	1	1	1	1	1	2	1	1
1	2	3	1	1	1	1	1	2	2	1
1	2	4	1	1	4	1	1	5	1	1
1	2	5	1	1	1	1	1	3	2	1
1	2	8	1	1	1	1	1	5	4	1
1	2	11	1	1	1	1	1	5	1	1
1	2	14	1	1	4	1	1	5	1	1
1	2	17	1	1	1	1	1	3	5	1
1	2	7	2	1	1	1	1	3	2	1
1	2	19	1	1	4	1	1	4	1	1
1	2	20	1	1	4	1	1	2	1	1
1	2	22	1	1	1	1	1	4	1	1
1	2	23	1	1	4	1	1	5	1	1
1	2	24	1	1	4	1	1	6	2	1
1	2	25	1	1	4	1	1	4	1	1
1	2	28	1	1	4	1	1	4	1	1
1	2	30	2	1	1	1	1	3	2	1
1	2	31	2	1	1	1	1	3	1	1
1	2	32	1	1	1	1	1	4	1	1
1	2	33	1	1	1	1	1	2	2	1
1	2	38	1	1	4	1	1	5	4	1
1	2	39	1	1	2	1	1	4	4	1
1	2	45	1	1	3	1	1	5	2	1

	10	1	53	62	13	41	3
3	10	5	83	111	20	191	1.9
	10	1	142	126	19		4.5
	10	6	70	90	16	117	2.3
	10	1	143	124	31		3
	10	1	63	91	13	72	2.6
	10	4	134	65	18	167	4
	10	3	98	123	16	208	3.8
	10	1	90	114	24	245	2.1
	10	1	85	95	20	178	2.9
	10	1	60	83	15	93	2.5
	10	1	75	124	19	152	3.4
	10	1	42	83	10	42	2.6
	10	5	81	111	20	244	
	12		83	61	11	70	
	12		54	45	12	26	7.8
	12		41	49	8	18	
	12		71	86	16	95	
	12		68	73	9	49	
	12		79	135	17	179	
	12		83	116	20	215	
	12		79	79	16	100	
	12		41	68	9	24	
	12		54	84	7	42	
	12		52	71	7	29	
	12		86	89	13	85	
	12		55	75	14	46	2.3
	12		103	94	15	126	
	12		53	94	10	40	
	12		96	113	23	268	
	12		79	87	15	111	
	12		55	50	5	16	
	12		70	95	11	90	
	12		65	84	15	89	
	12					51	
	12					60	

1	2	47	1	1	4	1	1	5	1	1	12	65	89	11	55
1	2	49	1	1	4	1	1	4	1	1	12	61	90	11	70
1	2	50	1	1	4	1	1	6	4	1	12	73	95	22	134
1	2	52	1	1	1	1	1	5	2	1	12	54	89	13	62
1	2	54	1	1	4	1	1	4	4	1	12	62	57	9	24
1	2	57	2	1	4	1	1	2	4	1	12	65	72	12	49
1	2	59	2	1	1	1	1	5	2	1	12	57	88	19	86
1	2	60	1	1	4	1	1	3	2	1	12	71	128	14	136
1	2	63	1	1	4	1	1	4	1	1	12	51	72	12	47
1	2	64	1	1	4	1	1	3	1	1	12	76	116	14	145
1	2	65	2	1	4	1	1	4	4	1	12	75	102	16	111
1	2	68	1	1	4	1	1	4	4	1	12	86	90	17	130
1	2	69	1	1	3	1	1	5	2	1	12				72
1	2	76	1	1	1	1	1	3	1	1	12	45	82	9	33
1	2	77	1	1	1	1	1	5	1	1	12	51	70	9	33
1	2	78	1	1	1	1	1	5	1	1	12	71	79	12	78
1	2	81	2	1	1	1	1	4	1	1	12	83	78	15	80
1	2	83	1	1	1	1	1	4	2	1	12	77	67	11	63
1	2	84	1	1	4	1	1	6	1	1	12	79	107	15	120
1	2	85	2	1	1	1	1	4	1	1	12	51	81	12	44
1	2	87	1	1	4	1	1	3	1	1	12	83	118	18	180
1	2	90	1	1	1	1	1	1	1	1	12	70	72	7	38
1	2	91	1	1	1	1	1	2	1	1	12	79	65	14	74
1	2	94	1	1	4	1	1	2	4	1	12	89	89	13	114
1	2	96	1	1	1	1	1	5	1	1	12	66	97	15	103
1	2	99	1	1	4	1	1	6	4	1	12	81	93	18	125
1	2	101	1	1	1	1	1	3	1	1	12	52	68	10	37
1	2	103	1	1	4	1	1	6	4	1	12	55	57	12	34
1	2	104	1	1	1	1	1	5	1	1	12	71	57	18	59
1	2	106	1	1	1	1	1	5	1	1	12	74	86	14	87
1	2	108	1	1	1	1	1	5	2	1	12	79	103	17	127
1	2	111	1	1	4	1	1	6	4	1	12	70	79	9	48
1	2	117	1	1	1	1	1	4	2	1	12	51	72	12	49
1	2	119	1	1	4	1	1	5	4	1	12	64	80	9	51
1	2	121	1	1	1	1	1	3	1	1	12	86	91	19	145
1	2	123	1	1	1	1	1	1	1	1	12	90	142	14	237

1	2	125	1	1	1	1	1	6	1	1	12	88	101	18	178
1	2	127	1	1	3	1	1	4	1	1	12				68
1	2	128	2	1	1	1	1	3	2	1	12	52	91	12	56
1	2	134	1	1	4	1	1	5	1	1	12	95	116	15	160
1	2	137	1	1	2	3	3	7	2	1	12				192
1	2	140	1	1	4	1	1	1	4	1	12	72	84	12	73
1	2	143	1	1	1	1	1	6	1	1	12	77	121	20	188
1	2	145	2	1	1	1	1	2	1	1	12	74	73	6	58
1	2	151	1	1	4	1	1	4	2	1	12	56	67	11	44
1	2	153	1	1	1	1	1	2	1	1	12	44	73	6	21
1	2	157	1	1	1	1	1	2	1	1	12	88	74	11	75
1	2	161	1	1	3	1	1	1	4	1	12				183
1	2	165	1	3	4	1	1	5	4	1	12	44	57	12	22
1	2	168	1	1	1	1	1	6	1	1	12	107	89	20	222
1	2	172	1	1	4	1	1	5	1	1	12	65	84	12	59
1	2	173	1	1	4	1	1	4	4	1	12	51	63	12	34
1	2	174	1	1	4	1	1	3	1	1	12	51	73	10	38
1	2	175	1	1	1	1	1	3	1	1	12	76	97	16	125
1	2	1137	1	1	4	1	1	5	1	1	12	61	91	17	79
1	2	1139	1	1	1	1	1	2	1	1	12	79	76	15	98
1	2	1140	1	2	1	1	1	2	1	1	12	55	72	11	45
1	2	1142	1	1	1	1	1	4	1	1	12	74	73	12	60
1	2	1143	1	1	1	1	1	3	1	1	12	34	57	12	21
1	2	1146	1	1	1	1	1	6	1	1	12	46	86	10	44
1	2	1148	1	5	1	1	1	3	1	1	12	69	101	13	105
1	2	1150	1	1	4	1	1	6	1	1	12	80	88	13	83
1	2	1151	1	1	1	1	1	5	6	1	12	59	66	11	45
1	2	1153	1	1	1	1	1	6	2	1	12	61	50	11	39
1	2	1156	1	1	4	1	1	6	2	1	12	67	79	10	62
1	2	1161	1	1	4	1	1	2	1	1	12	42	70	7	20
1	2	1162	1	1	1	1	1	3	1	1	12	45	50	9	18
1	2	1165	1	1	4	1	1	2	6	1	12	86	128	11	103
1	2	1174	1	1	4	1	1	5	1	1	12	70	88	17	98
1	2	1177	1	1	4	1	1	5	2	1	12	92	111	13	119
1	2	1212	1	1	1	1	1	3	1	1	12	55	74	10	42
1	2	1213	1	1	1	1	1	2	1	1	12	61	70	10	43

1	2	1215	1	1	3	1	1	2	1	1	12				49
1	2	1216	1	1	1	1	1	4	1	1	12	80	90	13	87
1	2	1218	1	1	1	1	1	6	6	1	12	83	93	13	90
1	2	1219	1	1	1	1	1	2	1	1	12	64	60	8	34
1	2	1220	1	1	1	1	1	5	2	1	12	42	74	15	42
1	2	1221	1	1	1	1	1	5	2	1	12	55	68	15	54
1	2	1223	1	1	1	1	1	3	1	1	12	70	83	15	95
1	2	1226	1	1	1	1	1	4	1	1	12	76	104	25	180
1	2	1227	1	1	3	1	1	2	2	1	12				101
1	2	1231	1	1	1	1	1	2	1	1	12	92	98	19	180
1	2	1232	1	1	1	1	1	4	1	1	12	96	87	17	165
1	2	1234	1	1	1	1	1	3	1	1	12	88	94	17	149
1	2	1235	1	1	1	1	1	6	2	1	12	75	82	14	96
1	2	1236	1	1	1	1	1	4	1	1	12	70	86	18	107
1	2	1237	1	1	1	1	1	3	2	1	12	50	92	12	71
1	2	1238	1	1	1	1	1	6	2	1	12	90	113	17	191
1	2	1244	1	1	1	1	1	6	2	1	12	86	125	19	227
1	2	1245	1	1	1	1	1	6	1	1	12	73	65	17	85
1	2	1248	1	1	1	1	1	6	2	1	12	69	123	20	157
1	2	1249	1	1	1	1	1	6	2	1	12	79	137	23	267
1	2	1250	1	1	1	1	1	6	1	1	12	72	94	17	111
1	2	1251	1	1	1	1	1	2	1	1	12	50	77	15	53
1	2	1252	1	1	1	1	1	2	1	1	12	62	90	11	62
1	2	1256	1	1	1	1	1	3	1	1	12	69	109	13	132
1	2	1257	1	1	1	1	1	6	2	1	12	60	105	16	105
1	2	1258	1	1	1	1	1	6	1	1	12	80	96	15	131
1	2	1259	1	1	3	1	1	2	1	1	12				33
1	2	1264	1	1	1	1	1	2	6	1	12	94	74	10	92
1	2	1265	1	1	1	1	1	3	1	1	12	40	63	7	17
1	2	1266	2	1	1	1	1	4	1	1	12	83	82	11	63
1	2	1267	1	1	1	1	1	6	2	1	12	72	92	15	100
1	2	1269	1	1	1	1	1	2	1	1	12	51	71	13	48
1	2	1273	1	1	1	1	1	2	1	1	12	69	83	12	63
1	2	1274	1	1	1	1	1	2	1	1	12	61	88	17	100
1	2	1278	1	1	1	1	1	4	1	1	12	84	98	16	106
1	2	1280	1	1	1	1	1	4	1	1	12	70	103	14	95

1	2	1281	1	1	1	1	1	2	1	1	12	48	85	12	35
1	2	1288	1	1	1	1	1	3	1	1	12	60	96	14	75
1	2	1289	1	1	1	1	1	1	1	1	12	88	95	13	135
1	2	1291	1	2	1	1	1	5	1	1	12	63	86	16	79
1	2	1293	2	2	1	1	1	1	1	1	12	68	95	12	90
1	2	1294	1	1	1	1	1	2	3	1	12	66	73	10	55
1	2	1295	1	1	4	1	1	4	4	1	12				39
1	2	1296	1	1	1	1	1	5	1	1	12	143	120	21	374
1	2	1299	1	1	4	1	1	4	4	1	12				29
1	2	1300	1	1	1	1	1	2	1	1	12	135	180	21	500
1	2	1302	1	1	1	1	1	3	1	1	12	78	111	22	186
1	2	1303	1	1	1	1	1	4	1	1	12	80	118	18	157
1	2	1305	1	1	1	1	1	2	1	1	12	74	108	18	163
1	2	1306	1	1	1	1	1	6	4	1	12	64	79	14	66
1	2	1307	1	1	1	1	1	2	1	1	12	85	95	12	106
1	2	1309	1	1	1	1	1	1	2	1	12	64	89	11	83
1	2	1310	2	1	1	1	1	6	2	1	12	72	88	20	119
1	2	1311	1	1	1	1	1	2	2	1	12	45	66	7	23
1	2	1315	1	1	1	1	1	2	1	1	12	77	89	10	77
1	2	1316	1	1	1	1	1	3	2	1	12	38	45	12	19
1	2	1317	1	1	1	1	1	6	2	1	12	73	79	18	102
1	2	1318	1	1	1	1	1	4	1	1	12	56	71	7	27
1	2	1319	1	1	1	1	1	4	1	1	12	70	140	16	144
1	2	1327	1	1	3	1	1	2	1	1	12				172
1	2	1328	2	1	1	1	1	3	1	1	12	66	87	16	89
1	2	1330	1	1	1	1	1	2	1	1	12	51	70	7	25
1	2	1331	1	1	1	1	1	6	1	1	12	81	100	16	139
1	2	1336	1	2	1	1	1	2	1	1	12	66	86	9	60
1	2	1339	2	1	1	1	1	3	1	1	12	67	88	14	78
1	2	1342	1	1	3	1	1	1	1	1	12				121
1	2	1348	1	1	1	1	1	6	1	1	12	106	138	24	335
1	2	1350	1	1	1	1	1	4	1	1	12	67	68	10	40
1	2	1352	2	1	1	1	1	4	1	1	12	48	70	13	44
1	2	1355	1	1	5	3	3	7	4	1	12				18
1	2	1357	1	2	1	1	1	2	2	1	12	85	134	17	241
1	2	1366	1	1	1	1	1	2	1	1	12	49	57	10	27

1	2	1367	2	1	1	1	1	6	1	1			12		68	86	15	72	
1	2	1368	1	1	1	1	1	2	1	1			12		65	72	10	58	
1	2	1372	1	2	3	1	1	6	1	1			12					148	
1	2	1377	1	1	3	1	1	2	1	1			12					64	
1	2	1380	2	1	1	1	1	1	1	1			12		75	76	14	84	
1	2	1381	1	1	1	1	1	3	1	3	9	9	12		137	65	21	264	1
1	2	1382	1	1	1	1	1	3	1	2	2		12		128	120	27	528	
1	5	392	1	1	1	1	1	5	1	1			1		70	81	14	71	
1	8	312	1	1	1	1	1	3	1	1			1		43	38	10	15	
1	8	313	1	1	1	1	1	2	2	1			1		42	75	12	41	
1	8	316	2	1	1	1	1	5	2	1			1		85	121	14	160	
1	8	317	1	1	1	1	1	3	1	1			1		45	73	12	40	
1	8	849	1	1	1	1	1	5	1	1			1		73	61	14	65	
1	8	851	1	1	1	1	1	2	1	1			1		77	65	14	73	
1	8	852	1	1	2	3	3	4	1	1			3						
1	8	315	1	1	1	1	1	4	1	1			9	1	82	136	15	173	2.1
1	8	314	1	1	1	1	1	2	2	1			12		51	54	8	23	
1	8	850	1	1	1	1	1	4	1	1			12		78	144	12	141	
1	10	250	1	1	4	1	1	3	1	1			1		51	87	13	57	
1	10	251	1	1	1	1	1	3	1	1			1		50	55	10	27	
1	10	255	1	1	1	1	1	1	2	1			1		52	72	10	45	
1	10	256	2	1	1	1	1	5	2	1			1		59	121	15	110	
1	10	257	1	1	1	1	1	4	1	1			1		62	71	9	44	
1	10	258	1	1	1	1	1	2	1	1			1		39	62	6	16	
1	10	261	2	1	1	1	1	3	1	1			1		87	99	19	164	
1	10	262	1	1	1	1	1	2	1	1			1		69	73	16	84	
1	10	267	2	1	1	1	1	3	2	1			1		57	84	11	53	
1	10	268	1	1	1	1	1	2	1	1			1		92	52	11	62	
1	10	269	2	1	1	1	1	3	1	1			1		82	109	19	155	
1	10	273	2	1	1	1	1	3	1	1			1		46	45	9	18	
1	10	276	1	1	1	1	1	5	1	1			1		68	64	11	56	
1	10	279	1	1	4	1	1	3	1	1			1		33	76	8	18	
1	10	283	2	2	1	1	1	6	1	1			1		65	60	14	53	
1	10	1423	1	1	1	1	1	2	1	1			1		68	72	9	38	
1	10	1425	1	1	1	1	1	6	2	1			1		51	65	10	57	
1	10	1426	2	1	1	1	2	3	2	1			1		50	76	9	30	

1	10	1428	1	1	1	1	1	2	1	1			1		48	52	8	19	
1	10	1407	1	1	1	1	1	6	2	1			1		56	73	12	60	
1	10	1411	2	1	1	1	1	1	2	1			1		60	96	13	83	
1	10	1414	1	1	1	1	1	4	1	1			1		67	90	9	45	
1	10	1416	2	1	1	1	1	2	1	1			1		66	113	17	125	
1	10	1417	1	1	1	1	1	6	1	1			1		53	55	12	30	
1	10	1421	1	1	1	1	1	5	2	1			1		48	59	10	33	
1	10	233	1	1	1	1	1	5	1	1			1		86	127	24	288	
1	10	235	1	1	4	1	1	2	1	1			1		61	87	15	81	
1	10	236	2	1	1	1	1	4	1	1			1		107	125	27	431	
1	10	239	1	1	1	1	1	5	1	1			1		61	71	16	55	
1	10	242	2	1	1	1	1	5	1	1			1		45	88	13	41	
1	10	243	1	1	1	1	1	5	1	1			1		71	94	11	78	
1	10	249	2	1	1	1	1	6	1	1			1		51	93	15	74	
1	10	833	1	1	1	1	1	4	1	1			1		75	65	10	46	
1	10	834	2	1	1	1	1	2	1	1			1		39	81	6	18	
1	10	835	1	1	5	1	1	6	4	1			1						
1	10	837	2	1	2	3	3	3	1	1			1						
1	10	838	1	1	1	1	1	6	2	1			1		65	89	13	72	
1	10	840	2	1	4	1	1	4	1	1			1		126	96	21	251	
1	10	841	1	1	2	1	1	6	4	1			1						
1	10	842	2	1	1	2	2	3	1	1			1		35	46	12	15	
1	10	843	2	1	1	2	2	3	1	1			1		62	73	22	94	
1	10	844	1	1	1	1	1	6	2	1			1		48	96	13	56	
1	10	845	2	1	1	1	1	6	2	1			1		51	41	20	40	
1	10	252	1	1	1	1	1	6	1	1			2	1	107	128	17	219	3.7
1	10	234	1	1	1	1	1	4	1	1			3	1	61	111	17	117	2.5
1	10	238	1	1	1	1	1	5	1	1			3	1	92	95	15	156	
1	10	244	1	1	1	1	1	2	1	1			3	1	88	115	33	316	
1	10	254	2	1	1	1	1	3	1	1			4	1	107	150	26	421	3.3
1	10	1408	1	1	1	1	1	4	1	1			4	1	88	98	11	136	2.3
1	10	266	1	1	1	1	1	3	1	3	1	1	9	1	98	131	24	332	3.1
1	10	253	1	1	1	1	1	5	1	1			10	1	81	107	20	188	2.1
1	10	271	1	1	1	1	1	4	1	1			10	1	77	89	19	123	3
1	10	282	1	1	5	3	3	7	4	1			10	1					
1	10	839	1	1	4	1	1	4	5	1			10	3	102	104	18	226	8

1	10	259	2	1	4	1	1	2	4	1	12	124	65	18	108
1	10	260	1	1	1	1	1	5	1	1	12	70	97	15	113
1	10	263	1	1	1	1	1	3	2	1	12	40	58	9	19
1	10	264	1	1	4	1	1	5	2	1	12	65	77	14	60
1	10	265	2	1	4	1	1	4	4	1	12	65	72	11	52
1	10	270	1	1	1	1	1	2	1	1	12	82	79	13	90
1	10	272	1	1	1	1	1	2	1	1	12	76	150	13	157
1	10	274	2	1	1	1	1	5	1	1	12	46	34	15	19
1	10	275	1	1	1	1	1	2	1	1	12	104	69	14	106
1	10	277	1	1	3	1	1	6	1	1	12				
1	10	278	2	1	2	1	1	7	4	1	12				
1	10	280	1	1	4	1	1	6	1	1	12	37	57	10	22
1	10	281	1	1	4	1	1	2	4	1	12	38	58	11	23
1	10	1422	1	1	1	1	1	3	1	1	12	56	64	9	28
1	10	1424	1	2	1	1	1	2	1	1	12	54	63	9	22
1	10	1427	2	1	1	1	1	3	1	1	12	47	63	10	32
1	10	1405	1	1	1	1	1	4	2	1	12	119	130	21	315
1	10	1406	1	1	1	1	1	4	1	1	12	90	75	13	105
1	10	1409	1	1	1	1	1	2	2	1	12	75	86	16	114
1	10	1410	1	2	1	1	1	3	1	1	12	39	79	7	25
1	10	1412	1	1	1	1	1	6	1	1	12	76	102	16	123
1	10	1413	1	1	1	1	1	2	1	1	12	70	105	10	73
1	10	1415	1	1	1	1	1	3	1	1	12	47	86	14	55
1	10	1418	1	1	1	1	1	2	1	1	12	55	71	8	25
1	10	1419	1	1	1	1	1	6	1	1	12	64	75	10	35
1	10	1420	1	1	1	1	1	6	2	1	12	93	88	24	195
1	10	237	1	1	4	1	1	6	1	1	12	121	71	16	131
1	10	240	2	1	4	1	1	2	4	1	12	53	55	10	26
1	10	241	1	1	4	1	1	3	1	1	12	44	83	10	32
1	10	245	1	1	4	1	1	6	4	1	12	112	124	19	285
1	10	246	1	1	1	1	1	3	1	1	12	54	87	13	67
1	10	247	1	1	2	3	3	7	1	1	12				
1	10	248	1	1	5	3	3	7	1	1	12				
1	10	836	1	1	1	1	1	3	1	1	12	50	69	10	38
1	10	846	1	1	2	1	1	3	4	1	12				
1	10	847	1	1	5	1	1	3	4	1	12				

1	10	848	1	1	5	3	3	7	4	1		12						
1	12	386	1	1	1	1	1	2	5	1		1		56	51	10	30	
1	12	1431	1	1	5	3	3	7	4	1		3	2					
1	12	387	1	1	2	1	1	1	4	1		10						
1	12	1429	1	1	1	1	1	6	6	1		12		69	83	15	76	
1	12	1430	1	1	1	1	1	2	1	1		12		58	83	12	61	
1	13	186	1	1	1	1	1	5	2	1		1		60	75	10	49	
1	13	187	1	1	1	1	1	5	1	1		1		73	72	15	67	
1	13	188	1	1	1	1	1	5	1	1		1		104	54	20	108	
1	13	189	1	1	1	1	1	3	1	1		1		72	98	16	106	
1	13	190	1	1	1	1	1	2	2	1		1		60	75	9	49	
1	13	191	1	1	1	1	1	4	4	1		1		112	62	16	138	
1	13	192	1	1	4	1	1	6	4	1		1		74	60	11	53	
1	13	194	1	1	1	1	1	6	2	1		1		78	67	18	103	
1	13	196	1	1	1	1	1	4	1	1		1		64	90	13	77	
1	13	195	2	1	1	1	1	1	1	1		3	1	67	70	15	65	3.3
1	13	184	1	1	3	1	1	2	1	1		4	1					
1	13	182	1	1	1	1	1	2	1	1		12		81	75	17	99	
1	13	183	1	1	4	1	1	4	1	1		12		45	64	10	29	
1	13	185	1	1	4	1	1	1	2	1		12		69	92	10	71	
1	13	193	1	1	1	1	1	5	1	1		12		55	57	10	29	
1	13	197	2	1	1	1	2	2	4	1		12		52	48	11	25	
1	13	1186	1	1	4	1	1	2	1	1		12		46	51	10	26	
1	14	372	2	2	1	1	1	3	2	1		1		59	65	21	76	
1	14	373	2	1	1	1	1	3	1	1		1		46	70	21	62	
1	14	374	1	1	1	1	1	3	2	1		1		54	76	14	55	
1	14	375	1	1	1	1	1	6	1	1		1		27	42	12	13	
1	14	378	1	1	1	1	1	2	1	1		1		61	42	13	34	
1	14	379	2	1	3	1	2	4	1	1		1						
1	14	376	2	1	1	1	2	2	1	1		12		67	75	11	45	
1	14	377	1	1	1	1	1	6	1	1		12		137	155	49	843	
1	16	867	1	1	1	1	1	4	1	2	3	12		102	131	18	267	
1	18	211	1	1	1	1	1	5	2	1		1		58	97	15	100	
1	18	214	1	1	1	1	1	3	5	1		1		103	91	16	153	
1	18	215	3	2	1	2	2	4	1	1		1		50	39	7	12	
1	18	216	2	1	1	2	2	3	1	1		1		28	53	10	13	

1	18	217	1	1	2	3	3	6	1	1			1						
1	18	217	2	1	2	3	3	2	2	1			1						
1	18	218	1	1	2	3	3	7	1	1			1						
1	18	219	2	1	1	1	1	5	2	2	8		1		77	76	36	207	
1	18	220	2	1	3	3	3	5	1	2	2		1						
1	18	1387	1	1	1	1	1	4	1	1			1		44	65	8	19	
1	18	1389	2	1	1	1	1	2	2	1			1		85	111	16	141	
1	18	1391	1	1	1	1	1	4	3	1			1		49	75	15	58	
1	18	1392	1	1	1	1	1	2	6	1			1		55	89	12	62	
1	18	1393	1	1	1	1	1	2	1	1			1		75	71	10	56	
1	18	1434	1	1	1	1	1	2	1	1			1		69	70	10	48	
1	18	1435	1	1	1	1	1	2	1	1			1		54	67	10	38	
1	18	1436	1	1	1	1	1	4	1	1			1		43	61	8	20	
1	18	349	1	1	1	1	1	4	1	1			1		54	60	12	42	
1	18	210	2	1	1	1	1	6	2	1			2	1	59	88	18	97	3.5
1	18	223	1	1	2	3	3	7	1	1			3	1					
1	18	347	1	1	1	1	1	3	1	1			3	1	51	65	12	44	2.5
1	18	1390	1	1	1	1	1	2	2	1			4	3	105	100	14	180	
1	18	221	1	1	3	1	1	5	2	1			10	5	83	79	22	142	
1	18	207	1	1	1	1	1	3	1	1			12		50	75	16	53	
1	18	208	1	1	1	1	1	5	1	1			12		54	66	10	39	
1	18	209	2	1	1	1	1	6	1	1			12		68	69	15	50	
1	18	212	1	1	1	1	1	2	1	1			12		71	57	19	65	
1	18	213	1	1	4	1	1	6	4	1			12		65	73	20	74	
1	18	222	1	1	1	3	3	6	4	3	8	7	12		66	84	30	193	
1	18	1383	2	1	1	1	1	4	1	1			12		84	68	15	70	
1	18	1384	1	1	1	1	1	1	1	1			12		66	88	15	90	
1	18	1385	1	1	1	1	1	3	1	1			12		81	78	18	120	
1	18	1386	1	1	1	1	1	3	1	1			12		70	92	11	57	
1	18	1394	1	1	1	1	1	4	1	1			12		140	127	25	472	
1	18	1395	1	1	5	3	3	7	4	2			12						
1	18	1432	1	1	1	1	1	6	2	2	1		12		97	107	25	351	
1	18	1433	1	1	1	1	1	2	2	1			12		76	97	14	133	
1	18	348	1	1	4	1	1	6	1	1			12		54	65	11	41	
1	18	350	1	1	3	1	1	1	1	1			12						
1	18	351	2	1	1	1	1	5	2	1			12		93	109	26	317	

1	19	318	2	1	1	1	1	2	1	1		1		88	65	18	94	
1	19	321	1	1	1	1	1	6	2	1		1		84	105	18	147	
1	19	322	2	1	1	4	1	5	3	1		1		31	46	14	15	
1	19	804	1	1	1	1	1	1	2	1		1		72	69	14	90	
1	19	808	1	1	1	1	1	5	1	1		1		84	65	20	109	
1	19	809	2	1	1	1	2	3	1	1		1		65	38	9	26	
1	19	811	1	1	1	1	1	4	1	1		1		65	65	11	50	
1	19	812	2	1	1	1	2	2	2	1		1		55	45	21	47	
1	19	819	2	1	1	1	2	3	1	1		1		94	84	12	74	
1	19	821	1	1	1	1	1	6	2	1		1		85	39	11	45	
1	19	822	1	1	1	1	1	6	1	1		1		58	35	12	18	
1	19	825	1	1	1	1	1	3	2	1		1		80	57	17	101	
1	19	827	1	2	2	3	3	7	1	1		1						
1	19	828	1	1	4	1	1	2	1	1		1		52	62	8	25	
1	19	830	2	1	5	3	3	7	4	1		1						
1	19	832	1	1	4	1	1	3	4	2	8	1		60	70	16	81	
1	19	1144	1	1	1	1	1	6	5	1		1		39	84	15	40	
1	19	813	2	1	1	1	2	2	1	1		4	1	72	91	16	100	5.6
1	19	820	1	1	3	1	1	2	1	1		10						
1	19	831	2	1	1	1	1	2	1	1		10	5	120	63	23	237	2.4
1	19	319	1	1	4	1	1	2	4	1		12		93	59	12	82	
1	19	320	1	1	4	1	1	5	1	1		12		68	88	17	88	
1	19	805	1	1	4	1	1	4	1	1		12		64	68	11	53	
1	19	806	2	1	1	1	1	4	1	1		12		64	61	13	44	
1	19	807	1	1	4	1	1	4	1	1		12		80	90	13	96	
1	19	810	1	1	1	1	1	3	2	1		12		50	79	13	55	
1	19	814	1	1	1	1	1	5	2	1		12		61	72	12	49	
1	19	815	2	1	1	1	2	4	1	1		12		72	115	13	107	
1	19	816	1	1	4	1	1	3	2	1		12		57	65	12	50	
1	19	817	3	2	2	2	2	2	4	1		12						
1	19	818	1	2	1	1	1	3	2	1		12		53	54	12	38	
1	19	823	2	5	1	2	2	4	1	1		12		62	60	16	55	
1	19	824	1	5	4	1	1	2	4	1		12		45	48	8	21	
1	19	826	1	1	4	1	1	6	1	1		12		92	117	21	222	
1	19	829	1	1	5	3	3	7	4	1		12						
1	21	1429	1	1	1	1	1	6	6	1		12		69	83	15	76	

1	21	1430	1	1	1	1	1	2	1	1			12		58	83	12	61	
1	21	1431	1	1	5	3	3	7	4	1			3						
1	22	286	1	1	1	1	1	6	2	1			1		62	61	14	57	
1	22	288	1	1	1	1	1	2	1	1			1		40	53	7	13	
1	22	291	2	1	1	1	2	3	1	1			1		62	67	13	57	
1	22	295	1	1	1	1	1	6	2	1			1		71	107	20	169	
1	22	298	1	1	1	1	1	3	1	1			1		127	134	32	519	
1	22	299	1	1	1	1	1	6	6	1			1		95	86	25	195	
1	22	301	2	1	3	1	1	2	1	1			1						
1	22	302	1	1	4	1	1	6	2	1			1		82	107	17	170	
1	22	303	1	1	3	1	1	2	1	1			1						
1	22	304	1	1	4	1	1	6	2	1			1		50	78	11	43	
1	22	305	1	1	3	1	1	1	3	1			1						
1	22	306	2	1	1	1	1	2	2	1			1		155	85	21	291	
1	22	307	3	2	1	1	1	5	1	1			1		58	44	15	50	
1	22	308	1	2	5	3	3	7	5	1			1						
1	22	310	1	1	1	1	1	4	1	1			1		58	91	12	66	
1	22	311	1	5	3	1	1	6	2	1			1						
1	22	1014	2	1	5	3	3	7	4	1			1						
1	22	284	1	1	1	1	1	3	2	1			3	1	61	98	15	97	5.1
1	22	1015	2	1	4	1	1	3	1	1			3	4	53	82	13	66	4.7
1	22	300	1	1	3	3	3	4	1	1			4	1					
1	22	309	1	2	5	3	3	7	5	1			4						
1	22	290	1	1	3	1	1	3	1	1			10	3					
1	22	297	1	1	2	1	1	4	4	1			10	3					
1	22	285	1	1	1	1	1	4	1	1			12		85	70	14	91	
1	22	287	1	1	1	1	1	2	1	1			12		55	55	10	27	
1	22	289	1	1	1	1	1	6	1	3	3	1	12		56	70	18	71	
1	22	292	1	1	1	1	1	5	2	1			12		67	74	13	55	
1	22	293	1	1	1	1	1	3	1	1			12		43	60	10	24	
1	22	294	1	1	1	1	1	5	1	1			12		73	92	15	101	
1	22	296	1	1	2	1	1	3	4	1			12						
1	22	1013	1	1	1	1	1	3	1	1			12		30	44	8	10	
1	23	1396	1	1	1	1	1	2	1	1			1		87	101	17	148	
1	23	1397	1	1	1	1	1	3	2	1			1		62	90	18	103	
1	23	1398	1	1	1	1	1	6	2	1			1		55	126	15	121	

1	23	1399	2	1	1	1	1	3	1	1			1		48	71	15	50	
1	23	1400	1	1	1	1	1	3	1	1			1		33	52	15	18	
1	23	1401	1	1	1	1	1	5	1	1			1		63	89	24	110	
1	23	1402	2	1	1	1	1	2	1	1			1		39	44	14	24	
1	23	1403	1	1	5	1	1	1	1	2			1						
1	23	1404	1	1	5	1	1	7	4	1			10						
1	24	1089	1	1	4	1	1	6	1	1			12		85	83	12	83	
1	24	1090	1	1	1	1	1	6	1	1			12		150	120	35	646	
1	26	870	1	1	4	1	1	6	2	1			1		70	77	10	48	
1	26	872	1	1	1	1	1	3	1	1			1		54	70	9	37	
1	26	873	1	1	1	1	1	4	1	1			1		49	63	9	30	
1	26	875	1	1	3	1	1	3	1	1			1						
1	26	877	3	1	1	2	2	4	1	1			1		50	50	7	14	
1	26	880	1	1	4	1	1	6	2	1			1		78	102	17	136	
1	26	881	1	1	1	1	1	2	2	1			1		73	93	15	98	
1	26	882	1	1	3	1	1	7	4	1			1						
1	26	883	1	1	1	1	1	3	2	1			1		47	63	12	31	
1	26	885	1	1	1	1	1	5	1	1			1		31	79	10	26	
1	26	887	1	1	4	1	1	2	1	1			1		41	63	6	18	
1	26	888	1	1	4	1	1	4	1	1			1		53	63	9	32	
1	26	889	1	1	3	1	1	4	1	1			1						
1	26	890	1	1	3	1	1	2	2	1			1						
1	26	892	1	1	1	1	1	5	2	2	3	4	1		98	84	17	168	
1	26	893	1	1	4	1	1	5	1	1			1		81	84	18	126	
1	26	894	2	1	1	1	1	3	1	1			1		49	56	8	17	
1	26	895	1	1	2	3	3	7	1	1			1						
1	26	896	2	1	1	1	1	2	1	1			1		68	39	14	30	
1	26	897	2	1	1	1	2	3	1	1			1		68	30	14	34	
1	26	898	2	1	5	3	3	7	4	1			1						
1	26	871	1	1	1	1	1	3	2	1			3	1	67	78	15	90	3.5
1	26	886	1	1	1	1	1	3	1	1			3	4	75	70	11	67	7.6
1	26	874	1	1	1	1	1	3	1	1			12		40	65	7	19	
1	26	876	1	1	4	1	1	2	1	1			12		49	47	7	16	
1	26	878	1	1	3	1	1	7	4	1			12						
1	26	879	1	1	4	1	1	4	1	1			12		75	82	15	95	
1	26	884	1	1	4	1	1	5	1	1			12		48	80	10	32	

1	26	891	1	1	2	1	1	7	4	1	12						
1	29	1074	1	1	2	1	1	2	4	1	12						
1	31	1076	1	1	1	1	1	2	1	1	9	1	55	93	13	68	4
1	32	948	1	1	1	1	1	5	1	1	1		45	72	12	40	
1	32	950	1	1	1	1	1	3	2	1	1		41	50	12	28	
1	32	953	2	1	1	1	1	5	1	1	1		67	63	13	51	
1	32	954	1	1	1	1	1	3	1	1	1		43	65	10	26	
1	32	956	1	1	1	1	1	6	2	1	1		53	73	17	56	
1	32	960	2	1	1	1	1	6	1	1	1		42	62	16	40	
1	32	962	1	1	1	1	1	4	1	1	1		57	26	7	12	
1	32	964	3	1	1	2	2	3	2	1	1		24	47	6	7	
1	32	965	2	1	1	1	1	3	1	1	1		78	73	21	108	
1	32	966	1	1	3	1	1	4	1	1	1						
1	32	967	3	1	1	1	2	6	1	1	1		48	58	15	26	
1	32	968	3	1	5	3	3	7	4	1	1						
1	32	969	3	1	5	3	3	7	4	1	1						
1	32	970	2	1	3	1	1	1	1	1	1						
1	32	971	3	1	1	2	2	2	1	1	1		52	16	14	9	
1	32	972	2	1	1	3	3	7	4	1	1						
1	32	973	2	2	4	1	1	5	2	1	1		48	52	13	29	
1	32	974	3	2	1	2	2	4	2	1	1		48	16	7	4	
1	32	975	3	1	1	1	2	4	1	1	1		27	38	8	6	
1	32	976	3	1	5	3	3	7	4	1	1						
1	32	977	2	1	1	2	2	2	4	1	1		55	22	12	10	
1	32	978	2	1	4	1	1	6	2	1	1		28	50	8	11	
1	32	979	1	1	3	3	3	7	4	1	1						
1	32	1185	1	1	1	1	1	4	1	1	1		86	36	20	61	
1	32	949	1	1	1	1	1	4	1	1	3	6	45	49	7	22	1.8
1	32	959	2	1	1	1	1	2	1	1	9	1	55	58	20	61	2.5
1	32	955	1	1	1	1	1	4	1	1	10	1	63	79	13	66	3.1
1	32	951	1	1	1	1	1	1	1	1	12		72	72	15	89	
1	32	952	1	1	4	1	1	5	1	1	12		111	87	22	177	
1	32	957	2	1	4	1	1	3	2	1	12		51	69	11	37	
1	32	958	1	1	5	1	1	2	4	1	12						
1	32	961	1	5	1	1	1	4	1	1	12		35	50	7	12	
1	32	963	2	1	1	1	2	1	1	1	12		34	42	9	13	

1	32a	982	2	1	4	1	1	5	1	1		1		73	37	13	37	
1	32a	983	3	1	1	1	2	3	1	1		1		82	75	25	142	
1	32a	984	3	1	1	2	2	3	1	1		1		29	51	9	11	
1	32a	985	2	1	1	2	1	5	2	1		1		30	50	8	10	
1	32a	986	1	1	1	1	1	5	2	1		1		27	48	9	7	
1	32a	987	2	1	4	2	1	4	1	1		1		36	40	5	7	
1	32a	988	1	1	1	1	1	6	1	1		1		33	48	15	19	
1	32a	989	3	1	1	2	2	4	1	1		1		30	55	9	12	
1	32a	990	3	1	4	2	2	2	6	1		1		35	44	10	14	
1	32a	991	2	1	1	2	2	3	1	1		1		38	50	11	14	
1	32a	992	2	1	1	2	1	2	1	1		1		48	44	13	22	
1	32a	993	2	1	1	1	1	2	1	1		1		22	43	12	9	
1	32a	994	2	1	1	2	2	4	1	1		1		42	45	9	13	
1	32a	995	3	1	5	3	3	7	4	1		1						
1	32a	996	2	1	1	2	1	2	1	1		1		48	20	14	7	
1	32a	997	3	1	1	2	2	2	1	1		1		29	43	9	9	
1	32a	981	1	1	1	1	1	4	1	1		3	1	61	67	15	63	3.6
1	32a	980	1	1	1	1	1	5	1	1		12		31	49	10	14	
1	32a	998	2	1	2	1	2	3	4	1		12						
1	34	899	1	1	1	1	1	5	1	1		1		57	70	14	64	
1	34	901	1	1	3	1	1	3	1	1		1						
1	34	902	1	1	4	1	1	4	1	1		1		68	81	14	67	
1	34	904	1	1	1	1	1	6	2	1		1		59	84	21	103	
1	34	905	1	1	5	1	1	1	4	2	3	1						
1	34	906	1	2	1	1	1	6	2	1		1		52	50	15	42	
1	34	909	1	1	4	1	1	2	1	1		1		64	37	8	18	
1	34	910	1	1	1	1	1	5	1	1		1		31	43	10	10	
1	34	911	1	1	3	1	1	1	5	1		1						
1	34	913	2	1	1	1	2	2	1	1		1		49	65	10		
1	34	914	1	1	3	1	1	4	2	1		1						
1	34	915	2	1	1	1	1	4	1	1		1		27	53	10		
1	34	916	3	1	1	2	2	4	1	1		1		44	28	17	7	
1	34	917	2	1	1	1	1	5	1	1		1		51	63	18	44	
1	34	918	2	1	1	1	2	6	2	1		1		71	64	23	67	
1	34	919	1	1	1	1	1	2	1	1		1		42	35	10	15	
1	34	920	2	1	1	1	2	6	2	1		1		39	53	14	25	

1	34	921	3	1	5	3	3	7	4	1	1							
1	34	922	2	1	1	1	1	3	1	1	1		43	53	14	23		
1	34	923	3	1	1	1	2	3	1	1	1		34	59	8	13		
1	34	924	3	1	1	1	2	3	1	1	1		27	47	12	15		
1	34	925	2	1	1	1	1	1	5	1	1		36	44	14	19		
1	34	926	3	1	1	2	2	3	1	1	1		33	44	12	14		
1	34	927	1	1	3	1	1	5	1	1	1							
1	34	928	2	1	1	1	1	3	2	1	1		40	44	17	23		
1	34	929	3	1	2	1	2	7	4	1	1							
1	34	930	1	1	1	1	1	4	1	1	1		33	44	7	6		
1	34	931	3	1	5	3	3	7	4	1	1							
1	34	932	2	1	1	1	2	6	1	1	1		29	53	15	18		
1	34	933	3	1	1	2	2	4	1	1	1		62	22	10	11		
1	34	934	2	1	1	2	2	4	2	1	1		72	18	9	11		
1	34	935	2	1	1	2	2	1	1	1	1		42	17	8	6		
1	34	936	3	1	1	1	2	2	1	1	1		26	43	6	5		
1	34	937	3	1	5	3	3	7	4	1	1							
1	34	938	3	1	1	2	2	2	1	1	1		54	23	10	9		
1	34	939	2	1	1	2	2	4	1	1	1		56	16	6	6		
1	34	940	1	1	5	3	3	7	4	1	1							
1	34	941	3	1	1	1	2	6	1	1	1		38	49	11	18		
1	34	942	3	1	5	3	3	2	2	1	1							
1	34	943	3	1	5	3	3	7	4	1	1							
1	34	944	2	1	4	1	1	5	1	1	1		23	45	9	6		
1	34	945	3	1	5	3	3	7	4	1	1							
1	34	946	1	1	1	1	1	5	1	1	1		22	42	10	7		
1	34	947	2	1	5	3	3	7	4	1	1							
1	34	903	1	1	1	1	1	5	1	1	3	1	51	72	15	47	2.3	
1	34	912	1	1	1	1	1	6	2	1	4	1	98	93	21	180	3.3	
1	34	900	1	1	1	1	1	3	1	1	9	5	72	68	13	63	2.3	
1	34	907	1	1	1	1	1	6	2	1	12		65	85	17	108		
1	34	908	1	1	1	1	1	4	1	1	12		42	47	6	14		
1	35	999	1	1	1	1	1	3	2	1	1		40	58	11	29		
1	35	1002	1	1	1	1	1	6	2	1	1		40	56	13	30		
1	35	1000	1	1	4	1	1	2	1	1	12		65	57	9	26		
1	35	1001	1	1	1	1	1	2	2	1	12		41	55	6	15		

1	35	1003	2	5	4	3	3	6	2	1		12	40	58	9	18	
1	35	1004	1	1	3	1	1	1	1	1		12					
1	37	1073	1	1	1	1	1	5	2	1		1	58	96	15	107	
1	39	1006	1	1	1	1	1	6	1	1		1	40	62	16	29	
1	39	1007	1	1	1	1	1	2	1	2	5	1	92	86	16	131	
1	39	1008	1	1	2	1	1	3	4	1		1					
1	39	1009	2	1	1	1	1	3	1	1		1	43	18	8	5	
1	39	1010	2	1	1	2	2	6	1	1		1	23	44	8	6	
1	39	1011	2	1	1	2	2	5	2	1		1	51	46	11	20	
1	39	1012	3	1	1	2	2	3	2	1		1	63	28	13	19	
1	39	1005	1	1	4	1	1	2	1	1		12	61	60	10	29	
1	41	1028	1	1	1	1	1	6	2	1		1	86	120	17	204	***
1	41	1029	1	1	4	1	1	5	1	1		1	41	46	8	13	
1	41	1030	1	1	4	1	1	5	2	1		1	75	84	13	72	
1	41	1034	1	1	4	1	1	6	2	1		1	93	110	24	197	
1	41	1035	1	1	1	1	1	3	2	1		1	53	78	14	63	
1	41	1037	1	1	1	1	1	3	1	1		1	49	56	12	23	
1	41	1038	1	1	4	1	1	4	1	1		1	52	66	10	31	
1	41	1040	1	1	2	3	3	7	4	1		1					
1	41	1041	1	1	1	1	1	6	1	1		1	45	71	18	49	
1	41	1042	1	1	1	4	1	6	1	1		1	27	46	8	6	
1	41	1083	1	1	1	1	1	6	1	1		1	44	85	17	47	
1	41	1031	1	1	1	1	1	5	1	1		12	82	79	12	66	
1	41	1032	1	1	3	1	1	6	1	1		12					
1	41	1033	1	1	1	1	1	4	2	1		12	53	76	9	35	
1	41	1036	2	1	1	1	1	4	1	1		12	85	65	11	67	
1	41	1039	1	1	4	1	1	4	1	1		12	33	43	6	7	
1	41	1077	1	1	1	1	1	2	1	1		12	33	58	5	12	
1	41	1078	1	1	4	1	1	3	1	1		12	48	69	10	31	
1	41	1079	1	1	4	1	1	2	1	1		12	41	51	8	15	
1	41	1080	3	1	2	1	2	2	4	1		12					
1	41	1081	1	1	4	1	1	6	1	1		12	58	73	10	35	
1	41	1082	2	1	5	3	3	7	4	1		12					
1	42	1067	1	1	1	1	1	5	2	1		1	50	66	11	31	
1	42	1066	1	1	5	1	1	6	4	1		12					
1	44	1059	1	1	1	1	1	5	2	1		1	40	45	9	14	

1	44	1057	1	1	4	1	1	4	1	1		12		89	115	18	182	
1	44	1058	1	1	4	1	1	2	1	1		12		53	103	8	49	
1	45	1068	1	1	4	1	1	3	1	1		12		68	73	14	81	
1	47	1107	1	1	4	1	1	6	1	1		12		76	67	10	47	
1	49	1086	2	1	1	2	1	4	1	1		1		54	50	9	20	
1	49	1087	2	1	1	2	2	2	1	1		1		23	41	5	3	
1	49	1088	2	1	1	2	2	2	1	1		1		45	57	17	28	
1	49	1085	1	1	1	1	1	4	1	1		10	7	73	86	16	96	1.8
1	50	1060	1	1	1	1	1	5	1	1		1		73	77	25	131	
1	50	1061	1	1	1	1	1	6	2	1		1		95	85	18	162	
1	50	1062	1	1	1	1	1	4	1	1		12		97	97	13	150	
1	50	1063	1	1	1	1	1	5	1	1		12		96	107	20	180	
1	50	1064	1	1	4	1	1	2	1	1		12		72	78	10	59	
1	51	1043	1	1	4	1	1	3	1	1		1		41	65	12	31	
1	51	1045	1	1	1	1	1	5	2	1		1		36	62	10	23	
1	51	1047	1	1	2	3	3	7	4	1		1						
1	51	1049	1	1	1	1	1	5	2	1		1		88	102	23	207	
1	51	1051	2	1	1	2	1	2	1	1		1		21	54	9	9	
1	51	1145	1	1	3	1	1	1	5	1		1						
1	51	1044	2	1	1	1	1	3	1	1		12		61	88	13	68	
1	51	1046	1	5	1	1	1	6	2	1		12		44	93	17	55	
1	51	1048	1	1	4	1	1	2	1	1		12		109	59	14	70	
1	51	1050	1	1	3	1	1	2	1	1		12						
1	52	1119	1	5	1	1	1	4	1	1		12		40	66	9	16	
1	55	1092	1	1	4	1	1	4	1	1		1		82	77	17	108	
1	55	1093	1	1	3	1	1	3	2	1		1						
1	55	1094	3	1	2	1	2	7	4	1		1						
1	55	1097	2	1	1	2	1	6	2	1		1		41	25	9	6	
1	55	1099	2	1	4	2	2	3	1	1		1		25	53	6	7	
1	55	1101	1	1	3	1	1	6	1	1		1						
1	55	1102	1	1	1	1	1	6	2	1		1		50	29	9	11	
1	55	1103	3	1	5	3	3	7	4	1		1						
1	55	1104	2	2	2	3	3	7	1	1		1						
1	55	1105	1	2	5	3	3	7	4	1		1						
1	55	1106	1	2	5	3	3	7	4	1		1						
1	55	1112	2	1	1	1	1	6	1	1		1		32	66	16	29	

1	55	1114	2	1	1	2	2	2	1	1	1		63	39	21	40		
1	55	1115	1	1	2	3	3	7	1	1	1							
1	55	1116	2	1	5	3	3	7	4	1	1							
1	55	1117	1	1	5	3	3	7	4	1	1							
1	55	1118	2	1	5	3	3	7	4	1	1							
1	55	1091	1	1	4	1	1	5	1	1	12		48	50	9	18		
1	55	1095	1	1	4	1	1	3	2	1	12		40	55	8	17		
1	55	1096	2	2	1	1	1	5	1	1	12		50	70	13	38		
1	55	1098	2	1	2	1	2	7	4	1	12							
1	55	1100	3	2	5	3	3	7	4	1	12							
1	55	1111	2	1	5	1	6	6	1	1	12		56	73	20	78		
1	55	1113	3	1	1	1	2	3	1	1	12		69	79	23	107		
1	56	1072	1	1	4	1	1	3	1	1	1		46	66	14	43		
1	57	1019	1	1	5	3	3	7	4	1	1							
1	57	1023	2	1	1	1	2	4	1	1	1		47	35	11	15		
1	57	1025	3	1	1	2	2	6	2	1	1		26	48	10	9		
1	57	1026	3	1	1	2	2	4	1	1	1		53	40	11	22		
1	57	1027	1	5	1	1	1	5	1	1	1		72	63	11	63		
1	57	1016	1	1	1	1	1	3	1	1	3	1	87	73	16	122	3.5	
1	57	1021	1	1	1	1	1	1	2	1	9	1	45	35	9	17	2.6	
1	57	1017	1	1	4	1	1	6	1	1	12		102	95	19	193		
1	57	1018	1	1	1	1	1	5	2	1	12		57	74	12	43		
1	57	1020	1	5	2	1	1	3	4	1	12							
1	57	1022	1	4	1	1	1	6	1	1	12		79	51	20	98		
1	57	1024	1	1	5	3	3	7	4	1	12							
1	57	1071	1	5	1	1	1	6	1	1	12		71	104	23	164		
1	58	1075	1	1	1	1	1	5	1	1	1		44	54	10	22		
1	59	1065	1	1	4	1	1	5	1	1	12		128	143	24			
1	62	1108	1	1	3	1	1	2	1	1	1							
1	62	1109	3	1	3	1	2	2	1	1	1							
1	62	1110	2	1	5	3	3	7	4	1	1							
1	64	1069	1	1	1	1	1	6	2	1	1		56	76	17	83		
1	64	1070	1	2	1	1	1	1	1	1	1		83	85	19	160		
1	65	1052	3	1	1	1	2	2	1	1	1		48	18	12	8		
1	65	1055	1	1	1	1	1	5	2	1	1		44	57	12	32		
1	65	1053	1	1	1	1	1	4	1	1	12		42	38	9	13		

1	65	1054	1	2	4	1	1	2	1	1		12	83	90	16	122
1	65	1056	2	1	3	1	1	4	1	2	4	12				
1	66	1084	1	1	1	1	1	5	6	2	7	1	87	94	22	213
1	68	575	1	1	1	1	1	2	1	1		1	68	55	11	40
1	68	576	1	1	1	1	1	5	1	1		1	60	76	20	85
1	68	577	1	1	1	1	1	5	2	1		1	70	75	18	117
1	68	578	2	1	1	1	1	3	1	1		1	77	108	16	132
1	68	579	1	2	1	1	1	4	1	1		1	117	62	15	104
1	68	580	1	1	1	1	1	3	1	1		1	58	54	10	26
1	68	582	1	1	1	1	1	6	1	1		1	71	110	14	135
1	68	583	1	2	1	1	1	2	1	1		1	78	52	9	41
1	68	584	1	1	1	1	1	5	1	1		1	51	63	20	69
1	68	586	2	2	1	1	1	5	1	1		1	63	115	14	114
1	68	587	1	1	1	1	1	6	2	1		1	76	120	22	201
1	68	588	2	1	1	1	1	5	2	1		1	67	83	13	56
1	68	610	1	1	1	1	1	4	1	1		1	72	73	15	84
1	68	611	2	1	1	1	1	5	1	1		1	73	57	13	49
1	68	612	1	1	1	1	1	3	1	1		1	39	51	10	20
1	68	613	1	1	1	1	1	5	1	1		1	33	41	13	15
1	68	614	2	1	1	1	1	2	1	1		1	69	78	11	51
1	68	618	2	1	1	1	1	6	1	1		1	122	85	21	181
1	68	622	2	1	1	2	2	1	1	1		1	42	30	8	11
1	68	623	3	1	5	2	2	2	4	1		1				
1	68	624	2	1	5	3	3	7	4	1		1				
1	68	642	1	1	4	1	1	6	2	1		1	37	62	12	27
1	68	643	2	1	1	2	1	4	1	1		1	40	50	11	19
1	68	644	2	1	1	2	1	3	1	1		1	23	44	6	6
1	68	646	1	1	2	3	3	4	1	1		1				
1	68	647	1	1	1	1	1	2	1	1		1	56	46	7	15
1	68	650	1	2	1	1	1	5	2	1		1	40	92	15	56
1	68	651	1	1	1	1	1	6	2	1		1	38	83	14	36
1	68	652	3	1	4	1	2	4	1	1		1	38	46	8	10
1	68	653	1	1	1	4	3	6	1	1		1	42	64	6	17
1	68	654	1	1	5	3	3	7	4	1		1				
1	68	655	1	1	5	3	3	7	4	1		1				
1	68	656	1	1	2	3	3	7	1	1		1				

1	68	657	3	1	1	2	2	3	1	1	1	50	28	15	5
1	68	658	1	1	5	3	3	7	4	1	1				
1	68	659	3	1	1	2	2	3	1	1	1	20	42	5	4
1	68	661	2	2	1	1	1	4	1	1	1	90	121	21	211
1	68	662	1	1	1	1	1	5	2	1	1	36	57	10	17
1	68	664	1	1	1	1	1	3	1	1	1	25	46	7	8
1	68	666	1	1	1	1	1	2	2	1	1	62	76	10	66
1	68	668	1	2	4	1	1	1	2	1	1	104	94	15	127
1	68	669	1	1	1	1	1	4	6	1	1	53	64	12	41
1	68	670	1	1	2	3	3	7	1	1	1				
1	68	671	1	1	1	4	1	5	1	1	1	42	82	13	44
1	68	672	1	1	1	1	1	6	6	1	1	79	106	23	223
1	68	673	2	1	1	1	1	2	1	1	1	43	29	10	13
1	68	1146	2	1	1	1	1	3	1	1	1	60	48	12	32
1	68	1147	2	2	2	3	3	7	4	1	1				
1	68	1439	1	1	1	1	1	3	1	1	1	57	67	12	
1	68	627	2	1	1	1	1	4	1	1	1	65	88	13	65
1	68	629	2	1	1	1	2	2	1	1	1	69	68	12	46
1	68	630	2	1	1	1	1	3	1	1	1	31	53	7	9
1	68	631	1	1	2	3	3	2	1	1	1				
1	68	632	3	1	1	2	2	3	2	1	1	41	52	8	17
1	68	633	2	1	1	1	1	2	1	1	1	63	42	19	39
1	68	634	1	1	3	3	3	5	2	1	1				
1	68	637	2	1	4	1	2	3	4	1	1	35	61	8	13
1	68	638	2	1	1	1	1	2	1	1	1	35	58	8	13
1	68	639	1	1	1	1	1	5	2	1	1	35	60	12	21
1	68	640	1	2	4	1	1	5	2	1	1	71	93	20	120
1	68	641	1	1	5	1	1	4	4	1	1				
1	68	593	1	1	2	3	3	7	4	1	1				
1	68	597	1	1	4	1	1	4	1	1	1	77	31	12	28
1	68	598	1	1	1	1	1	5	1	1	1	60	70	10	38
1	68	599	1	1	1	1	1	5	1	1	1	51	77	14	49
1	68	601	1	1	1	1	1	6	2	1	1	78	102	19	156
1	68	603	1	1	4	1	1	6	1	1	1	80	87	18	115
1	68	604	1	1	1	1	1	6	1	1	1	114	109	20	262
1	68	605	1	1	1	1	1	5	1	1	1	108	69	20	148

1	68	589	1	1	1	1	1	5	1	1			3	1	72	100	14	103	2.7
1	68	665	1	1	1	1	1	4	1	1			3	6	72	71	14	68	2.6
1	68	607	1	1	1	1	1	4	1	1			9	1	68	82	13	65	2.1
1	68	574	2	1	1	1	1	2	1	1			10	1	76	91	12	74	4.3
1	68	581	1	1	2	1	1	7	4	1			12						
1	68	585	1	1	4	1	1	5	1	1			12		50	62	12	33	
1	68	590	1	1	2	1	1	7	4	1			12						
1	68	608	1	1	5	3	3	7	4	1			12						
1	68	609	2	1	2	1	1	2	4	1			12						
1	68	615	1	1	3	3	3	7	4	1			12						
1	68	616	1	1	3	3	3	7	4	1			12						
1	68	617	1	1	5	3	3	7	4	1			12						
1	68	619	1	1	5	3	3	7	4	1			12						
1	68	620	1	1	3	3	3	7	4	1			12						
1	68	621	1	1	5	3	3	7	4	1			12						
1	68	645	2	1	1	2	2	3	1	1			12		39	56	12	28	
1	68	648	2	1	5	3	3	7	4	1			12						
1	68	649	1	1	1	1	1	5	2	2	5		12		66	71	17	80	
1	68	660	1	1	5	3	3	7	4	2		1	12						
1	68	663	1	1	3	1	1	5	1	1			12						
1	68	667	1	1	2	1	1	7	4	1			12						
1	68	625	1	1	2	1	1	6	4	1			12						
1	68	626	1	1	4	1	1	5	2	1			12		56	90	13	86	
1	68	628	2	1	3	1	1	2	1	1			12						
1	68	635	1	1	5	1	1	7	4	1			12						
1	68	636	2	1	5	3	3	7	4	1			12						
1	68	591	1	1	3	1	1	6	4	1			12						
1	68	592	2	1	5	1	1	7	4	1			12						
1	68	594	1	1	5	3	3	7	4	1			12						
1	68	595	1	1	3	1	1	7	4	1			12						
1	68	596	1	1	5	3	3	7	4	1			12						
1	68	600	1	1	4	1	1	6	1	1			12		52	73	8	27	
1	68	602	1	1	1	1	1	3	2	1			12		74	95	17	129	
1	68	606	1	1	1	1	1	4	1	1			12		70	85	11	62	
2	2	400	1	1	1	1	1	2	1	1			10	7	82	115	12	126	1.2
2	4	353	1	1	1	1	1	6	2	1			1		80	95	14	114	

2	4	356	1	1	1	1	1	2	2	1			1		80	87	14	89	
2	4	357	1	1	1	1	1	1	2	1			1		91	106	16	171	
2	4	359	1	1	1	1	1	1	1	2	6		1		77	80	17	120	
2	4	360	2	1	1	1	1	3	2	1			1		64	67	9	40	
2	4	361	1	1	1	1	1	2	2	1			1		61	69	9	38	
2	4	366	1	1	2	1	1	4	1	1			1						
2	4	367	1	1	2	3	3	7	4	1			1						
2	4	368	1	1	1	1	1	4	1	1			1		54	82	10	39	
2	4	369	1	1	1	1	1	1	3	1			1		43	64	18	46	
2	4	371	1	1	1	1	1	6	1	1			1		77	100	14	85	
2	4	402	1	1	1	1	1	3	4	3	6	3	1		91	106	28	287	
2	4	355	1	1	1	1	1	4	1	1			3	6	76	100	16	151	2.4
2	4	370	1	1	1	1	1	5	1	1			4	5	68	95	13	97	2.7
2	4	354	1	1	1	1	1	1	1	1			10	3	95	98	19	213	7
2	4	362	1	1	2	1	1	5	4	1			10	3					
2	4	352	1	1	1	1	1	5	1	1			12		74	115	15	121	
2	4	358	1	1	1	1	1	5	1	1			12		70	86	15	89	
2	4	363	1	1	1	1	1	5	1	1			12		39	54	12	21	
2	4	364	1	1	4	1	1	5	1	1			12		36	45	8	12	
2	4	365	2	1	5	3	3	7	4	1			12						
2	5	396	2	1	1	1	1	2	1	1			1		48	45	8	17	
2	5	398	1	1	2	3	3	2	1	1			9	1					
2	5	395	1	1	1	1	1	2	1	1			12		55	72	9	36	
2	5	397	1	1	3	1	1	2	1	1			12						
2	5	399	1	1	5	3	3	7	4	1			12						
2	10	393	1	1	1	1	1	6	1	1			1		61	90	13	71	
2	10	394	1	1	1	1	5	1	2	7			12		101	125	26	404	
2	11	381	1	1	1	1	1	5	1	1			1		57	63	12	47	
2	11	382	1	1	1	1	1	4	1	1			1		33	47	13	20	
2	11	383	1	1	1	1	1	1	1	1			1		58	109	30	185	
2	11	380	1	1	1	1	1	3	1	1			12		71	129	12	111	
2	11	384	1	1	2	1	1	5	1	1			12						
2	12	323	1	1	1	1	1	6	1	1			1		63	60	14	55	
2	12	325	1	1	4	1	1	5	2	1			1		61	85	13	62	
2	12	326	1	1	1	1	1	4	1	1			1		48	73	11	38	
2	12	327	1	1	1	1	1	2	2	1			1		57	80	12	56	

2	12	332	1	2	1	1	1	2	1	1		1	55	38	8	18
2	12	334	1	1	1	3	3	6	4	1		1				
2	12	335	2	1	2	3	3	7	1	1		1				
2	12	336	1	1	1	1	1	6	1	1		1	74	94	18	126
2	12	337	1	1	1	1	1	2	1	1		1	61	73	9	43
2	12	339	1	1	1	1	1	6	2	1		1	45	85	16	54
2	12	340	1	1	1	1	1	3	1	1		1	33	71	11	26
2	12	341	1	1	1	1	1	3	1	1		1	43	88	11	41
2	12	346	2	1	1	2	2	2	1	1		1	42	35	7	10
2	12	324	1	1	1	1	1	3	2	1		12	55	76	10	44
2	12	328	1	1	4	1	1	6	1	1		12	106	133	24	292
2	12	329	1	1	4	1	1	6	4	1		12	88	130	20	217
2	12	330	2	1	1	1	1	6	2	1		12	85	100	17	147
2	12	331	1	1	2	1	1	2	4	1		12				
2	12	333	1	1	5	3	3	7	4	1		12				
2	12	338	1	1	1	1	1	2	1	1		12	34	68	10	24
2	12	342	1	1	3	1	1	5	1	1		12				
2	12	343	1	1	1	1	1	1	2	1		12	103	132	15	239
2	12	344	1	1	2	1	1	7	4	1		12				
2	12	345	1	1	5	1	1	7	4	1		12				
2	13	388	1	1	1	1	1	5	1	1		1	66	63	17	60
2	13	389	1	1	1	1	1	3	1	1		1	58	53	18	52
2	13	408	1	1	4	1	1	4	1	1		1	54	56	10	30
2	13	411	1	1	1	1	1	5	1	2	4	1	86	121	23	276
2	13	414	1	1	1	1	1	3	1	1		1	57	88	11	60
2	13	415	1	1	1	1	1	5	2	1		1	53	66	16	61
2	13	417	1	1	1	1	1	3	1	1		1	73	90	15	79
2	13	419	1	1	1	1	1	4	1	1		1	83	129	16	183
2	13	437	1	1	1	1	1	2	2	1		1	56	68	9	38
2	13	440	1	1	4	1	1	2	1	1		1	98	105	11	136
2	13	445	2	1	1	1	1	4	6	1		1	99	58	15	106
2	13	447	1	1	3	1	1	6	2	1		1				
2	13	448	1	1	1	1	1	3	1	1		1	43	43	12	23
2	13	453	1	1	3	1	1	2	1	1		1				
2	13	473	2	1	2	3	3	7	1	1		1				
2	13	474	1	1	5	3	3	7	4	1		1				

2	13	478	1	1	3	1	1	3	2	1			1				
2	13	481	1	1	1	1	1	5	2	1			1	62	117	14	98
2	13	482	1	1	4	1	1	3	2	1			1	39	58	10	21
2	13	483	1	1	1	1	1	2	2	1			1	56	42	6	16
2	13	484	1	1	4	1	1	2	1	1			1	41	80	7	23
2	13	487	2	1	1	1	1	6	1	1			1	103	87	32	206
2	13	505	2	1	1	1	1	3	1	1			1	21	48	8	7
2	13	507	2	1	1	2	2	5	2	1			1	35	52	12	16
2	13	508	2	1	1	1	1	2	1	1			1	29	45	12	8
2	13	510	2	1	1	2	1	3	1	1			1	26	46	10	8
2	13	511	1	1	1	1	1	5	2	1			1	34	58	9	14
2	13	513	1	1	2	3	3	7	4	1			1				
2	13	514	2	1	1	2	2	3	3	1			1	20	42	7	7
2	13	515	3	1	1	1	2	4	2	1			1	34	61	9	18
2	13	517	2	1	1	2	2	2	6	1			1	41	37	10	16
2	13	519	1	1	1	1	1	3	1	1			1	44	20	8	8
2	13	520	2	1	1	1	1	6	1	1			1	30	69	10	22
2	13	521	3	2	1	2	2	3	2	1			1	32	55	6	10
2	13	539	3	2	1	2	2	6	1	1			1	22	54	6	7
2	13	541	1	1	4	1	1	6	1	1			1	55	27	8	11
2	13	542	2	1	1	2	2	2	1	1			1	11	51	8	3
2	13	543	1	1	1	1	1	1	1	1			1	33	45	5	8
2	13	545	1	1	1	1	1	5	2	1			1	36	55	16	33
2	13	549	2	1	1	1	1	1	1	1			1	96	85	16	140
2	13	555	1	1	1	1	1	3	1	1			1	73	116	15	126
2	13	573	2	1	1	1	1	5	1	1			1	63	79	25	113
2	13	1135	1	1	1	1	1	6	4	3	8	9	1	126	132	37	643
2	13	1136	2	2	4	1	1	6	4	1			1	45	75	9	31
2	13	1137	1	1	3	3	3	7	4	1			1				
2	13	1138	1	1	1	3	3	1	2	1			1	31	58	10	20
2	13	1139	2	1	4	3	3	6	2	1			1	92	61	15	90
2	13	1140	3	1	5	3	3	7	4	1			1				
2	13	1141	2	1	5	3	3	7	4	1			1				
2	13	1142	1	1	1	1	1	6	2	1			1	46	71	12	41
2	13	1440	1	1	1	1	1	2	1	1			1	67	81	26	
2	13	556	1	1	1	1	1	4	1	1			1	60	92	19	105

2	13	558	1	1	1	1	1	6	1	1		1	61	120	17	130
2	13	559	1	2	1	1	1	6	2	1		1	80	108	18	154
2	13	560	1	1	1	1	1	6	2	1		1	74	61	21	94
2	13	561	2	1	1	1	1	6	1	1		1	38	70	13	27
2	13	564	1	1	1	1	1	6	6	1		1	67	87	15	102
2	13	567	2	2	1	1	1	6	2	1		1	65	87	15	88
2	13	572	2	2	1	2	2	3	1	1		1	49	27	9	8
2	13	528	2	1	4	1	1	2	2	1		1	32	49	16	20
2	13	529	3	1	4	1	2	2	1	1		1	74	125	19	165
2	13	531	1	1	4	1	1	5	1	1		1	37	40	8	9
2	13	532	3	2	4	2	2	5	1	1		1	33	68	13	20
2	13	533	2	1	1	1	1	5	1	1		1	37	57	19	38
2	13	536	3	1	1	2	2	6	6	1		1	29	76	9	18
2	13	537	2	1	1	1	1	6	6	1		1	30	51	19	20
2	13	538	2	1	1	1	2	4	2	1		1	52	43	8	18
2	13	489	2	1	1	1	1	5	1	1		1	50	94	13	65
2	13	490	2	1	3	1	1	3	1	1		1				
2	13	491	1	1	1	1	1	4	2	1		1	70	46	13	48
2	13	492	3	1	1	2	2	4	1	1		1	48	61	11	31
2	13	493	1	1	4	1	1	4	1	1		1	44	69	8	29
2	13	494	2	1	4	2	2	2	1	1		1	36	58	6	10
2	13	495	1	1	1	1	1	2	1	1		1	37	62	8	15
2	13	496	1	1	3	1	1	5	1	1		1				
2	13	497	2	1	1	1	1	6	2	1		1	45	56	12	32
2	13	498	1	1	1	1	1	2	1	1		1	30	63	7	10
2	13	499	1	1	5	3	3	1	4	1		1				
2	13	500	2	1	1	1	1	3	1	1		1	24	53	5	9
2	13	501	2	1	1	1	1	2	1	1		1	44	25	7	7
2	13	502	2	1	4	2	2	4	1	1		1	36	59	9	18
2	13	503	2	1	1	1	1	5	2	1		1	42	50	13	29
2	13	504	1	1	4	1	1	6	1	1		1	52	58	13	31
2	13	458	1	2	1	1	1	6	1	2	7	1	73	99	12	116
2	13	459	1	1	4	1	1	6	4	2	3	1	86	71	20	130
2	13	460	2	1	1	1	1	6	2	1		1	95	42	16	66
2	13	463	1	2	2	3	3	6	4	1		1				
2	13	465	2	1	1	1	1	3	1	1		1	88	132	27	331

2	13	469	1	1	3	1	1	1	4	1		1						
2	13	421	1	1	4	1	1	5	1	1		1		62	58	10	36	
2	13	423	1	1	4	1	1	3	3	1		1		33	62	9	20	
2	13	434	1	1	1	1	1	3	2	1		1		100	99	15	135	
2	13	439	1	1	3	1	1	5	2	1		3						
2	13	467	1	1	2	1	1	6	4	1		3						
2	13	427	1	1	1	1	1	2	1	1		3	6	75	93	15	101	2.2
2	13	488	1	1	1	1	1	6	1	1		6	7	73	92	18	153	1.4
2	13	450	2	1	1	1	1	3	1	1		9	1	28	51	11	16	3
2	13	476	2	1	1	1	1	6	1	1		9	1	85	97	29	224	2.6
2	13	546	1	1	1	1	1	5	1	1		9	1	72	85	19	120	
2	13	551	1	1	1	1	1	5	1	1		9	1	76	57	16	59	4.6
2	13	1183	1	1	1	1	1	4	5	1		9	1	126	55	22	122	2.6
2	13	462	1	1	1	1	1	2	2	1		9	7	99	107	22	237	2
2	13	430	1	1	1	1	1	5	1	1		9	1	96	111	22	251	5.8
2	13	438	1	1	1	1	1	5	1	1		10	6	92	113	18	181	2.9
2	13	480	1	1	1	1	1	6	2	1		10	7	65	94	19	111	2.1
2	13	552	1	1	4	1	1	5	1	1		10	1	107	110	14	172	2.7
2	13	565	1	1	1	1	1	5	1	1		10	6	98	105	16	213	5.3
2	13	569	1	1	1	1	1	3	1	1		10	5	70	92	23	166	3
2	13	457	1	1	1	1	1	4	1	1		10	7	81	82	11	70	2.3
2	13	466	1	1	5	3	3	7	4	1		10						
2	13	390	1	1	4	1	1	5	1	1		12		69	97	13	75	
2	13	391	1	1	3	1	1	6	1	1		12						
2	13	403	1	1	4	1	1	4	4	1		12		70	79	12	56	
2	13	404	1	1	4	1	1	2	4	1		12		57	74	12	48	
2	13	405	1	1	4	1	1	3	4	1		12		102	112	18	233	
2	13	406	1	1	3	1	1	5	1	1		12						
2	13	407	1	1	2	3	3	7	4	1		12						
2	13	409	1	1	2	1	1	1	4	1		12						
2	13	410	1	1	1	1	1	4	1	1		12		102	116	16	207	
2	13	412	1	1	4	1	1	5	1	1		12		103	98	16	160	
2	13	413	1	1	1	1	1	4	1	1		12		111	104	21	288	
2	13	416	1	1	1	1	1	5	2	1		12		66	77	17	100	
2	13	418	1	1	4	1	1	4	1	1		12		94	87	14	118	
2	13	441	2	1	1	1	1	3	1	2	4	12		83	72	21	110	

2	13	442	1	1	3	3	3	7	4	1		12				
2	13	443	1	1	1	1	1	2	2	1		12	79	96	11	88
2	13	444	1	1	4	1	1	2	2	1		12	71	86	11	83
2	13	446	2	1	2	3	3	7	1	1		12				
2	13	449	1	1	5	1	1	2	4	1		12				
2	13	451	1	1	4	1	1	4	2	1		12	40	51	7	13
2	13	452	1	1	5	1	1	4	4	1		12				
2	13	471	1	1	4	1	1	4	1	1		12	110	150	38	656
2	13	472	2	1	5	3	3	3	4	1		12				
2	13	475	1	1	4	1	1	2	1	1		12	75	56	16	52
2	13	477	1	1	1	1	1	5	2	1		12	50	86	20	85
2	13	485	1	1	1	1	1	4	1	2	6	12	167	93	23	403
2	13	486	1	1	4	1	1	3	1	2	8	12	82	124	23	252
2	13	506	1	1	5	3	3	6	2	1		12				
2	13	509	1	1	1	1	1	5	2	1		12	27	52	9	12
2	13	512	1	1	3	3	3	5	4	1		12				
2	13	516	2	1	5	3	3	7	4	1		12				
2	13	518	2	1	2	1	1	2	4	1		12				
2	13	540	1	1	3	1	1	2	1	1		12				
2	13	544	1	1	4	1	1	6	1	1		12	65	80	10	60
2	13	547	1	1	4	1	1	6	1	1		12	65	98	17	94
2	13	548	1	1	1	1	1	4	1	1		12	53	95	14	60
2	13	550	1	2	1	1	1	6	1	1		12	94	137	18	229
2	13	553	1	1	1	1	1	6	1	1		12	83	107	21	203
2	13	554	1	2	4	1	1	5	4	1		12	78	77	8	111
2	13	1184	1	1	5	3	3	7	4	1		12				
2	13	557	1	1	4	1	1	3	1	1		12	51	85	9	39
2	13	562	2	1	3	1	1	3	1	1		12				
2	13	563	1	1	1	1	1	5	6	1		12	71	89	17	125
2	13	566	1	2	1	1	1	5	1	1		12	85	108	13	136
2	13	568	2	1	5	3	3	7	4	1		12				
2	13	570	2	1	3	1	1	6	1	1		12				
2	13	571	1	1	5	3	3	7	4	1		12				
2	13	522	1	1	5	1	1	6	4	1		12				
2	13	523	1	1	5	3	3	7	4	1		12				
2	13	524	2	2	3	3	3	7	4	1		12				

2	13	525	3	2	3	3	3	7	4	1			12				
2	13	526	3	1	5	3	3	7	4	1			12				
2	13	527	3	1	1	2	2	3	2	1			12	21	49	9	8
2	13	530	2	1	2	2	2	7	4	1			12				
2	13	534	1	1	5	3	3	7	4	1			12				
2	13	535	1	1	5	3	3	7	4	1			12				
2	13	454	1	1	2	1	1	7	4	1			12				
2	13	455	1	1	1	1	1	2	2	1			12	81	102	15	133
2	13	456	1	1	1	1	1	6	2	1			12	79	87	15	110
2	13	461	1	1	1	1	1	6	2	2	6	5	12	81	109	25	252
2	13	464	1	1	5	1	1	3	4	1			12				
2	13	468	1	1	2	3	3	6	4	1			12				
2	13	470	1	1	5	3	3	7	4	1			12				
2	13	420	1	1	4	1	1	2	1	1			12	58	103	11	68
2	13	422	1	1	2	1	1	7	4	1			12				
2	13	424	1	2	4	1	1	4	1	1			12	92	129	18	182
2	13	425	1	1	4	1	1	2	1	1			12	69	84	11	68
2	13	426	1	2	4	1	1	1	4	1			12	82	129	14	145
2	13	428	1	1	4	1	1	3	1	1			12	66	97	15	93
2	13	429	1	1	4	1	1	4	1	1			12	68	130	14	11
2	13	431	1	1	1	1	1	6	2	1			12	61	98	17	99
2	13	432	1	1	4	1	1	4	4	1			12	60	69	11	48
2	13	433	1	1	4	2	2	3	1	1			12	64	90	15	94
2	13	435	1	1	4	1	1	2	1	1			12	56	75	6	28
2	13	436	1	1	2	1	1	3	4	1			12				
2	13	479	1	1	5	3	3	7	4	1							
2	14	868	2	1	1	1	1	2	2	1			1	85	118	33	224
2	14	869	1	2	5	3	3	7	4	1			1				
2	14	385	1	1	4	1	1	2	4	1			12	58	92	18	74
2	15	865	1	1	4	1	1	6	1	1			1	42	57	15	33
2	15	864	1	1	1	1	1	2	2	1			12	93	105	21	219
2	15	866	1	1	3	1	1	7	1	1			12				
2	17	1143	3	1	5	3	3	7	4	1			12				
3	6	777	1	1	1	1	1	5	1	1			12	107	111	21	249
3	8	774	1	1	1	1	1	4	2	1			12	68	103	15	100
3a	3	780	1	1	1	1	1	5	2	1			1	87	103	17	169

3a	3	781	2	1	1	1	1	5	2	1	1		37	55	14	23		
3a	3	782	1	1	1	1	1	2	2	1	12		55	80	9	58		
3a	6	776	1	5	1	1	1	6	1	1	4	1	58	90	12	75	2.8	
3a	7	771	1	5	5	3	3	7	4	1	12							
3a	7	772	1	5	1	1	1	6	2	1	12		99	105	19	221		
3a	7	773	1	5	1	1	1	5	2	1	12		65	54	11	40		
3a	8	783	1	1	5	1	1	3	4	1	12		102	109	21	214		
3b	7	769	1	5	1	1	1	5	2	1	12		82	120	24	266		
3c	9	770	1	1	1	1	1	3	1	1	10	1	104	100	21	269	2.9	
3c	10	775	1	1	1	1	1	4	1	1	12		73	92	10	65		
3f	4	759	1	1	1	1	1	6	2	1	1		73	100	20	135		
3f	4	763	1	1	1	1	1	3	1	1	1		70	88	12	89		
3f	4	765	1	1	4	1	1	3	1	1	1		53	98	12	66		
3f	4	766	1	1	1	1	1	4	1	1	1		80	124	17	219		
3f	4	768	1	1	4	1	1	6	2	1	1		54	63	9	34		
3f	4	762	1	1	1	1	1	1	1	1	4	1	118	143	22	539	3.9	
3f	4	761	1	1	1	1	1	1	2	1	10	5	133	160	35	791	2.1	
3f	4	757	1	1	1	1	1	6	1	1	12		113	92	19	236		
3f	4	758	1	1	1	1	1	4	1	1	12		71	132	12	138		
3f	4	760	1	5	1	1	1	4	1	1	12		81	106	19	152		
3f	4	764	1	1	1	1	1	4	1	1	12		71	71	10	65		
3f	4	767	1	1	2	1	1	7	4	1	12							
3f	8	778	1	1	1	1	1	5	2	1	12		81	81	15	95		
3f	8	779	1	5	1	1	1	2	1	1	12		62	61	11	49		
4a	3	674	1	1	1	1	1	4	1	1	1		73	104	15	110		
4a	3	677	2	1	1	1	1	5	1	1	1		51	110	13	85		
4a	3	678	1	1	1	1	1	5	1	1	1		74	127	16	196		
4a	3	679	1	1	1	1	1	3	1	1	1		86	122	18	214		
4a	3	680	2	1	1	1	2	4	1	1	1		47	65	8	25		
4a	3	684	1	1	3	1	1	5	1	1	1							
4a	3	690	1	1	1	1	1	5	2	1	1		80	110	18	167		
4a	3	693	1	1	2	3	3	6	2	1	1							
4a	3	691	1	1	1	1	1	4	1	1	3	1	72	106	10	84	2.1	
4a	3	681	1	1	2	1	1	7	4	1	10							
4a	3	682	2	1	1	1	2	3	1	1	10	7	94	51	13	81	1.3	
4a	3	675	1	1	4	1	1	3	1	1	12		48	84	11	46		

4a	3	676	1	1	4	1	1	5	2	1	12		53	96	12	62	
4a	3	683	1	1	1	1	1	5	2	1	12		75	122	19	188	
4a	3	685	1	1	1	1	1	5	5	1	12		73	92	22	159	
4a	3	686	1	1	1	1	1	6	1	1	12		77	119	15	147	
4a	3	687	1	1	1	1	1	6	2	1	12		80	105	16	130	
4a	3	688	1	1	3	1	1	5	1	1	12						
4a	3	689	1	1	1	1	1	4	1	1	12		70	100	15	99	
4a	3	692	1	1	4	1	1	5	1	1	12		62	92	9	49	
4a	8	695	1	1	1	1	1	6	2	1	1		61	108	15	106	
4a	8	703	1	1	1	1	1	4	2	1	1		55	53	7	24	
4a	8	704	1	1	1	1	1	3	2	1	1		48	64	11	33	
4a	8	705	1	1	1	1	1	5	2	1	1		74	86	15	84	
4a	8	785	1	1	1	1	1	2	1	1	1		92	79	11	89	
4a	8	786	1	1	4	1	1	2	1	1	1		83	91	17	120	
4a	8	787	1	1	1	1	1	2	2	1	1		87	70	13	71	
4a	8	789	1	1	4	1	1	3	2	1	1		112	156	30	696	
4a	8	698	1	1	1	1	1	4	1	1	3	1	134	88	18	266	4.5
4a	8	694	1	5	1	1	1	3	1	1	12		54	95	13	81	
4a	8	696	1	1	1	1	1	2	2	1	12		73	122	14	129	
4a	8	697	1	1	4	1	1	5	6	1	12		72	103	12	99	
4a	8	699	2	1	1	1	1	3	1	1	12		81	53	14	67	
4a	8	700	1	5	1	1	1	3	2	1	12		78	110	19	158	
4a	8	701	1	1	5	1	1	6	4	1	12						
4a	8	702	1	5	1	1	1	5	2	1	12		58	106	19	104	
4a	8	784	1	1	4	1	1	2	1	1	12		48	66	10	29	
4a	8	788	2	1	5	3	3	7	4	1	12						
4a	9	755	1	1	4	1	1	3	1	1	4	1	52	67	13	44	2.4
4a	9	706	1	1	1	1	1	2	1	1	12		74	86	18	121	
4a	10	708	1	1	4	1	1	1	2	1	1		58	67	10	47	
4a	10	709	1	1	1	1	1	5	1	1	4	1	67	69	21	111	3.3
4a	10	707	1	1	1	1	1	3	2	1	12		58	96	19	106	
4b	2	727	1	1	4	1	1	6	1	1	1		62	66	15	60	
4b	2	729	1	1	3	1	1	5	1	1	1						
4b	2	731	2	1	1	1	1	5	2	1	1		63	72	22	84	
4b	2	732	2	1	1	1	1	3	1	1	1		88	56	13	62	
4b	2	726	1	1	1	1	1	4	1	1	2	1	67	92	13	95	3

4b	2	733	1	1	1	1	1	4	2	1	3	1	77	97	17	125	3.5
4b	2	734	1	1	1	1	1	6	2	1	10	7	75	107	17	169	1.5
4b	2	728	1	1	3	1	1	2	1	1	12						
4b	2	730	1	1	3	3	3	7	4	1	12						
4b	3	713	1	1	1	1	1	3	1	1	1		54	90	11	57	
4b	3	715	1	1	1	1	1	2	1	1	1		78	97	12	104	
4b	3	717	1	1	1	1	1	6	1	1	1		86	100	18	155	
4b	3	719	1	1	1	1	1	4	1	1	1		88	129	19	242	
4b	3	720	1	1	1	1	1	2	1	1	1		58	95	13	101	
4b	3	723	1	1	1	1	1	4	1	1	1		61	78	10	55	
4b	3	724	1	1	1	1	1	3	1	1	1		49	58	11	33	
4b	3	725	1	1	1	1	1	6	2	1	1		42	56	7	17	
4b	3	712	1	1	4	1	1	2	4	1	3		108	144	18	243	
4b	3	716	1	2	1	1	1	1	1	1	4	4	97	108	20	248	3
4b	3	714	1	1	1	1	1	6	1	1	10	7	134	144	28	575	1.6
4b	3	710	1	1	4	1	1	2	1	1	12		86	78	12	89	
4b	3	711	1	1	4	1	1	6	2	1	12		71	90	16	93	
4b	3	718	1	1	4	1	1	6	2	1	12		113	137	25	427	
4b	3	721	1	1	1	1	1	4	1	1	12		131	100	17	246	
4b	3	722	1	1	1	1	1	3	1	1	12		106	40	14	79	
4b	3		1	1	1	1	1	1	1	3	12		123	112	17		***
4b	5	754	1	1	1	1	1	3	1	1	9	1	55	85	11	62	
4b	7	401	1	1	1	1	1	3	1	1	1		67	96	15	93	
4b	7	750	1	1	1	1	1	5	1	1	1		35	48	7	11	
4b	7	751	1	1	4	1	1	2	2	1	1		57	75	9	40	
4b	7	752	1	1	4	1	1	2	1	1	1		63	62	11	41	
4b	7	753	1	1	1	1	1	6	1	1	3	1	58	95	18	91	5
4b	7	748	1	1	4	1	1	4	1	1	12		60	71	8	30	
4b	7	749	1	1	1	1	1	6	1	1	12		67	94	21	119	
4b	8	736	1	1	1	1	1	4	1	1	1		56	81	12	57	
4b	8	737	1	1	1	1	1	5	1	1	1		61	68	13	50	
4b	8	739	2	1	1	2	2	3	1	1	1		60	37	13	25	
4b	8	740	1	5	1	1	1	3	1	1	1		69	98	16	113	
4b	8	743	1	1	1	1	1	4	1	1	1		85	124	14	185	
4b	8	744	1	1	4	1	1	2	1	1	1		95	110	17	158	
4b	8	745	1	1	1	1	1	3	1	1	1		63	100	13	91	

4b	8	747	1	5	1	1	1	5	1	2	4		3	1	79	108	17	188	3.4
4b	8	738	1	2	1	1	1	2	2	1			4	1	63	75	13	72	7.3
4b	8	735	1	1	1	1	1	3	1	1			12		67	126	14	129	
4b	8	741	1	1	4	1	1	1	1	3	1	1	12		101	130	14	194	
4b	8	742	1	1	1	1	1	5	1	1			12		54	87	15	82	
4b	8	746	1	1	4	1	1	4	1	1			12		100	96	19	154	
RMS		HA595	1	1	4	1	1	4	1	1			12		85	71	13	75	
RMS		HA596	1	1	1	1	1	3	1	1			1		65	116	14	111	
RMS		HA597	1	1	1	1	1	3	1	1			1		94	155	21	347	
RMS		HA598	1	1	1	1	1	4	1	1			3	5	61	71	13	58	1.8
RMS		HA599	1	1	4	1	1	4	1	1			12		62	63	11	42	
RMS		HA601	1	1	1	1	1	5	1	1			1		63	79	15	76	
RMS		HA602	1	1	4	1	1	5	1	1			12		61	95	13	66	
RMS		HA604	1	1	1	1	1	1	5	1			3	4	76	98	21	202	9.3
RMS		HA605	1	1	1	1	1	3	1	1			3	1	95	95	15	143	2.8
RMS		HA606	1	1	1	1	1	1	1	1			1		74	106	16	135	
RMS		HA607	1	1	1	1	1	6	1	1			12		98	116	19	226	
RMS		HA608	1	1	4	1	1	2	1	1			9	1	88	136	12	159	3.5
RMS		HA610	1	1	1	1	1	2	1	1			1		40	59	7	13	
RMS		HA611	1	1	1	1	1	3	1	1			1		59	67	9	36	
RMS		HA670	1	1	1	1	1	3	1	2	6		12		168	150	44	1274	
RMS		HA600	1	1	4	1	1	4	1	3	1	1	12		72	163	22	250	
RMS	n/s	HA603																	
RMS	n/s	HA609																	
RMS		HA669	1	1	1	1	1	1	1	3	1	1	12		80	84	17		***
SBmus															97	62	19		
SBmus															71	116	17		
SBmus															72	132	10		
SBmus															91	106	20		
SBmus															72	100	12		
SBmus															67	85	13		

BM	1866	8.1	1	1	1	1	1	2	1	1	12	88	58	12
BM	1938	1-1.87	1	1	1	1	1	3	1	1	12	59	88	13
BM	1938	1-1.88	1	1	1	1	1	5	1	1	12	62	98	15
Strom		A262										66	80	12
Strom		A262										63	106	17

Flake Debitage

P: primary, S: secondary, I: inner

Trench	layer	class	20-40mm	<20mm
1	10	p	4	
1	10	s	11	
1	10	i	16	
1	10	p		1
1	10	s		19
1	10	i		50
1	14	p	1	
1	19	i	1	
1	26	p	1	
1	26	i	3	
1	26	i		13
1	32	p	3	
1	32	s	8	
1	32	i	15	
1	32	s		6
1	32	i		27
1	32a	p	2	
1	32a	s	18	
1	32a	i	21	
1	32a	s		1
1	32a	i		11
1	34	p	29	
1	34	s	43	
1	34	i	73	
1	34	p		6
1	34	s		21
1	34	i		92
1	39	p	1	
1	39	s	12	
1	39	i	14	
1	39	s		16
1	39	i		11
1	41	s	2	
1	41	i	8	
1	41	i		5
1	47	s	2	
1	51	p	1	
1	52	p	4	
1	55	p	7	
1	55	s	13	
1	55	i	18	

1	55	p		2
1	55	s		5
1	55	i		39
1	57	i	3	
1	62	p	3	
1	62	s	5	
1	62	i	18	
1	62	i		8
1	65	p	2	
1	65	s	1	
1	65	i	3	
1	68	p	15	
1	68	s	38	
1	68	i	45	
1	68	p		2
1	68	s		7
1	68	i		28
2	12	p	2	
2	12	p		1
2	13	p	20	
2	13	s	41	
2	13	i	64	
2	13	p		6
2	13	s		45
2	13	i		482
3a	3	p	1	
3a	7	p	1	
4a	3	p	2	
4a	8	p	1	
4a	9	s	1	

KEY TO LAMINATED MATERIAL

Shape: shape
Br: breakage
ol: outline
bu burnt

Shape: 1. Sub-round
2. Sub-oval
3. Tapering rectangle
4. Triangular

Breakage: 1. Broken
2. Complete

Outline: 1. Curved
2. Angled
3. Right-angled
4. Denticulate

Burnt. 1. Burnt areas present

Laminated material; worked pieces
All pieces are made on laminated shales and are bifacially flaked around the edges.

trench	layer	cat no	shape	br	ol	bu	ML	MW	MTh	Weight
1	1	127	1	2	2	1	220	210	13	771
1	2	165		1	2				13	218
1	2	166		1	1				13	309
1	2	167		1	1				9	156
1	2	168		1	1				12	267
1	2	169		1	1				6	40
1	2	170		1	3				6	148
1	2	171		1	2				10	169
1	2	172		1	1				13	342
1	2	173		1	1				7	106
1	2	174		1	1				10	115
1	2	175		1	1				11	111
1	2	176		1	1				6	126
1	2	177		1	1				12	109
1	2	178		1	2				7	72
1	2	179		1	1				10	109
1	2	180		1	2				12	254
1	2	181		1	1				6	134
1	2	182		1	2				13	305
1	2	183		1	2				10	156
1	2	184		1	1				8	79
1	2	185		1	2				8	76
1	2	186		1	4				9	54
1	2	187		1	1				7	115
1	2	188		1	1				7	202
1	2	189		1	2				10	317
1	2	190		1	1				14	384
1	2	191		1	1				10	295
1	2	192		1	1				23	448
1	2	193		1	1				21	400
1	2	194		1	1				11	399
1	2	195		1	2				9	395

1	2	196		1	2				12	614
1	2	197	1	2	2		115	114	8	165
1	2	198	2	2	2		115	102	12	175
1	2	199	3	2			190	110	16	422
1	2	200	1	2	2		275	220	9	976
1	2	201	1	2	1		110	97	9	144
1	2	202	1	2	2		140	135	10	290
1	2	203	1	2	2		120	115	9	133
1	2	204	1	2	2		142	128	9	235
1	2	205		1	1				14	778
1	2	206		1	1				16	581
1	2	207		1	2				6	97
1	2	209		1	1				8	21
1	2	210		1	1				13	1817
1	2	211		1	1				13	175
1	2	212	1	2	2		150	140	9	268
1	2	218		1	1	1			8	739
1	2	219		1	1				13	215
1	2	220		1	2	1			11	251
1	2	221		1	1				13	239
1	2	222		1	1				9	243
1	2	223		1	1				17	406
1	2	224		1	1				8	128
1	2	225		1	1				9	241
1	2	226		1	1				13	428
1	2	227		1	1				15	421
1	2	228		1	1				14	592
1	2	229		1	1				18	667
1	2	230		1	1				16	407
1	2	231		1	2	1			8	194
1	2	232		1	1				8	92
1	2	233		1	1				10	133
1	2	234		1	1				9	136
1	2	235		1	2				12	229
1	2	236		1	1				5	60
1	2	237		1	1				7	129

1	2	238	1	2	1		91	89	10	120
1	2	239	1	2	1		93	91	6	73
1	2	240	2	2	1		155	127	17	496
1	2	241		1	1	1			20	543
1	2	242		1	1				12	262
1	2	245		1	2				8	40
1	5	75		1	1				15	376
1	5	76		1	1				15	385
1	8	68		1	1				18	637
1	8	69		1	2	1			12	253
1	8	70	2	2	1		163	88	9	207
1	10	62		1	2				7	67
1	10	63		1	2				6	67
1	10	64		1	1				11	906
1	10	65		1	2				18	770
1	10	66		1	2				16	1375
1	10	151		1	2				11	224
1	10	152		1	2				9	113
1	10	153		1	1				16	276
1	10	154	1	2	1		120	110	12	255
1	10	155	1	2	2		115	113	11	210
1	10	156	2	2	2		155	135	15	464
1	10	157		1	2				9	326
1	10	158		1	2				8	292
1	10	159		1	1				20	606
1	10	160		1	2				9	77
1	10	161		1	1				10	54
1	10	163		1	1				16	796
1	10	164		1	2				23	7284
1	10	213		1	1				10	110
1	12	78		1	1				15	247
1	14	93		1	2				13	865
1	14	94	1	2	4		118	100	18	274
1	18	214		1	2				21	858
1	18	215	2	2	1		130	105	16	329
1	18	216		1	2				13	120

1	18	217	2	2	1	155	100	11	340
1	18a	125	1	2	2	140	135	19	544
1	18a	126	2	2	2	202	170	11	562
1	19	12		1	2			14	152
1	19	13		1	1			14	65
1	19	19		1	1			19	290
1	19	20		1	1			19	419
1	19	21		1	1			10	108
1	19	22		1	2			15	255
1	19	23		1	1			8	110
1	19	24		1	2			20	573
1	19	25		1	2			22	595
1	19	26		1	1			7	80
1	19	27		1	2			15	220
1	19	28		1	2			10	137
1	19	29		1	5			16	271
1	19	30		1	3			21	620
1	20	67		1	2			19	300
1	22	117		1	1			11	607
1	22	118		1	1			7	14
1	22	119		1	1			14	723
1	22	120		1	4			25	660
1	22	121		1	2			10	205
1	22	132	1	2	2	109	90	12	180
1	22	133		1	1			13	508
1	26	36		1	2			14	276
1	26	37		1	2			13	255
1	26	38		1	1			8	28
1	26	39		1	1			12	296
1	26	40		1	2			15	384
1	26	41		1	1			12	195
1	26	42		1	5			13	442
1	26	43		1	1			14	351
1	26	44		1	2			10	219
1	26	45		1	1			13	409
1	26	46	1	2	2	107	95	15	191

1	26	47	2	2	2		142	120	8	227
1	26	48	1	2	2		240	210	22	1503
1	32	88		1	2				8	85
1	32	89		1	2				8	60
1	32	90		1	2				5	22
1	32	91		1	2				8	102
1	32	92		1	1				12	105
1	32a	83		1	1				11	103
1	32a	84	1	2	1		84	83	7	59
1	32a	85	1	2	1		120	120	7	156
1	34	58		1	1				12	217
1	34	59		1	1				15	313
1	41	123		1	2				11	140
1	42	72	1	2	4		130	110	15	344
1	42	73	2	2	1		150	125	26	645
1	44	135		1	1				18	642
1	45	134		1	1				6	39
1	50	4	1	2	2	1	210	210	18	1134
1	65	33		1	2				9	548
1	68	54		1	1				16	67
1	68	55		1	1				15	176
2	4	5	1	2	1		115	110	13	194
2	4	6		1	1				7	89
2	10	131	1	2	2		108	104	12	165
2	11	7	1	2	1		90	85	10	112
2	11	8		1	3				7	64
2	11	9		1	1				10	108
2	11	10		1	1				8	119
2	12	16	1	2	1		85	83	14	131
2	13	96		1	1				12	183
2	13	97		1	1				13	177
2	13	98		1	1				8	97
2	13	99		1	2				10	253
2	13	100		1	1				11	112
2	13	101		1	2				10	152
2	13	102		1	1				7	88

2	13	103		1	2				14	109
2	13	104		1	1				19	131
2	13	105		1	1				10	27
2	13	106		1	1				11	61
2	13	107	2	2	2		130	117	15	331
2	13	108	1	2	1		68	65	8	42
2	13	109	1	2	2		117	107	11	184
2	13	112		1	2				15	199
2	13	113		1	2				6	21
2	13	114		1	2				9	96
2	13	115		1	2				12	157
2	13	116	4	2	2		135	140	34	571
3b	7	1	1	2	1		110	102	15	228
3c	9	3	2	2	1		102	79	13	161
4b	3	2	1	2	1		78	69	8	70
							0	0		
BM	1866	8.1.4	1	2	1	1	63	60	5	
BM	1866	8.1.5	1	2	1		73	71	11	
BM	1866	8.1.7	1	2	1		79	75	9	
BM	1866	8.1.8	1	2	1		91	88	11	
BM	1866	8.1.9	1	2	1		128	119	10	
BM	1866	8.1.10	1	2	1	1	162	163	12	
BM	1938	1.1.84	1	2	1	1	200	193	23	
BM	1938	1.1.85	1	2	1		145	130	13	
BM	1938	1.1.86	1	2	1		139	126	5	
BM	1938	1.1.79	1	2	1		115	115	8	
Strom		A255	1	2	1		215	215	11	
Strom		A255	1	2	1		253	253	21	
SB Mus		229	1	2	1		104	102	15	
SB Mus		34	1	2	1		159	159	22	
SB Mus		345	1	2	1		130	118	12	
SB Mus			1	2	1		73	66	7	
SB Mus			1	2	1		101	96	8	
SB Mus			1	2	1		113	100	9	

Laminated material; unworked fragments

trench	layer	Total no.	Weight
1	1	4	46
1	2	33	1648
1	8	1	2
1	10	26	362
1	14	1	367
1	18	6	325
1	19	16	976
1	22	2	112
1	23	1	575
1	26	3	57
1	32	18	765
1	32a	21	410
1	34	33	238
1	39a	1	34
1	39	17	139
1	41	14	522
1	47	3	11
1	49	4	42
1	55	43	603
1	57	5	17
1	62	39	160
1	65	4	171
1	68	83	1145
2	4	1	34
2	11	1	20
2	12	3	192
2	13	141	3089
4a	3	1	72

BARNHOUSE, ORKNEY: COARSE STONE ASSEMBLAGE

Ann Clarke

First Draft, May 1991

There is a total of 157 artefacts made on coarse stone of which 43% are simple worn cobble tools and the rest comprises ground slabs, small ground pebbles, axes and maceheads, flakes, multi-hollowed stones, flaked cobbles and a number of miscellaneous objects (table 1). Details of each object are available in the catalogue and there follows below a summary of the main characteristics of the artefact types.

The predominant raw material used for the artefacts is sandstone which varies in texture from fine- to coarse-grained. Other stones such as quartz and quartzite, granite, amphibolite and igneous rocks are present in smaller numbers. All of the artefacts appear to have been made on cobble or tabular blanks, it is unlikely that any stone was directly quarried for use and most of the stone would have been available locally from beaches or gravel deposits of the boulder clay. It is apparent that the type of stone has been selected according to requirements. Thus volcanic and metamorphic rocks have been chosen for the more carefully shaped objects such as the multi-hollwed stones, axes, maceheads and stone balls whilst sandstones and quartzites have been selected for the cobble tools. All of the ground

slabs and pebbles are of sandstone.

Over one third of the assemblage has been heavily abraded. The physical processes involved in such weathering are not known but many of the sandstone pieces are much lighter in weight than is normal and the surface of the stone is very soft. Heat damage is also present and many of the pieces are in a fragmentary condition.

Cobble tools (T= 67)

The cobble tool types are defined by the pattern and location of the wear traces which are present on the piece. Those with faceting on the ends and/ or discrete pecked areas on the faces of the cobble (faceted and facially pecked cobbles) are most common (115, 118) whilst those with more random forms of wear (plain cobbles) are also numerous (table 1). The main material used is sandstone (68%) although cobbles of quartz, quartzite and other metamorphic rock form a significant component and these latter types are often prefered for those tools which have the faceted or facially pecked wear traces. The sizes of the tools cannot be discussed because of the fragmentary nature of the assemblage.

The wear types on the cobble tools from the site and the materials which were selected for use are typical to Orcadian Neolithic sites (Clarke forthcoming a). It seems likely that

many of the cobbles, particularly those with faceting and/ or facial pecking were used as knapping tools and the selection of some harder rock types would accord with the variety of hammers strengths used in a knapper's tool kit. The specific functions of other cobble tools are not known but they can be used for a great variety of tasks.

Four cobbles, three of quartz and one of volcanic rock, bear signs of a surface polish and these may have been used as some form of a burnisher (149). The shape of the faces has not been altered through use although two of the cobbles have additional light pecking on the face.

There are a further six pieces which are distinguished by very different wear traces to the rest of the assemblage. In most cases this takes the form of broad areas of heavy faceting around the perimeter of the cobble which alters the outline (153, 156, 157) and these may have been used as some form of grinder. Two of the pieces retain their original circular plan (152, 155) and are pecked around the edge but also have pecking on the faces with a shallow hollow worked in the centre. These are relatively large and may have functioned as anvil stones.

Ground cobbles (T= 20)

These artefacts, all of sandstone, bear traces of grinding on

specific parts of the piece. On eight tabular cobbles one face has been ground to form a flat or slightly skewed profile (18). The wear extends right out to the edges on these pieces and some striations or a slight gloss are visible (17). On three other pieces, parts of one side have been ground to form a slightly angled edge (21). These ground areas appear to have been formed through the use of the tool. It is unlikely that they were all used for the same work: those with slightly angled edges may have been used as some form of sharpener whilst those with facial grinding appear to have been used against a larger and harder surface. A further six pebbles have only putative worn faces. Only one piece (32) seems to have been ground in order to shape the object. This has one lightly ground face and two very fine bifacially ground sides. Neither of the ends have been worked and it is uncertain whether this can be considered as a blank for an axe or as a finished piece although it is perhaps unlikely as a blank because of the finished nature of the edge grinding.

There are also two larger pieces which may be considered as either querns or grinding stones. One (74) has a shallow concave profile and a pecked rim surrounds the dish. The other (75) has a worn face made at quite a steep angle to the base. This latter stone would not be able to retain any material that was being ground loose and it is most likely to be a grinding slab for the shaping of objects such as axes.

Small worn pebbles (T= 16)

These are small pebbles which have been ground to shape but which are of quite different forms to those above. They form three sub-groups based on shape and the location of wear and there are, in addition, several unworn blanks.

The first group includes three pieces which have been ground all over. These are small, narrow pebbles which in two cases bear fine faceting down the length as well as a worn tip (39, 41). The other piece (40) has been ground to a tapering cylindrical form with a rounded facet. The second group is formed of pebbles of a similar size and shape but which bear less extensive wear. This wear may be either in the form of a light gloss or pecking on a narrow side and/ or end. The final group is composed of three spatulate objects. These are again made on small pebbles but have a flatter cross-section than the above. They are distinguished by the formation of spatulate type ends created by heavy bifacial grinding (46, 47, 48). One final piece (54) is different from the rest as being a thin tabular fragment with fine bifacial grinding on both sides and some on one face. The function of these pieces is not known. They are in some cases quite finely worked and must have been used to fashion small objects.

Multi-hollowed stones (T= 6)

This is a discrete group of objects which bear two or more hollows on the sides and faces of the piece(33, 35, 36). They are very similar in size and shape and all are made on harder types of stone such as granite and volcanic rock. On some pieces there is additional pecking which often forms a broad facet around the edges. These are unlike the other cobble tools as the shapes formed are fairly specific. It is not known whether these hollows were formed prior to use or are as a result of working.

Flakes (T= 9)

These are all primary sandstone flakes of which at least two may be spalls from heat damaged cobbles. Many are abraded and only one bears evidence for light wear traces along an edge.

Axes (T= 11) 2 butt ends, 5 blade ends, 1 complete, 3 flakes. All but the flakes are made on fine-grained sandstones or a volcanic type of rock. They have been finely ground all over and in some cases bear a polish. The two butt remnants are long and narrow and must originally have been part of quite a large axe form (55, 64). These are similar to the chisel shaped axe (63) both in form (narrow with a thick cross-section) and in the rounded facet which has been worked on the butt end of each piece. The rest of the axes are broader and flatter in cross-section and vary in size (56, 58, 66). There are in addition 3 highly polished flakes of unidentified rock. Two can be seen to have been removed from the blade (69) and

side (67) of an axe.

Maceheads (T= 4)

There are three maceheads and one possible unfinished piece (60). The maceheads are all fragments two of which are cushion macehead types (59, 66) whilst the third is too broken to identify. They are made on volcanic and metamorphic rock and one is made of a banded clay and mudstone, the layering of which lies perpendicular to the shaft hole. An unworked lump of very similar material was found in a pit in house 2 and this, together with the evidence for a possible unfinished macehead suggests that such pieces may have been fabricated on site.

Miscellaneous (T= 21)

These objects are detailed more fully in the catalogue. They include one shaped stone ball and several probable fragments of similar pieces. All are made on the same type of volcanic rock. The complete stone ball (80) has been pecked all over to shape and has a flattened base. Three other fragments exhibit such shaping with an area of flattening and are of a similar size to the above. There are a further two cobbles of the same rock which have been roughly worked and which may be blanks for the production of stone balls. Such objects are known from the sites of Rinyo, Skara Brae and the chambered tomb at Cuween Hill (Ork 12).

The two shaped stones are of interest. Both are made on sandstone cobbles and the pieces have been worked with broad bands of pecking around the edges to form either splayed or indented sides (70, 71). One has been hollowed on both faces whilst the other has extensive areas of pecking on both faces. It is unlikely that these are blanks for perforated objects such as maceheads as they are rather larger than these pieces. No similar pieces have been found on other Neolithic sites on Orkney.

Other objects include a fragment of a small stone mortar (85), two stones with grooves on them, a fragment of haematite and a small perforated tabular fragment, probably a bead (83). These are found at other Neolithic sites.

Location of objects

The distribution of the artefact assemblage is varied. Objects such as the cobble tools, stone flakes and grinding stones are scattered across the site and, apart from a small concentration of cobble tools in the area between Houses 7 and 12, it does not appear that specific activity areas can be located solely from these distributions. Although such artefacts are present within the houses they are more commonly found outwith the structures or else in the ploughsoil. In contrast the small ground pebbles are most likely to be found

within houses. The axes and maceheads have very discrete distributions. Four of the axes were found in the ploughsoil and these are located, in pairs, over the areas of H7 and H12. One stratified polished fragment was also found just S of H7 whilst another axe was recovered from the OLS between H7 and H12. Two other axes were found in the occupation midden and subsequent layer to the N of H6. The fine chisel axe was recovered from the E recess of H2 whilst another polished fragment was found in the slot fill of S8 and these are the only axes to be directly associated with structures. One other polished flake was found in OLS to the S of H1. Thus the axes are concentrated particularly in the areas of H7 and H12. The four maceheads have a more scattered distribution. The one of banded mudstone was found in the occupation midden to the E of H6 whilst the other three are found outwith the main excavated area of the site, two of which are from the ploughsoil.

Objects of stone have been recovered from all the structures and in most cases these comprise only small numbers of the obviously functional types such as cobble tools, grinding stones and small ground pebbles (table 1). Only the assemblages from House 2 and structure 8 are significantly different: not only are there more pieces from these contexts but, as well as the types mentioned above, they also include the more carefully shaped pieces. These are from H2: two

multi-hollowed stones; one shaped stone; one axe; a small faceted pebble; and a lump of banded mudstone, and from S8: the stone ball; a multi-hollowed stone; miscellaneous cobble tool (all found together in the drain outside the wall); another miscellaneous cobble tool; polished axe fragment; bifacially edge ground cobble; and the bifacially edge ground tabular piece. The significance of these finds is given more emphasis when the distribution of other pieces of the same artefactual type is examined. Thus of the three remaining hollowed stones , two were found just outside H2 to the east and north whilst the other shaped stone was found in ploughsoil over S8. The axe chisel was found in the E recess of H2 and a polished axe fragment from the slot in S8. The rest of the axes are all from the NE quadrant of the site and none are directly associated with structures. The lump of banded mudstone was found in the W recess of H2 and its great similarity to a macehead of the same material is of interest. The axe from H2 has not been compared against all of the other Orcadian axes but it is of quite a distinctive shape and deserves comparison with an axe of similar proportions but with convergent sides from Skara Brae. This latter piece was found, during Clarke's excavations on the floor of an early house in association with an apparently selective assemblage of other artefacts (Clarke 1976, fig 5). Incidentally a finely decorated skaill knife was also found here (Clarke et al forthcoming). At Barnhouse the artefacts which are present in

H2 and S8 account for a relatively high proportion of the more finely worked pieces and although they appear to have been deposited at various times there remains the possibility that the combination of artefacts may represent a similar process of intentional deposition to that noted from Skara Brae. There is one more intersting concentration of artefacts in layers E of H7 which includes a probable stone ball fragment, a mortar, the remaining multi-hollowed stone and three axes.

Discussion

The composition of the coarse stone assemblage is significantly different from those of other Neolithic sites in Orkney. At this site many new artefact types are represented whilst other more usual types are not present. The main exception is the collection of worn cobble tools which is similar in character to those from other neolithic assemblages and it is likely that they were used for similar types of work such as flint knapping.

A most significant feature of the assemblage is the number of objects which bear traces of wear in the form of grinding whether produced intentionally in order to shape the piece or as a by- product of use. Those which have been used as tools are varied in form ranging from the larger slabs and tabular forms through to the small, narrow pebbles. It is unlikely therefore that they were all used in the same way; some may

have been used for sharpening or burnishing whilst others may have been used to grind organic produce. Undoubtedly, some would have been used to produce such objects as the bifacially ground slab and the axes, but if this is evidence for the production of axes on site it is perhaps surprising that there is no evidence for only partially worked objects. Since there is no surviving evidence for bone working it is not possible to determine whether such ground slabs and pebbles may have been used in the production of bone artefacts. Only one grinding slab has been found from other Neolithic sites and this is a flat facially worn slab from an unknown context at Skara Brae. The small ground pebbles are also relatively unusual and the only similarities are with a spatulate piece and a ground piece from Pool (Clarke forthcoming a).

The multi-hollowed stones and the shaped stones remain enigmatic but their associations with H2 and S8 are of interest. There is a possible multi-hollowed stone from Pool. Of interest is a small multi-faceted pebble recovered from H2 of which there is also a similar piece from Pool.

Two artefact types: Skaill knives; and stone discs are notable by there absence from this site. Although a few stone flakes are present it is not certain whether all were produced deliberately or whether some may be a product of heat damage or hammerstone working. They hardly constitute an assemblage,

and this is in contrast to the large numbers of such flakes which are recovered from other Neolithic sites (Clarke forthcoming b). Skaill knives are most often found in quantity in the midden deposits from such sites (eg Rinyo, Skara Brae, Pool) and it is likely that the concentrations of these flakes represent an emphasis on specific processing activities such as butchering (Clarke forthcoming b). Stone discs, which are absent at Barnhouse are again common at certain other sites (Pool, Skara Brae). These most probably functioned as pot lids and may be differentiated by size to represent larger lids which were used to cover pots whilst over a fire and smaller discs which may be associated with storage (Clarke forthcoming a). These discs may be also associated with midden deposits.

From the evidence of the coarse stone assemblage from Barnhouse it would appear that certain specific activities were being carried out on site which are not common to other Neolithic sites. Although there is little functional information for the artefacts which are present it seems likely that the cobble tools, ground slabs and pebbles were used mainly for the production of other artefacts; for flaking and grinding stone and possibly bone. For the more distinctive objects such as the shaped and multi-hollowed stones there is, as yet, no assigned function.

In contrast, artefacts such as Skaill knives and stone discs,

which have come to represent standard Neolithic practices are not present at all. The lack of extensive midden deposits is of interest. If they had been present but since been destroyed, one may be led to expect an assemblage of such flakes and discs, but these artefacts are absent despite extensive fieldwalking. Alternatively the middens may have existed but still not have had these flakes and discs, even although such objects are present in the middens at Rinyo (Childe and Grant 1947). It seems most likely that the lack of middens and associated artefacts are linked and thus point to the non-existence of certain processing activities which are suggested by these tools.

It has already been noted above from which sites there are comparative objects and these are Pool, Skara Brae and Rinyo. At each of these sites only one object is represented whilst at Barnhouse there are several of the type. These sites all have early period houses but at Skara Brae and Rinyo neither site has detailed contextual information for the finds. At Pool, the three objects which are similar to those found at Barnhouse have been recovered from contexts assigned to the latest phase which is later than those from Barnhouse. It is thus not completely certain whether certain aspects of the artefact assemblage from Barnhouse can be considered on purely chronological grounds. It is clear, however, that the composition of the assemblage is quite different from those

of other Neolithic sites and as such represents a different or alternative set of manufacturing and processing strategies.

Table 1 Coarse Stone Assemblage by Type and Area

Type/Area	H1	H2	H3	H4	H5	H6	H7	S8	H9	H10	H11	H12	A	B	C
Cobble tools	1	3	2	-	3	4	2	6	-	-	1	2	1	24	11
Miscellaneous cobbles	-	-	-	-	-	1	-	2	-	-	-	-	1	2	-
Shaped stone	-	1	-	-	-	-	-	-	-	-	-	-	-	-	1
Multi-hollowed	-	2	-	-	-	-	-	1	-	-	-	-	-	2	1
Ground cobbles	-	2	1	1	-	1	-	3	-	1	-	-	2	7	4
Ground pebbles	-	1	-	-	-	2	2	1	1	-	-	-	2	5	2
Axes/Maceheads	-	1	-	-	-	-	-	1	-	-	-	-	3	4	6
Bifacial flaked cobbles	-	-	-	-	-	-	1	-	-	-	-	-	-	1	1
Stone flakes	-	-	-	-	1	1	-	-	-	-	-	-	-	7	-
Grooved stone	-	-	-	-	1	-	-	1	-	-	-	-	-	-	-
Bead	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-
Mortar	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-
?Shale disc	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-
Mudstone lump	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-
Other rock	-	1	-	-	-	-	-	-	-	-	-	-	-	-	3
Modern whetstone	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Totals	1	10	5	2	5	9	5	18	2	1	1	2	10	56	30

A occupation midden associated with H6; B other layers

C ploughsoil T total

BARNHOUSE, ORKNEY: COARSE STONE CATALOGUE

The numbers in bold refer to: catalogue number; layer number; find number; and grid square (for ploughsoil finds). The measurements (in millimetres) at the end of each entry refer to length, width and thickness of the whole piece and other specified dimensions.

Bifacally flaked cobbles: these are cobbles which have been flaked bifacially along parts of the edge prior to use.

1. 1; --; 57/12: flat oval cobble of coarse-grained sandstone, abraded. Flaked bifacially on both ends. On one side a notch has been roughly worked. 155 x 93 x 48.

2. 212; 2090: elongated oval sandstone cobble, lightly abraded. Heavily bifacially flaked on both ends with some light pecking down the sides. 200 x 94 x 62.

3. 649; 4437: flat oval cobble of black sandstone, heavily abraded. Rough bifacial flaking on both sides and one end, the opposite end is flaked unifacially. On one side a notch has been roughly worked. 140 x 71 x 30.

Flakes

4. 14; 41: primary flake of black micaceous sandstone, abraded. 69 x 72 x 17.

5. 110; 708: primary flake of black micaceous sandstone. Possibly some light unifacial flaking and rounding on distal end. 79 x 126 x 12.

6. 225; 3104: primary flake of red sandstone, abraded. 111 x 153 x 22.

7. 254; 4554: primary flake of sandstone, abraded. 46 x 56 x 11.

8. 280; 3499: primary flake of black micaceous sandstone, probably a spall from a heat damaged cobble. 26 x 38 x 3.

9. 522; 6073: primary flake of sandstone, abraded. 40 x 22 x 6.

10. 534; 5436: primary flake of sandstone, broken down length. 83 x 61 x 20.

11. 605; 6103: primary flake of coarse-grained sandstone, abraded, probably a spall from a heat damaged cobble. 90 x 70 x 16.

12. 1051; 5090: primary flake of sandstone, abraded. 69 x 86 x 9.

Ground slabs and cobbles: these are cobbles which bear evidence for grinding on parts of the surface. In most cases these ground areas would have been produced as a result of the use of these cobbles as a tool. The last piece in type D appear to have been intentionally ground in order to shape the sides of the piece.

Type A: facially ground

13. 1; --; 55/20: Flat sandstone pebble, broken across width. One face has been worn smooth, particularly at the edges. 102 x 86 x 26.

14. 226; 1574: flat, sub-rectangular cobble of fine-grained sandstone. One of the faces is very smooth and slightly concave in section. 188 x 86 x 23.

15. 447; 2563: flat, sub-rectangular cobble of sandstone. One face has been worn flat and in parts the surface is quite glossy. 135 x 93 x 37.

16. 619; 5718: tabular fragment of fine-grained sandstone. One face is very smooth with a slight gloss on the edges. 59 x 31 x 30.

17. 690; 3156: elongated oval cobble of fine-grained sandstone. One face has been heavily ground out to the edges and has a slightly skewed profile. Striations running across the width are visible around the edge of the ground area. 129 x 44 x 24.

18. 726; 4119: cobble of sandstone which has split along a bedding plane. The broken face has then been ground to form a slightly skewed profile. Areas of heavier grinding are present around the outer edges of the face. 110 x 85 x 45.

19. 770; 4618: sub-rectangular cobble of fine-grained sandstone. One face has been worn very smooth and is slightly skewed in profile. One side is also pecked and flaked. 123 x 88 x 20.

20. 1069; 5722: fragment of a tabular sandstone cobble, burnt. One face appears to have been worn flat. 89 x 84 x 37.

Type B: edge ground

21. 1; --; 71/45: flat oval pebble of sandstone, abraded, broken across width. It has been ground bifacially on one side to form an acute edge angle. 66 x 55 x 22.

22. 230; 4303: tabular pebble of fine-grained sandstone, broken across width. Both faces may have been smoothed and part of one edge has been ground unifacially. Black discolouration on ground edge. 69 x 60 x 19.

23. 608; 4445: irregular oval cobble of coarse-grained sandstone. Part of one edge has been unifacially ground. 60 x 51 x 27.

Type C: putative worn face

24. 82; 583: flat sub-oval pebble of fine-grained sandstone, abraded. ?Slightly skewed worn face. 69 x 61 x 18.

25. 205; 3002: sub-oval pebble of coarse-grained sandstone. ?Concave worn face. 67 x 44 x 24.

26. 457; 2544: sub-oval pebble of sandstone, burnt. ?Concave worn face. 71 x 65 x 36.

27. 534; 6140: flat oval pebble of sandstone. ?Concave worn face. 96 x 80 x 23.

28. 539; 4525: flat slab of black sandstone. One face may have been pecked and smoothed. 265 x 195 x 36.

29. 732; 3764: oval pebble of coarse-grained sandstone, abraded. ?Slightly skewed worn profile. 58 x 55 x 23.

Type D: miscellaneous grinding

30. 1; --; 62/23: flat cobble of fine-grained sandstone, broken across the width. One face may have been smoothed whilst one side has a polish on it with some pecking down the middle. 97 x 102 x 32.

31. 619; 5174: flat cobble of sandstone, abraded, broken across width. Both faces have been partially ground particularly at the edges. Part of one side appears to have been ground flat. 110 x 90 x 33.

32. 1160; 6015: flat slab of fine-grained sandstone. Both sides have been ground bifacially to form a regular acute edge angle. One face also appears to have been ground although the natural irregularities have not been removed. Neither of the ends have been worked. In plan this piece has an irregular outline as, although the ground sides are straight and splayed, the lengths of these sides differ and the unworked ends are irregularly curved. 142 x 99 x 27.

Multi-hollowed stones: these are cobbles which have two or more hollows formed on the sides and faces of the piece.

33. 1; --; 56/41: sub-oval cobble of quartzitic sandstone. Two shallow hollows have been formed on a face and a side. A broad band of pecking runs from one end down part of the opposite side. 107 x 92 x 89; diameter of hollows 34mm and 30mm and depth 2mm.

34. 34; 349: cobble of volcanic rock, very abraded with onion-peeling. There is a hollow worked on one face and a possible one on the opposite face. The sides are too damaged to see any working. 91 x 81 x 59; diameter of hollow 29mm, depth 7mm.

35. 130; 1106: oval cobble of pink granite. One face is almost entirely removed through heat damage. Two deep regular hollows have been formed on a face and a side. A broad band of pecking is located on both ends. 109 x 89 x 60; diameter of top hollow 34mm, side hollow 33mm x 26mm, both 5mm deep.

36. 171; 1028: oval cobble of granite. Three shallow hollows have been worked on both faces and on a side. There is a broad area of pecking down opposite side and one end has been heavily pecked and flaked. 92 x 72 x 70; diameter of hollows c. 35mm, depth 2mm.

37. 340; 1674: sub-oval cobble of volcanic rock. Three shallow hollows have been formed on two sides and a face. Irregular pecking over the rest of the piece. 85 x 85 x 67; diameter of side hollows 35mm, depth 4mm; diameter of face hollow 10mm, depth 3mm.

38. 1069; 5719: sub-oval cobble of volcanic rock, heavily abraded. There is a hollow on one face and one side appears to have been flattened and then hollowed. 95 x 80 x 73; diameter of top hollow 40mm, depth 8mm; the side hollow is too irregular to measure.

Small worn pebbles: these are distinctively worn pieces which form five sub-groups.
Type A: ground all over.

39. 1; --; 60/30: narrow pebble of black mudstone, broken across width. Flat oval in section. The faces and sides have been ground and some narrow facets have been formed which run parallel to the length. The unbroken end has been ground to form two fine facets with a ridge between them. 58 x 12 x 7.

40. 605; 3514: pebble of fine-grained sandstone. Broken across width. It has been ground all over to form a cylindrical shape which tapers towards the broken end. The opposite end has been

ground to a rounded profile. 54 x 17 x 15.
41. 924; 5140: finger-shaped pebble of fine-grained sandstone, broken laterally. Some narrow facets run parallel to the length and the unbroken end has been ground and is slightly damaged.
46 x 15 x 12.

Type B: lightly worn pebbles.

42. 226; 1572: narrow oval pebble of sandstone, abraded. Some possible light wear on the narrow end. 77 x 19 x 15.

43. 364; 1656: finger-shaped pebble of black micaceous sandstone, broken across the width. The tip of the unbroken end and part of one narrow side bear a light gloss. 70 x 17 x 11.

44. 674; 3716: narrow oval pebble of sandstone, abraded. Some possible grinding and faceting on narrow end. 93 x 25 x 24.

45. 876; 4755: finger-shaped pebble of black micaceous sandstone. Possible light gloss on narrow end and some localised pecking on one side. 82 x 25 x 15.

Type C: spatulate objects.

46. 151; 1243: pebble of black micaceous sandstone, fragment missing from one end. One face has been ground all over and the opposite face is ground only towards the ends, forming two fine spatulate edges. Visible striations are multi-directional. The narrow side has a gloss on it. 71 x 28 x 7.

47. 463; 2020: pebble of black micaceous sandstone. Both faces have been ground particularly towards the narrow end to form a fine spatulate edge. Visible striations are multi-directional. 64 x 28 x 11.

48. 606; 3091: flat pebble of black micaceous sandstone, broken at worked end. Both faces have been ground at one end to form a fine spatulate edge. Visible striations are multi-directional. 67 x 20 x 9.

Type D: unworn, possible blanks for types A, B or C.

49. 1; --; 62/23: flat pebble of black micaceous sandstone, broken across width. 73 x 37 x 15.

50. 396; 4751: finger-shaped pebble of sandstone, broken across width. 38 x 23 x 15.

51. 404; 3761: finger-shaped pebble of sandstone, abraded,

broken across width. 48 x 22 x 13.
52. 532; 6124: flat pebble of black micaceous sandstone. 60 x 39 x 7.

53. 1061; 5593: finger-shaped pebble of black micaceous sandstone, broken across width. 47 x 15 x 13.

Type E: miscellaneous.

54. 979; 6029: Thin, tabular fragment of black micaceous siltstone. Segment surviving. Both sides have been ground bifacially to form an acute angle and then the edges have been faceted. The face is more extensively ground towards the broader end. Visible striations are unilinear on each ground area. 73 x 28 x 6.

Axes and maceheads

55. 1; --; 50/40: Axe. Fine-grained sandstone, abraded and damaged, broken down length and across width. Butt end surviving. The sides taper towards the butt end. The unbroken faces have been finely ground and the butt end is faceted. Broken length 150; broken width 22 at butt, 46 in middle, 48 at break; broken width 38.

56. 1; --; 51/42: Axe. Fine-grained micaceous sandstone, very abraded. The sides are parallel and the blade end curved in plan. The butt end is heavily bifacially flaked. Finely ground all over almost to a polish. 147 x 74 x 51.

57. 1; --; 55/55: Axe. Fine-grained black micaceous sandstone, abraded, fragment. Blade end surviving. The cutting edge is curved in plan. Finely ground all over. 54 x 56 x 24.

58. 1; --; 55/55: Axe. Fine-grained volcanic rock, fragment missing at butt end. The sides converge and the blade end is an asymmetrical curve in plan. It has been ground all over and the sides have narrow, perpendicular facets. The blade end has been blunted with a ground facet. Length 81; width at blade 40, at centre 44, at butt 35; thickness 19.

59. 1; -- 77/54: ?Cushion macehead. Volcanic rock, very abraded, broken across shaft hole. Blade end surviving although very damaged. Thickness 37; width 48; diameter shaft hole c16mm.

60. 1; -- 10/48: ?Unfinished macehead. Fragment of hornfelde schist. Split down length on quartz vein and broken at one end. A hollow has been pecked in the centre of unbroken face and the undamaged end has been faceted and is curved in plan. Width 69; diameter of hollow 34.

61. 94; 546: Tiny flake of ? with high polish on exterior. 60 x 20 x 3.

62. 220; 2123: Axe. Black micaceous sandstone, fragment. Blade end surviving. The sides are parallel and the blade end is asymmetrically curved in plan. Finely ground all over. Width 60; thickness 18.

63. 350; 1669: Axe. Siltstone. The sides converge and the blade end is asymmetrically curved. The butt end is rounded. It has been polished all over and both the butt and blade ends have been faceted. Length 99; width at blade end 23, at centre 26, at butt 18; thickness 19.

64. 606; 3093: Axe. Volcanic rock, broken across width. Butt end surviving. The sides diverge and the butt is curved and faceted. It has been ground all over and has a light polish. Broken length 103; width at butt end 34, at centre 42, at break 46; thickness 28.

65. 606; 4412: Cushion macehead. Banded clay and mudstone, broken across shafthole. Width 41; thickness 28.

66. 607; 3025: Axe. Volcanic rock, fragment. Blade end surviving. The sides slightly converge and the blade end is gently curved. It has been finely ground all over, almost to a polish. The sides have narrow perpendicular facets and in parts are more highly polished, probably through hafting. Broken length 64; width at blade 47, at centre 49, at break 47; thickness 13.

67. 765; 4612: Polished flake. Unidentified material. Probably removed from the side of an axe. 38 x 19 x 10.

68. 960; 4823: Macehead. ?Gneiss. Too fragmented to identify or measure.

69. 1081; 5975: Polished flake. Unidentified material. Probably removed from the blade of an axe. 13 x 20 x 5.

Miscellaneous

70. 1; --; 39/23: Shaped stone. Sandstone, abraded. The stone has been shaped by pecking and possibly grinding around the edges. In plan the ends are curved and the sides diverge and have been flattened and then indented. A hollow has been formed on both faces and these are smooth and regular. The piece is also splayed in profile. 78 x 66 x 47; hollows 25mm diameter and 2mm deep.

71. 130; 1045: Shaped stone. Sandstone, abraded. The stone has been shaped by pecking around the edges. In plan the ends are curved and the sides are quite heavily indented. There is a spread of pecking on both faces which is concentrated towards the centre. 114 x 84 x 55.

72. 785; --: Grooved stone. Sandstone, fragment, very abraded. Three small grooves have been made on one face. 61 x 61 x 25.

73. 1163; 4216: Grooved stone. Sandstone slab, fragment, burnt. Two grooves have been made on one face. 220 x 110 x 45.

74. 1; --; 60/10: Quern/ grinding stone. Slab of sandstone, fragment missing, burnt. The upper face is concave in profile and has been worn to a smooth surface with some pecking present. A flat, pecked rim surrounds part of the worn area. 370 x 220 x 75; worn area 240 x 150 x 20 deep.

75. 146; 1931: Quern/ grinding stone. Irregular block of sandstone. The upper face is concave in section and is formed at an angle to the base. The face is worn out to the edges and is smooth with some pecking present. 150mm high; worn area 180 x 130 x 5 deep.

76. 22; 203: ?Stone ball. Fragment, volcanic rock. This has been pecked over most of the unbroken face to shape a curve. The unpecked face remains quite flat. Similar in size to cat. no. 79.
58 x 63 x 29.

77. 211; 5960: ?Stone ball. Fragment, volcanic rock. Some pecking on unbroken face. 47 x 48 x 17.

78. 226; 1825: ?Stone ball. Fragment, volcanic rock. Rough facets have been pecked on either end and one area is quite flat. 81 x 80 x 30.

79. 294; 1947: Sub-spherical cobble of volcanic rock. Some pecked areas. ?Blank for a stone ball. 78 x 73 x 62.

80. 1069; 5743 and 5745: Stone ball. Top missing, volcanic rock. Pecked all over to form a round shape with a distinctive flat face. 70 x 70 x 53.

81. 1173; 6038: Sub-spherical cobble of volcanic rock. Some pecked and flaked areas. ?Blank for a stone ball. 88 x 77 x 62.

82. 326; 1664: Unworked lump of banded clay and mudstone. This is the same material which was used for the macehead cat. no. 64. 85 x 55 x 51.

83. 606; 3028: Perforated object. Small piece of burnt siltstone, flat sub-oval in shape. A small perforation has been made off-centre. 32 x 24 x 8; diameter of perforation 6mm.

84. 996; 5036: Small shale fragment, roughly circular in plan. Probably natural. 24 x 23 x 5.

85. 1080; 6117: Stone mortar. Fragment, made on a small block of sandstone. The base is flat and the sides roughly squared. A hollow with a steeply curved profile and rounded base has been formed on one face. 50 x 38 x 25; depth of hollow 20mm.

86. 1; --; 59/37: Cobble fragment of quartz porphyry.

87. 1, --; 25/39: Cobble fragment of amphibolite.

88. 1; --; 90/17: Fragment of haematite, partly polished. 24 x 12 x 3.
89. 130; 1008: Cobble fragment of quartz porphyry.

90. 1; --; 82/29: Fragment of a modern carborundum whetstone. 37 x 32 x 17.

Complete Cobbles

Plain hammerstones: these are cobbles with less distinctive wear patterns. In many cases the wear is very light and often quite random.

91. 1; --; 29/39: Irregular shaped cobble, coarse-grained sandstone, abraded. Some light pecking on ends and sides. 135 x 82 x 52.

92. 147; 1889: Oval cobble of quartz. Heavily pecked and flaked on one side and pecking on ends. 107 x 95 x 68.

93. 161; 3232: Irregular shaped cobble of fine-grained sandstone. Some light pecking on ends and sides. 137 x 113 x 113.

94. 182; 4620: Oval cobble of coarse-grained sandstone. Some pecking on ends and sides. 75 x 59 x 41.

95. 396; 5977: Irregular shaped pebble of quartzite. Pecked on prominent edges. 33 x 32 x 27.

96. 661; 6004: Oval cobble of fine-grained sandstone. Spread of pecking on one end and sides. 85 x 63 x 51.

97. 733; 3737: Irregular shaped pebble of sandstone. Extensive pecked areas on both ends. 47 x 36 x 36.

98. 786; 3169: Flat oval cobble of fine-grained sandstone, abraded. Some pecking and flaking from sides. 114 x 77 x 26.

99. 883; 5885: Irregular shaped cobble of coarse-grained sandstone. Light pecking on one end and sides. 62 x 52 x 43.

100. 1069; 5634: Sub-rounded cobble of coarse-grained sandstone, abraded. Pecking spread over surface. 66 x 66 x 64.

Faceted cobbles: these are cobbles with facets formed on the ends and/ or sides.

101. 175; 1609: Sub-round pebble of coarse-grained sandstone. Heavily pecked all round edge forming one flat facet on both ends. 51 x 51 x 44.

102. 225; 3129: Oval cobble of banded gneiss, very abraded. Possible faceting. 165 x 91 x 59.

103. 619; 4711: Sub-oval cobble of coarse-grained sandstone. Carse rounded facet on end and side. 89 x 56 x 49.

104. 625; 4617: Large cobble of metemorphic rock. Heavily abraded and fragmentary. Some heavy faceting on both ends. 125 x 96 x 70.

105. 756; 4701: Sub-oval cobble of coarse-grained sandstone, burnt. Broad facet on one end and a smaller one on opposite end, Additional pecking. 86 x 80 x 40.

106. 776; 3126: Oval cobble of banded gneiss. Heavy pecking all over. Faceting at one end. 170 x 95 x 62.

107. 967; 5757: Sub-oval cobble of coarse-grained sandstone. Small facet on one side and pecked on opposite side. 59 x 48 x 30.

108. 1102: 4255: Irregular-shaped cobble of quartzite. Extensive pecked areas on both ends, one of which is faceted. 104 x 75 x 55.

Facially pecked cobbles: these are cobbles which have distinctive traces of pecking on the faces.

109. 189; 1120: Sub-oval cobble of quartzite. Twin areas of light pecking on one face and one area of light pecking on opposite face. Some pecking on end. 68 x 61 x 49.

110. 205; 3945: Elongated oval cobble of fine-grained sandstone, very abraded. Two linear pecked areas on one face and one on a side. Pecked and flaked from both ends. 119 x 40

x 26.
111. 207; 1872: Sub-oval pebble of coarse-grained sandstone. Two areas of pecking on one face. Pecking down sides and on one end. 68 x 48 x 34.

112. 225; 3109: Flat oval cobble of sandstone, abraded. One area of pecking on both faces. Flaked and pecked down both sides. 127 x 85 x 30.

113. 404; 3756: Oval cobble of coarse-grained sandstone. Single pecked areas on one face and a side. Some additional light pecking on end and opposite sdie. 83 x 61 x 33.

Facially pecked and faceted cobbles: these are cobbles which combine the wear characteristics of the former two types.

114. 1; --; 44/21: Flat oval cobble of quartzite. Very light area of pecking on one face. Both sides have two small areas of faceting, on the one side they are pecked whilst on the opposite side the facets are very smooth. 126 x 81 x 38.

115. 1; --; 70/22: Oval cobble of sandstone. Two areas of pecking on one face and one on opposite face. One rounded facet on one end and a flat facet on opposite end. Some pecking down sides. 123 x 101 x 52.

116. 130; 1629: Irregular shaped cobble of plagioclase amphibolite. Heavily pecked and flaked on both ends and side forming one rough facet. Discrete area of pecking in centre of one face. 128 x 102 x 64.

117. 191; 1167: Sub-oval cobble of quartz. Areas of very light pecking on three faces. Both ends have a rounded facet. 58 x 43 x 35.

118. 732; 3765: Sub-round cobble of quartz. Twin areas of pecking on one face and single area on ooosite face. Three facets have been formed at one end and the opposite end and a side are faceted also. 69 x 58 x 45.

119. 770; 6101: Sub-oval cobble of sandstone, very abraded. Single area of pecking on both faces. One facet at one end and pecking on other end and sides. 101 x 92 x 63.

Cobble fragments: these pieces have wear traces but since they are fragments it is not possible to accord them to particular wear types. Distinctive areas of wear are noticed. No measurements.

120. 1; --; 44/49: Banded gneiss. Pecking and flaking.

121. 1; --; 43/58: Sandstone. Some pecking.

122. 1; --; 29/39: Amphibolite. Some faceting.

123. 1; --; 27/46: Quartzite. Rounded facet.

124. 1; --; 74/31: Sandstone, very abraded. Broad facet and some pecking.

125. 1; --; 52/59: Sandstone, very abraded. One facet and some facial pecking.

126. 1; --; 54/46: Sandstone, abraded. Distinct areas of linear pecking on faces. One facet.

127. 40; 270: Black micaceous sandstone, abraded. Broad pecked area.

128. 105; 3200: Sandstone, very abraded. Some pecking.

129. 130; 1066: Granite. Flaked from one facet.

130. 147; 2508: Sandstone, burnt. Some light pecking.

131. 219; 5406, 230; 5408 and 4305: Plagioclase amphibolite. These three fragments join. Rough facet.

132. 280; 1927: Sandstone, burnt. One round facet.

133. 521; 3597: Sandstone, burnt. Some pecking.

134. 534; 5438: Sandstone, burnt. Broad ares of pecking.

135. 960; 4826: Sandstone, abraded. Small area of pecking on one face.

136. 962; 1123: Sandstone, burnt. Some light pecking.

137. 1005; 5022: Sandstone, very abraded. Areas of extensive pecking.

138. 1005; 5006: Sandstone, abraded. Broad areas of pecking.

139. 1055; 5627: Quartzite. One broad facet.

140. 1102; 4185: Sandstone, abraded. Some light pecking.

141. 1103; 4189: Sandstone, burnt. Some light pecking.

142. 1. --; 72/28: Sandstone. Hammerstone flake.

143. 105; 3201: Quartzite. Hammerstone flake.

144. 184; 4619: Quartzite. Hammerstone flake.

145. 205; 1892: Sandstone. Hammerstone flake.

146. 226; 1826: Sandstone. Hammerstone flake.

147. 670; 4652: Sandstone. Hammerstone flake.

Polished stone: these are cobbles with areas of polishing on parts of the face.

148. 225; 3635: Oval cobble of volcanic rock. One face is smooth and slightly glossy and discoloured. 118 x 75 x 49.

149. 277; 4809: Large secondary flake of quartzite. Part of surviving face appears to have been polished. 108 x 120 x 34.

150. 463; 2140: Flat oval cobble of quartz. Localised area of pecking on one face and some pecking down sides. the opposite face is particularly polished. 78 x 60 x 32.

151. 674; 3717: Fragment of quartz cobble. The sides have been faceted. The polished face is slightly concave in section and there is an area of light pecking over the polish. 105 x 100 x 46.

Miscellaneous cobble tools: these are more heavily worn than the other cobble tools and are quite distinctive.

152. 187; 2040: Coarse-grained sandstone cobble 'slice', sub-circular in plan. It has been faceted around the entire perimeter and is pecked in the centre of the unbroken face. 140 x 122 x 32.

153. 188; 2067: Regular oval cobble of sandstone. One continuous, broad facet has been worked around the entire perimeter. The ends are slightly flattened. Possible shaped stone. 94 x 82 x 52.

154. 606; 3092: Sub-oval cobble of fine-grained sandstone. Broad facets have been formed around most of the perimeter. There is some flaking from the edge of the facets. A single facet at one end is very flat. 112 x 95 x 63.

155. 612; 4765: Flat sub-circular cobble of fine-grained sandstone. A light spread of pecking over one face and the opposite face is pecked all over with a shallow hollow formed in the centre. Parts of the perimeter are faceted and flaked from the fully pecked face. 180 x 160 x 40.

156. 654; 5272: flat round cobble of sandstone. There is a broad area of faceting around most of the perimeter and pecked

areas on both faces. 80 x 75 x 40.
157. 1069; 6074: Round cobble of sandstone, very abraded. There is a broad area of faceting around the perimeter. There is a pecked area on both faces forming light indentations. 86 x 76 x 50.

WEST MIDDEN, LINKS OF NOLTLAND, WESTRAY: COARSE STONE REPORT

The following is a summary of the draft report, written in 1982, on the coarse stone assemblage from the area of the West Midden which formed part of the excavations at the Links of Noltland.

Introduction

The coarse stone assemblage comprises 541 pieces of which 51% is Skaill knives and 34% is flake debitage from the manufacture, use and deposition of the tools. The rest of the assemblage is comprised of a few stone discs, cobble tools and some flaked cobble tools.

Raw Material

Beach pebbles of micaceous sandstone from the local Rousay Flagstone beds are the most common material in use. This is an aranaceous sandstone containing mica flakes which tend to accumulate in layers along which the rock splits easily, giving it the name 'flagstone'. Homogeneity of a raw material such as flint enables the worker to control the fracture of the stone most easily whilst flaws, cracks and inclusions in a less homogenous material cause the stone to fracture randomly. In order to examine the structure of the flagstones thin-sections were taken of pieces of grey and black flagstones by Mr G Collins and he reported on them as follows: the black flagstone was defined as a calcareous siltstone containing numerous angular to sub-rounded quartz grains averaging 0.04mm in diameter. Mica, individual flakes of muscovite up to 0.1mm in length, were aligned parallel to the bedding plane. Iron ore, Ilmenite leucoxene or haematite helps to give the rock its dark colour. The grey flagstone is a fine-grained calcareous sandstone containing abundant angular quartz grains averaging 0.07mm in diameter. Some angular felspar grains were present and calcite abundant. Iron ore, leucoxene and haematite are present in small quantities. Mica, predominantly muscovite, is present up to 15mm long. The mica appears to be richer in certain zones parallel to the bedding making the rock more fissile in this zone. In comparison, the small grain sizes and less well developed micas are both factors which contribute to the black flagstone being a tougher rock and therefore more suitable to the manufacture of implements. The grey flagstone is the most common material in use in this assemblage and its lack of structural homogeneity has perhaps defined the limits of working to initial flake removal and, on a few pieces, simple retouch.

Only 19 pieces of materials other than flagstone were collected and these are pebbles of granite-gneiss, camptonite, quartz, breccia and amphibolite all of which may be derived locally from igneous dykes or from glacial drift deposits.

The Artefacts

Flake assemblage

The flakes are the most numerous artefact type and comprise 86% of the total coarse stone assemblage. Most of the larger flakes were recovered by hand during excavation whilst the smaller flakes, or debitage, was most commonly found during wet-sieving of the loose. Since sorting of the wet-sieve material was not complete at the time of writing this report only a fraction of the flake debitage can be commented on. For the purposes of this early report Skaill knives were defined as those flakes which showed signs of use or edge damage irrespective of size whilst those with no evidence for use were classified as debitage *i.e.* residual lithic material from manufacture and/ or use.

The majority (54%) of the flakes are primary with 29% secondary and 16% inner flakes. From the total assemblage 42% weigh less than 40g of which 63% are classified as unused and two thirds of these are inner flakes.

Manufacture

A Skaill knife is defined as a flake, usually primary but can be secondary or inner, which has been detached from a beach cobble by throwing at an anvil which leaves a characteristic powdery crushed scar on the proximal end of the flake. Many of the smaller flakes do not carry this scar but instead exhibit a little nick as if it had been detached by direct percussion. However, observations from the experimental replication of Skaill knives suggest that such scars can also be produced through shattering the cobble against an anvil.

Further modification of the Skaill knife is kept to a minimum, and of the total flake assemblage only 32 flakes exhibit secondary flaking. Four main groups of secondary flaking are present: those which show thickness or width reduction through flaking; those that have steep retouch along an edge; those that have their original edge angle thinned; and those that have had single flakes removed leaving a denticulate edge.

Edge damage

Evidence for the use of the flakes was identified by the presence of edge damage which was observed macroscopically. Previous experimental butchering work using Skaill knives and observation of the subsequent edge damage on the replicated flakes formed the basis from which the edge damage categories were produced. These comprise 24 categories of edge damage during cataloguing but for the purposes of the analysis these were reduced to seven categories:

1. Rounded and unifacially flaked, unifacially flaked
2. Rounded and bifacially flaked, bifacially flaked
3. Rounded
4. Denticulate
5. Crushed and battered
6. Bevelled
7. Snapped

Upon examination of the replicated tools after experimental butchery, it became apparent that factors such as original edge morphology and multiplicity of use were important in confusing any direct relationships that might be apparent between the actual use of the flake and the edge damage produced. Thus, the thicker edge angles seemed to exhibit less edge damage than the finer edges even though the type of use to which they were put was similar. Damage such as snapping and denticulation was apparent on the thinner edge angles whilst rounding was most common on the thicker edge angles (Clarke 1991). This observation was tested statistically on the assemblage from the West Midden and the conclusion was that certain edge angles were more likely to produce particular types of edge damage where the finer edges tend to be snapped or denticulate whilst the thicker angles tend towards rounding or flaking. It is quite possible that these edge damage categories do reflect some actual differences in use, particularly the differences between those that are flaked and unflaked. However, original edge morphology is an important factor to be taken into account before trying to assign edge damage characteristics to a particular use.

The ratio of total perimeter to used perimeter (TP:UP) and the location of the edge damage was taken to provide a picture of the extent of use of the flakes. Some 83% of the flakes have between one third to all of the edge used whilst 63% have about a half of the edge used, therefore on most of the flakes pieces full advantage was taken of the available edges during use.

Flaked cobbles

Nine cobbles have evidence for flaking to create a chopper-like edge around part of the tool; six are flaked unifacially and three bifacially. One, of granite-gneiss, is of a particularly fine form being shaped unifacially to form an oval with a pointed tip. Two possible notches on either side of this uniface suggest a form of hafting. This piece and most of the rest of these flaked cobbles have traces of edge damage, sometimes light rounding, and other times crushing and flaking which indicate that the tools were intended for use once a suitable edge angle had been created.

Chipped laminated material

There are eight stone discs, all fragments with probable diameters of 125mm to 200mm, only one appears to have been damaged by heat. One other piece has been chipped to form a pointed oval shape, but heavy weathering of the surface has obscured the detail.

Cobble tools

The seventeen cobble tools are quite plain forms and are usually only lightly worn with light pecking and/ or flaking on the ends of the cobble, only occasionally is the pecking heavy enough to cause faceting.

Context

Although Skaill knives occur in all four of the phases they appear predominantly in phase 1 (54%) and phase 3 (33%) and the largest numbers (157) have been deposited in the main midden layers of phases 1 and 3. The Skaill knives in phase 4 are all associated with the ploughsoil or evidence for ploughing as are the 17 Skaill knives from the plough soil of phase 2 and here the Skaill knives may have been deposited along with the midden material which was applied to enrich the ploughsoil. There appeared to be no difference in the forms of edge damage on Skaill knives between phases.

None of the other artefact types showed any great differentiation by context type except that all but one of the stone discs were from the middens of phase 3. Also from phase 3 midden is the pointed oval piece of chipped laminated material whilst the uniface of granite-gneiss is associated with the skeletal layer of phase 3.

WEST MIDDEN, LINKS OF NOLTLAND, WESTRAY: COARSE STONE CATALOGUE

Cobble Tools

8; FP89; 2; 11
Oval cobble of grey micaceous sandstone. Heavily weathered and broken across fault. Faceting on distal end and one side.
ML 69; MW 51; MTh 41; 219g

13; FQ87; 5; 630
Small oval pebble of grey micaceous sandstone. Light pecking on distal end and possible light multi-directional striations on flat face.
ML 59; MW 24; MTh 25; 53g

13; FR87; 4; 44
Small oval pebble of grey micaceous sandstone. Light pecking on distal tip and heavy pecking and flaking on proximal end.
ML 83; MW 34; MTh 19; 52g

13; FR88; 4; 37
Oval pebble of grey micaceous sandstone. Light pecking on both ends and around part of edge.
ML 86mm; MW 38mm; MTh 26; 131g

20; FQ83; 6; 3229
Irregular-shaped cobble of grey micaceous sandstone. Natural flat surface at proximal end appears to have been used as a platform from which large but irregular flakes have been struck. The flaking does not continue around the whole of the platform, possibly an attempt to reduce the cobbles width. Flaking and pecking on distal end through use.
ML 105; MW 105; MTh 58; 886g

20; FQ83; 23; 150
Flat oval cobble of black micaceous sandstone. Bifacial flaking on distal edge through use.
ML 102; MW 54; MTh 20; 153g

22; FQ87; 7; 750
Small rounded pebble of grey micaceous sandstone. Pecked on either end.
ML 57; MW 30; MTh 34; 78g

22; FQ87; 7; 725
Oval cobble of brown micaceous sandstone. Broken across width. Some flaking on distal end and light pecking on part of edge.
ML 76; MW 60; MTh 48; 324g

23; FQ83; 4; 1767
Rounded pebble of grey micaceous sandstone. Localised heavy pecking on either face and some lighter pecking on one end.
ML 65; MW 45; MTh 46; 209g

29; FQ83; 23; 3556
Flat oval pebble of black micaceous sandstone. Bifacial flaking on distal and proximal ends through use.
ML 68; MW 42; MTh 10; 50g

29; FQ83; 23; 3550
Oval pebble of grey micaceous sandstone. Small patch of pecking on distal end forming a light facet.
ML 78; MW 33; MTh 31; 119g

32; FQ83; 18; 3493
Long, narrow flat cobble of grey micaceous sandstone. Broken across width. Light pecking on distal end.
ML 171; MW 60; MTh 28; 364g

32; FP87; 18; 356
Flat oval pebble of red micaceous sandstone, broken along width. Bifacial flaking on distal edge through use. Burnt.
ML 57; MW 66; MTh 15; 84g

32; FP87; 19; 416
Oval pebble of grey micaceous sandstone with a band of heavy pecking across one face.
ML 88; MW 40; MTh 36; 202

33; FR87; 6; 118
Sub-triangular flat pebble of grey micaceous sandstone. Heavy bifacial flaking around most of edge through use. Burnt.
ML 108; MW 75; MTh 15; 148g

33; FQ88; 9; 549
Oval pebble of black micaceous sandstone, broken along width. Large flake removed and pecking on distal end.
ML 57; MW 29; MTh 19; 42g

Unstratified
Broken cobble of brown micaceous sandstone. Flaked in several directions at proximal end forming a jagged surface. The distal end is heavily pecked. Possibly a utilised core.
ML 85; MW 79; MTh 53; 406g

Unifacial flaked cobbles
13; FQ86; 4; 258
A beach cobble of pink granite-gneiss shaped to form an oval with a pointed tip by flaking over the ventral face. Notches on either side suggest some form of hafting. Possible edge damage in the form of bifacial flaking around most of edge.
ML 126; MW 95; MTh 33; 436g

20; FP88; 10; 154
Two large overlapping flakes removed from ventral face of black sandstone cobble to form a point. Light wear is present on this tip.
ML 93; MW 87; MTh 33; 260g

21; FQ87; 13; 806
A flat cobble of grey sandstone which has been flaked unifacially around two thirds of the edge. Half of the cortical material on the ventral face has been removed by flaking. Subsequent edge damage is very light.
ML 100; MW 100; MTh 23; 259g

22; FQ89; 7; ws1
One large flake has removed over half of the cortical material on ventral face of grey sandstone cobble. Additional edge damage consists of heavy bifacial flaking and rounding.
ML 98; MW 95; MTh 39; 430g

32; FQ83; 18; 3497
A beach cobble of grey sandstone with two large discontinuous flakes removed from ventral face. An attempt to join these together by further flaking has failed and the edge is thicker here. Additional edge damage consists of heavy bifacial flaking and rounding.

ML 97; MW 111; MTh 28; 370g

32; FP87; 18; 392
A beach cobble of red sandstone that has been flaked unifacially around half of perimeter. The flaking has removed just under half of the ventral face. Edge damage consists of bifacial flaking and rounding.
ML 73; MW 85; MTh 23; 299g

Bifacial flaked cobbles

All are made on cobbles of grey micaceous sandstone and the flaking is irregular and overlapping.

13; FQ87; 5; 629
Cobble broken across width with two small flakes removed from this platform. Bifacial flaking around unbroken edge. No sign of use wear.
ML 124; MW 59; MTh 39; 211g

20; FQ83; 2; 148
Bifacial flaking on one or more edges. Edge damage consists of light flaking and rounding on part of edge.
ML 120; MW 125; MTh 34; 692g

33; FR88; 7; 62
One face covered in flake scars except for small ridge of cortex in centre. Other face has flakes removed from one or more edges. No sign of edge damage.
ML 132; MW 155; MTh 52; 912g

Laminated material

11; FP87; 6; 148
Stone disc, broken. Bifacially chipped around circumference.
Diam 200mm; MTh 15

13; FQ87; 5; WS2
Stone disc, fragment. Bifacially chipped around circumference.
MTh 5

18; FP87; 8; 161
Stone disc, broken and burnt.
Diam 155; MTh 11

20; FQ83; 2; 2195
Bifacially chipped to form an oval with one pointed end and one flattened end. Shaping on sides suggests hafting. Weathered.
ML 143; MW 100; MTh 20

20; FQ83; 2; 1224
Probable stone disc fragment.
No measurements

23; FP87; 10; 130
Stone disc fragment. Bifacially chipped around circumference.
Diam 120; MTh 7

23; FQ83; 4; 2554
Stone disc, oval in plan. Bifacially chipped around circumference.

ML 186; MW 153; MTh 13

25; FR89; 4; 8
Stone disc fragment. Bifacially chipped around circumference.
Diam 125; MTh 15

32; FQ89; 10; 147
Primary flake laminated material. Chipped unifacially around perimeter.
ML 55; MW 95; MTh 32

Cores
These are cobbles of grey micaceous sandstone which have been flaked unidirectionally from a cortical platform. No dimensions, weights only.

20; FQ83; 2; 1910; 2687g
20; FQ83; 2; 1912; 761g
29; FQ83; 23; 3541; 283g

WEST MIDDEN, LINKS OF NOLTLAND, WESTRAY:
CODES FOR SPREADSHEET CATALOGUE

TYPE
1a. Primary flakes - used
1b. Primary flakes- used but broken
1c. Primary flakes- unused
2a. Secondary flakes- used
2b. Secondary flakes- used but broken
2c. Secondary flakes- unused
3a. Inner flakes - used
3b. Inner flakes- used but broken
3c. Inner flakes - unused

RAW MATERIAL
1. Grey micaceous sandstone - tough
2. Black micaceous sandstone- tough
3. Brown micaceous sandstone- not tough
4. Brown micaceous sandstone- tough
5. Grey micaceous sandstone- not tough
6. Quartz
7. Other

MEANS OF DETACHMENT
1. Anvil technique (with crushed scar)
2. Direct percussion
3. Cannot determine

PLATFORM
1. Cortical
2. Inner
3. Cannot determine

EDGE DAMAGE
1. Unifacially flaked
2. Bifacially flaked
3. Rounded
4. Denticulated
5. Crushed/ battered
6. Bevelled/ faceted
7. 1 & 3
8. 1&4
9. 1&6
10. 2&3
11. 2&4
12. 2&6

13. 3&4
14. Snapped
15. 1&14
16. 2&14
17. 3&14
18. 4&14
19. 5&14
20. 6&14
21. 7&14
22. 4&5
23. 3&6
24. 4&6

LOCATION OF EDGE DAMAGE

1. Parallel/ opposite fracture scar
2. Left lateral edge
3. Right lateral edge
4. 1&2
5. 1&3
6. 2&3
7. 1&2&3

West Midden, Links of Noltland, Westray: Flake Catalogue

Phase	Trench	Layer	Find	Type	Mat	MOD	Plat	ED	Loc	wgt	ML	MW	MTh
4	FP87	3	WS1	1a	5	1	1	2	4	99	71	70	16
4	FP87	3	WS2	1a	1	1	1	4	2	9	40	32	6
5	FP87	12	134	1a	3	1	1	7	1	189	84	94	23
5	FP89	4	131	1a	4	1	1	8	7	61	66	70	15
5	FP89	4	132	1a	1	1	1	1	1	64	52	89	14
8	FQ87	4	470	1a	3	1	1	15	5	95	71	73	20
8	FQ87	4	471	1a	4	1	1	4	1	44	56	50	14
8	FP88	2	32	1c	1	1	1			27	72	41	8
8	FP89	2	6	1c	1	2	1			20	73	37	8
8	FP88	2	WS4	2a	1	1	2	7	4	25	40	57	13
8	FQ89	5	WS1	2c	1	1	2			4	31	24	9
8	FP88	2	WS6	2c	1	1	2			4	36	24	4
8	FP88	2	WS7	2c	1	1	2			4	26	32	5
8	FP88	2	WS1	3c	1	1	2			18	53	32	13
8	FP88	2	WS3	3c	1	1	2			3	27	17	8
8	FP88	2	WS5	3c	1	1	2			5	36	30	5
11	FP87	6	131	1a	3	1	1	2	1	368	104	97	30
11	FP87	6	133	1a	1	1	1	2	7	116	65	98	16
11	FP87	6	150	1c	1	1	1			58	47	55	19
11	FP87	6	132	2a	1	1	1	3	4	88	86	54	23
11	FP87	6	151	2a	1	1	1	8	1	121	63	102	21
11	FP87	6	153	2a	1	1	1	4	2	186	92	83	30
11	FP87	6	143	2c	5	1	2			6	68	21	7
13	FQ87	5	465	1a	4	1	1	4	7	37	60	70	9
13	FQ87	5	648	1a	1	1	1	7	3	120	60	87	17
13	FQ88	6	490	1a	5	1	1	4	1	97	65	90	18
13	FQ88	6	502	1a	1	1	1	8	7	94	71	88	14
13	FQ88	6	509	1a	5	1	1	10	5	368	111	110	21
13	FQ88	6	WS1	1a	1	1	1	3	1	102	82	60	21
13	FP88	6	137	1a	1	1	2	1	3	214	105	60	33
13	FP88	6	138	1a	1	1	1	4	7	34	52	62	10
13	FR87	4	40	1a	4	1	1	1	7	65	75	82	10
13	FR87	4	60	1a	5	1	1	4	1	55	55	60	19
13	FR89	3	35	1a	1	1	1	8	7	107	94	92	12
13	FR89	3	40	1a	1	1	1	7	7	35	44	69	10
13	FQ87	5	641	1c	1	1	1			47	60	38	17
13	FQ89	6	31	1c	1	1	1			155	75	97	20
13	FP88	6	135	1c	4	1	1			60	55	70	15
13	FP88	6	134	1c	1	1	1			43	46	65	15
13	FQ86	4	201	2a	1	1	1	6	3	134	69	96	19
13	FQ87	5	623	2a	1	1	1	4	1	130	70	102	19
13	FQ87	5	WS1	2a	1	2	2	1	1	13	44	38	10
13	FQ88	6	499	2a	1	1	2	7	1	139	91	71	28
13	FQ89	6	131	2a	5	1	1	4	2	137	70	90	19
13	FR87	4	51	2a	3	1	2	1	1	131	114	74	26
13	FR89	3	WS1	2a	1	1	1	23	5	79	59	73	20
13	FQ87	5	610	2c	1	1	2			130	40	89	35
13	FQ88	6	506	2c	1	1	2			99	73	79	19
13	FP88	6	136	2c	1	1	1			123	85	53	25
15	FQ87	8	WS2	1a	1	1	1	21	7	9	28	37	11
15	FP87	11	227	1a	1	1	1	1	7	30	39	62	14
15	FP87	11	236	1a	1	1	2	3	5	68	58	63	20
15	FP89	9	135	1a	5	1	1	1	1	141	72	100	15

15	FP87	11	298	1c	1	1	1			152	90	63	27
15	FP89	9	134	1c	2	1	1			157	89	82	17
15	FQ87	8	WS1	2a	1	1	1	7	1	44	45	62	23
15	FP87	11	226	2a	1	1	2	7	1	66	62	66	17
15	FP87	11	228	2a	1	1	2	3	1	46	47	83	13
15	FP87	11	230	2c	3	1	1			194	89	105	22
18	FP87	8	170	1a	1	1	1	1	5	110	65	85	21
19	FP87	9	188	1a	5	1	1	10	7	412	100	118	28
20	FQ83	2	1021	1a	1	1	1	7	7	26	32	58	12
20	FQ83	2	1175	1a	1	1	1	24	7	14	33	59	8
20	FQ83	2	1181	1a	1	1	1	10	7	340	100	105	39
20	FQ83	2	1183	1a	1	1	1	24	4	140	56	116	22
20	FQ83	2	1184	1a	1	1	1	10	4	256	94	106	23
20	FQ83	2	1313	1a	1	1	1	8	7	58	50	89	18
20	FQ83	2	1946	1a	1	1	1	9	4	70	50	67	18
20	FQ83	2	2220	1a	1	1	2	9	5	56	71	74	12
20	FQ83	2	2497	1a	1	1	2	4	5	56	49	80	14
20	FQ83	6	3193	1a	1	1	2	8	7	54	57	80	12
20	FP87	13	266	1a	1	1	1	4	7	102	57	90	16
20	FP87	13	273	1a	1	1	1	1	1	107	66	85	16
20	FP87	13	291	1a	1	1	1	18	5	152	62	107	26
20	FP88	10	156	1a	5	1	1	10	5	376	177	58	30
20	FP88	11	517	1a	3	1	1	10	1	212	89	104	20
20	FQ83	2	430	1c	1	1	2			15	29	50	9
20	FQ83	2	1228	1c	1	1	1			40	51	66	13
20	FQ83	2	2410	1c	5	1	1			50	46	45	30
20	FQ83	6	3188	1c	1	1	1			6	25	42	9
20	FQ83	6	3228	1c	1	1	1			2	25	32	4
20	FQ83	6	WS1	1c	1	1	1			14	29	50	11
20	FQ83	6	WS4	1c	1	1	2			3	50	15	7
20	FP87	13	251	1c	1	1	1			8	30	41	8
20	FP87	13	WS6	1c	1	1	1			79	58	83	12
20	FP87	13	272	1c	1	1	1			39	45	64	14
20	FQ83	2	1314	2a	1	1	2	13	1	70	121	37	15
20	FQ83	2	1507	2a	1	1	2	8	4	34	58	42	18
20	FQ83	2	1914	2a	1	1	2	11	6	146	81	78	22
20	FQ83	5	2875	2a	1	1	1	7	1	55	83	46	17
20	FQ83	6	WS2	2a	1	1	2	13	7	9	30	41	8
20	FP87	13	252	2a	1	1	1	2	1	313	103	113	24
20	FP87	13	271	2a	1	1	1	1	3	81	68	60	23
20	FP87	13	270	2a	1	1	2	4	1	58	62	60	22
20	FP87	13	WS7	2a	1	1	2	1	3	12	52	22	10
20	FP87	13	WS1	2a	1	1	2	1	1	33	47	67	13
20	FP88	10	162	2a	1	1	2	17	5	16	52	38	9
20	FP88	11	283	2a	1	1	2	1	2	216	137	55	29
20	FP89	10	152	2a	1	1	1	1	1	121	78	103	19
20	FP89	11	162	2a	1	1	2	4	1	135	103	63	22
20	FQ83	9	553	2b	4	1	2			37	58	52	14
20	FQ83	2	1869	2c	1	1	2			27 flakes x 2			
20	FQ83	2	2415	2c	7	1	1			35	49	37	17
20	FQ83	2	WS1	2c	1	1	2			22 flakes x 3			
20	FQ83	6	3167	2c	1	1	1			4	18	21	13
20	FQ83	6	3224	2c	1	1	1			12	45	41	8
20	FQ83	6	WS5	2c	1	1	1			2	19	25	7
20	FQ83	8	3171	2c	1	1	1			19	47	46	15
20	FQ83	8	3177	2c	1	1	2			7	25	35	12

20	FP87	13	WS2	2c	1	1	1			21	41	33	15
20	FP87	13	WS7	2c	1	1	1			12	62	17	13
20	FP89	6	146	2c	1	1	2			107	83	68	20
20	FP89	11	WS1	2c	1	1	2			39	91	46	13
20	FP88	10	158	3a	2	1	2	1	4	29	54	45	15
20	FQ83	2	1020	3c	1	1	2			1	13	25	3
20	FQ83	2	1172	3c	1	1	2			1	21	15	4
20	FQ83	2	1324	3c	1	1	2			3 flakes x 3			
20	FQ83	2	WS2	3c	1	1	2			28 flakes x 8			
20	FQ83	3	1416	3c	7	1	2			47	52	54	20
20	FQ83	5	2915	3c	3	1	2			14	46	40	8
20	FQ83	6	WS3	3c	1	2	2			4	19	31	7
20	FQ83	6	WS6	3c	1	1	2			1	24	15	4
20	FQ83	6	WS7	3c	1	1	2			1	13	10	5
20	FQ83	8	3165	3c	1	1	2			10	37	35	10
20	FQ83	10	WS1	3c	1	1	2			2	43	15	4
20	FP87	13	WS3	3c	1	1	2			16	33	53	10
20	FP87	13	WS4	3c	1	1	1			6	28	38	8
20	FP87	13	WS5	3c	1	1	1			3	20	21	6
20	FP87	10	WS1	3c	1	1	1			71	57	65	22
21	FQ83	7	40	1a	1	1	1	8	1	382	87	138	32
21	FQ83	7	WS14	1a	1	1	1	4	1	24	58	31	16
21	FQ83	11	3243	1a	1	1	1	1	1	406	106	110	33
21	FQ83	11	3329	1a	5	1	1	7	7	277	136	96	25
21	FQ83	11	WS1	1a	5	1	2	7	7	193	106	86	18
21	FQ83	12	3325	1a	1	1	1	3	7	11	29	44	8
21	FQ83	14	3465	1a	1	1	1	8	1	167	73	122	21
21	FQ83	7	3008	1b	1	1	2			38	53	58	14
21	FQ83	11	3327	1c	1	1	1			64	52	81	15
21	FQ83	7	WS1	2a	1	1	2	4	1	20	52	35	9
21	FQ83	7	WS4	2a	1	1	1	1	4	51	70	56	18
21	FQ83	7	WS9	2a	1	1	1	8	1	141	82	78	21
21	FQ83	7	WS10	2a	1	1	2	8	1	56	61	62	22
21	FQ83	11	3262	2a	1	1	1	4	1	41	53	72	11
21	FQ83	11	3277	2a	1	1	1	2	1	177	83	94	22
21	FQ83	11	3304	2a	1	1	1	3	1	21	39	41	12
21	FQ83	11	3316	2a	1	1	2	4	7	39	82	54	12
21	FQ83	11	3326	2a	1	1	1	7	1	68	58	62	17
21	FQ83	14	WS1	2b	1	1	2			19	26	57	15
21	FQ83	7	3170	2c	1	1	1			19	48	55	13
21	FQ83	7	WS7	2c	1	1	2			5	29	29	10
21	FQ83	11	WS2	2c	1	1	1			14	22	59	13
21	FQ83	11	WS3	2c	1	1	1			11	24	29	19
21	FQ83	11	WS4	2c	1	1	1			29	44	50	15
21	FQ83	11	WS6	2c	1	1	1			6	29	32	9
21	FQ83	11	WS7	2c	1	1	2			8	21	42	10
21	FP88	7	WS2	3c	1	1	1			14	31	54	10
21	FQ83	7	WS3	3c	1	1	1			18	29	63	9
21	FQ83	7	WS5	3c	1	1	1			1	18	16	3
21	FQ83	7	WS6	3c	1	1	1			12	40	31	13
21	FQ83	7	WS8	3c	1	1	1			2	17	12	11
21	FQ83	7	WS11	3c	1	1	1			10	28	38	10
21	FQ83	7	WS12	3c	1	1	1			12 flakes x 19			
21	FQ83	7	WS13	3c	1	1	1			9	42	32	6
21	FQ83	7	WS15	3c	1	1	1			5	27	18	13
21	FQ83	7	WS16	3c	1	1	1			1	25	18	2

21	FQ83	7	WS17	3c	1	1	1			5	38	20	7
21	FQ83	11	WS5	3c	1	1	1			13	37	53	9
22	FQ87	7	735	1a	1	1	1	8	4	65	75	55	14
22	FQ87	7	736	1a	1	1	1	8	7	18	35	63	9
22	FQ89	7	35	1a	1	1	1	1	1	105	61	86	22
22	FP87	14	237	1a	1	1	2	1	4	31	56	37	13
22	FP87	14	240	1a	1	1	1	2	1	290	108	130	22
22	FP87	14	297	1a	1	1	1	13	1	70	56	78	19
22	FP89	12	173	1a	1	1	1	8	1	102	62	80	19
22	FP87	14	239	1c	1	1	2			23	46	35	12
22	FP89	12	172	1c	1	1	1			50	53	52	23
22	FQ87	7	734	2a	1	1	1	1	1	164	71	88	23
22	FQ87	7	743	2a	1	1	2	18	7	100	71	80	18
22	FP87	14	293	2a	1	1	2	3	1	89	62	68	17
22	FP88	12	171	2a	1	1	2	6	1	12	35	35	9
22	FQ87	7	709	2c	1	2	1			14	44	35	12
22	FQ87	7	737	2c	2	1	1			158	64	90	30
22	FQ87	7	751	2c	1	1	1			274	70	113	37
22	FP87	14	242	2c	1	1	2			21	51	47	8
22	FP89	12	179	3a	1	1	2	4	3	22	67	31	14
23	FP87	10	215	1a	1	1	1	2	1	139	52	120	23
23	FP87	10	226	1a	1	1	1	1	1	130	77	103	19
23	FQ83	4	2631	1b	4	1	1			11	58	29	7
23	FP87	10	216	1c	1	1	1			123	67	95	26
23	FQ83	4	1517	2c	1	1	2			12	43	44	8
23	FQ83	4	1575	2c	1	1	2			43	63	53	15
23	FQ83	4	WS2	2c	1	1	2			6 flakes x 2			
23	FP87	10	227	2c	1	1	2			60	42	61	31
23	FQ83	4	WS1	3c	1	1	1			26 flakes x 9			
25	FQ87	9	WS1	1a	4	1	1	7	7	151	85	83	21
25	FQ88	7	512	1a	1	1	1	11	1	438	92	149	30
25	FQ89	8	50	1a	5	1	1	17	1	144	72	103	32
25	FP87	15	304	1a	1	1	1	5	1	652	125	180	33
25	FP88	13	200	1a	3	1	1	2	6	81	50	82	17
25	FP89	13	184	1a	5	1	1	7	7	54	60	76	12
25	FR87	5	2	1a	1	1	1	7	5	61	50	76	17
25	FR89	4	41	1a	4	1	1	10	5	354	158	100	23
25	FR89	4	47	1a	1	1	1	13	4	175	92	117	16
25	FR89	4	45	1b	2	1	1			14			
25	FQ88	7	511	1c	1	1	1			253	113	88	22
25	FQ88	7	513	1c	1	1	1			140	61	103	23
25	FR87	5	WS3	1c	1	1	1			66	55	68	25
25	FR88	5	43	1c	2	1	1			74	68	81	13
25	FQ87	9	754	2a	1	1	2	7	5	123	85	76	18
25	FQ89	8	54	2a	3	1	1	10	3	168	80	108	18
25	FP87	15	301	2a	1	1	1	15	4	138	77	98	17
25	FP88	13	285	2a	1	1	1	1	2	257	100	92	26
25	FP88	13	284	2b	3	1	1			21	49	40	11
25	FR87	5	WS1	2c	1	1	2			48	55	52	16
25	FR87	5	WS4	2c	1	1	2			7	42	24	8
25	FQ89	8	52	3a	3	1	2	4	1	10	36	55	5
25	FQ83	5	WS2	3c	1	1	1			22	45	40	7
26	FP88	14	202	1a	1	1	1	4	8	64	52	82	14
26	FP89	14	189	1b	1	1	1			31			
26	FP89	14	188	1c	1	1	1			128	60	105	19
27	FP88	20	3529	2a	1	1	1	20	7	40	64	60	10

29 FQ83	23	3548	1a	2	1	1	10	1	350	110	133	23
29 FQ83	23	3551	1a	1	1	1	8	7	98	74	90	15
29 FQ83	23	3552	1c	1	1	1			12	40	28	8
32 FQ83	18	3496	1a	5	1	1	10	4	367	104	110	31
32 FQ87	11	785	1a	1	1	1	13	1	1152	139	155	45
32 FQ87	11	788	1a	3	1	1	10	5	245	95	105	33
32 FQ87	12	781	1a	1	1	1	18	7	99	63	100	14
32 FQ88	8	520	1a	1	1	1	4	7	21	38	55	9
32 FQ88	8	521	1a	1	1	1	8	1	141	68	102	17
32 FQ89	10	154	1a	1	3	3	7	7	64	52	74	15
32 FQ89	11	167	1a	1	1	1	10	7	74	65	80	13
32 FQ89	11	169	1a	5	1	1	18	1	74	71	78	14
32 FQ89	11	171	1a	3	1	1	13	7	182	105	83	15
32 FQ89	11	200	1a	1	1	1	8	7	86	59	81	19
32 FQ89	11	210	1a	1	1	1	3	1	252	93	125	18
32 FQ89	11	221	1a	1	1	2	7	7	9	26	41	7
32 FQ89	11	223	1a	2	1	1	4	6	37	50	55	11
32 FQ89	11	224	1a	3	1	1	8	7	14	35	41	10
32 FQ89	11	227	1a	1	1	1	3	2	248	97	86	27
32 FP87	17	345	1a	3	1	2	1	1	241	75	95	25
32 FP87	18	361	1a	1	1	1	6	3	79	83	54	16
32 FP87	18	362	1a	5	1	1	7	5	126	63	90	14
32 FP87	18	367	1a	3	1	1	4	7	35	42	77	9
32 FP87	18	370	1a	3	1	1	2	5	270	116	95	17
32 FP87	18	371	1a	3	1	1	4	7	196	95	115	18
32 FP87	18	372	1a	3	1	1	3	1	248	71	138	18
32 FP87	18	374	1a	5	1	1	3	1	51	55	73	10
32 FP87	18	379	1a	1	1	1	14	7	71	64	86	10
32 FP87	18	387	1a	1	1	1	4	6	35	31	68	15
32 FP87	18	390	1a	1	1	1	2	1	72	61	75	15
32 FP87	18	393	1a	1	1	1	8	7	119	71	113	15
32 FP87	18	394	1a	5	1	1	9	7	83	70	80	18
32 FP87	18	396	1a	1	1	1	5	2	181	67	113	19
32 FP88	15	207	1a	2	1	1	7	5	145	90	76	19
32 FP88	16	219	1a	5	1	1	9	7	20	40	53	9
32 FP88	16	220	1a	5	1	1	2	7	147	84	97	17
32 FP88	16	226	1a	3	1	1	1	1	182	95	100	16
32 FP88	16	227	1a	1	1	1	2	1	152	71	101	20
32 FP88	16	232	1a	1	1	1	8	2	60	65	57	17
32 FP88	16	234	1a	5	1	1	15	5	105	75	75	21
32 FP88	16	237	1a	5	1	1	8	1	139	80	90	24
32 FP88	16	246	1a	1	1	1	1	4	46	53	56	14
32 FP88	16	251	1a	5	1	1	18	7	25	46	50	9
32 FP89	15	190	1a	5	1	2	10	2	220	110	71	24
32 FP89	15	196	1a	1	1	1	8	4	68	54	76	14
32 FP89	15	204	1a	3	1	1	1	7	34	63	48	15
32 FP89	15	225	1a	5	1	1	5	3	347	113	109	19
32 FP89	15	226	1a	3	1	1	7	2	233	101	109	20
32 FP89	15	244	1a	5	1	1	7	1	124	77	72	18
32 FP89	16	257	1a	2	1	1	13	6	36	44	64	9
32 FP89	16	259	1a	3	1	1	11	4	57	70	68	12
32 FP89	16	276	1a	5	1	1	4	1	27	37	64	11
32 FP89	16	283	1a	1	1	1	8	7	75	72	70	16
32 FP89	16	286	1a	1	1	1	1	6	43	43	73	13
32 FP89	16	WS1	1a	1	1	1	7	7	15	34	42	8
32 FQ89	11	151	1b	3	1	1			29			

32 FQ89	11	155 1b	5	1	1			22			
32 FQ89	11	159 1b	1	1	1			120			
32 FQ89	11	160 1b	5	1	1			72	74	65	16
32 FQ89	11	203 1b	5	1	1			9			
32 FP88	16	218 1b	5	1	1			31	56	40	14
32 FP88	16	231 1b	2	1	1			117	73	68	18
32 FP89	15	205 1b	1	1	1			9			
32 FP89	15	207 1b	4	1	1			70	103	44	18
32 FP89	15	219 1b	5	1	1			109	83	60	15
32 FP89	15	241 1b	1	1	1			17			
32 FP89	16	251 1b	1	1	1			46			
32 FP89	16	261 1b	5	1	1			56			
32 FQ88	12	527 1c	1	1	1			26	43	61	8
32 FQ89	11	150 1c	2	1	1			137	72	96	21
32 FQ89	11	204 1c	5	1	1			106	57	90	15
32 FQ89	11	217 1c	5	1	1			147	107	82	17
32 FP87	18	353 1c	3	1	2			19	45	45	9
32 FP87	18	373 1c	2	1	1			74	72	67	12
32 FP87	18	377 1c	1	1	1			24	40	60	9
32 FP87	18	382 1c	1	1	1			263			
32 FP89	15	245 1c	4	1	1			11	27	43	9
32 FP89	16	271 1c	2	1	1			9	32	38	7
32 FP87	17	347 1c	2	1	2			146	69	93	22
32 FP89	16	279 1c	5	1	1			54	38	79	14
32 FQ83	11	777 2a	1	1	1	4	2	226	109	71	36
32 FQ87	10	137 2a	1	1	1	14	1	26	54	35	14
32 FQ89	11	153 2a	1	1	1	4	1	83	68	76	18
32 FQ89	16	264 2a	1	1	1	8	7	102	63	89	24
32 FP89	16	266 2a	2	1	1	10	7	15	35	45	9
32 FP89	16	275 2a	5	1	1	7	1	109	83	73	19
32 FQ88	12	533 2b	4	1	2			36	63	46	17
32 FP89	15	195 2b	1	1	1			18	40	45	10
32 FP89	15	209 2b	1	1	1			30	62	38	17
32 FQ87	11	781 2c	5	1	1			269	80	116	23
32 FQ89	11	91 2c	5	1	1			20	33	52	10
32 FQ89	11	212 2c	1	1	2			10	30	40	9
32 FQ89	11	218 2c	2	1	2			89	80	69	19
32 FP87	18	376 2c	3	1	2			37	72	47	13
32 FP88	16	235 2c	2	1	1			136	71	71	21
32 FP88	16	242 2c	2	1	2			54	63	45	15
32 FP88	16	254 2c	1	1	1			105	77	70	20
32 FP89	16	272 2c	3	1	1			19	51	44	8
32 FP89	16	278 2c	5	1	1			38	48	73	13
32 FQ88	8	522 2c	2	1	2			121	87	79	14
32 FP88	16	223 3c	1	1	1			23	45	38	10
33 FQ83	19	3502 1a	3	1	1	7	1	332	91	111	42
33 FQ83	19	3506 1a	3	1	1	7	5	293	120	90	18
33 FQ83	19	3508 1a	1	1	1	8	4	238	75	141	18
33 FQ83	19	3512 1a	1	1	1	4	4	91	167	76	19
33 FQ87	13	783 1a	1	1	1	9	7	43	53	73	12
33 FQ87	13	785 1a	3	1	1	8	7	117	70	100	17
33 FQ87	13	787 1a	3	1	1	13	7	52	57	71	13
33 FQ87	13	789 1a	2	1	1	7	7	7	25	39	6
33 FQ87	13	790 1a	1	1	1	8	1	17	30	68	9
33 FQ87	13	793 1a	3	1	1	15	1	46	54	75	10
33 FQ87	13	798 1a	1	1	1	4	7	4	23	34	5

33 FQ88	9	536	1a	1	1	1	4	1	132	115	91	16
33 FQ88	9	543	1a	5	1	1	1	1	211	101	85	16
33 FQ88	9	551	1a	1	1	1	7	6	166	59	123	20
33 FQ88	9	552	1a	1	1	1	4	5	31	47	60	10
33 FQ89	11	222	1a	2	1	1	7	7	97	93	55	12
33 FR87	6	186	1a	1	1	1	8	1	132	70	97	18
33 FR87	6	230	1a	3	1	1	1	7	176	111	76	16
33 FR88	7	61	1a	1	1	1	7	4	227	65	85	19
33 FR89	5	65	1a	5	1	1	22	3	49	50	71	12
33 FR89	5	WS1	1a	1	1	1	22	1	46	49	67	15
33 FR89	5	WS4	1a	2	1	1	4	7	3	19	30	5
33 FQ87	13	784	1b	3	1	1			30	59	57	9
33 FQ87	13	795	1b	1	1	1			125			
33 FQ88	9	540	1b	3	1	1			50	56	63	13
33 FR87	6	187	1b	3	1	1			24			
33 FR89	5	WS5	1b	3	2	2			13			
33 FQ87	13	799	1c	1	1	3			127			
33 FQ88	9	530	1c	3	1	1			170	67	104	22
33 FQ88	9	542	1c	5	1	1			147	77	88	23
33 FQ88	9	548	1c	1	1	2			49	68	36	16
33 FQ88	9	550	1c	1	1	1			231	79	91	22
33 FR87	7	59	1c	1	1	1			140	67	88	19
33 FR87	6	180	1c	1	1	1			154	81	88	19
33 FP89	13	797	2a	4	1	1	7	3	190	113	94	24
33 FQ87	13	801	2a	1	1	1	21	7	22	37	45	10
33 FQ87	13	809	2a	1	1	2	7	4	18	46	41	11
33 FQ88	9	541	2a	3	1	1	1	1	166	127	82	14
33 FQ88	9	544	2a	1	1	2	7	1	96	76	61	23
33 FR89	5	55	2a	1	1	1	7	1	169	100	102	17
33 FR89	5	64	2a	1	1	1	1	1	42	38	65	20
33 FR89	5	WS6	2a	3	1	1	7	1	11	30	45	10
33 FQ83	19	3513	2c	5	1	1			55	56	65	13
33 FQ83	19	3515	2c	1	1	1			57	50	68	16
33 FQ87	13	807	2c	3	1	1			150	74	103	19
33 FQ87	13	WS1	2c	1	1	1			20	49	33	16
33 FQ87	13	WS2	2c	1	1	1			109	85	64	20
33 FQ88	9	539	2c	5	1	2			188	78	93	36
33 FR87	6	185	2c	3	3	2			59	70	66	13
33 FR87	6	WS1	2c	1	1	2			95	90	75	16
33 FQ87	13	808	2c	1	1	1			90	85	65	22
33 FQ87	13	WS3	2c	1	1	1			87	83	70	20
33 FR87	6	177	2c	1	3	2			20	50	20	9
33 FR89	5	WS2	3b	1	1	2			83	52	63	27
33 FQ88	9	534	3c	2	1	1			59	66	38	28
33 FR89	5	WS3	3c	1	2	1			15	47	25	12
36 FP88	17	256	1a	5	1	1	21	7	18	35	50	10
36 FP88	17	260	1a	3	1	2	15	4	103	92	74	15
36 FP88	17	265	1a	5	1	1	9	1	57	60	71	12
36 FP88	17	266	1a	3	1	1	10	1	379	118	109	25
36 FP87	19	395	1a	2	1	1	8	1	173	65	117	18
36 FP87	19	410	1a	1	1	1	3	1	169	68	98	23
36 FP87	19	412	1a	1	1	1	5	2	82	75	59	15
36 FP87	19	418	1a	1	1	1	1	1	44	56	52	14
36 FP87	19	419	1a	5	1	1	3	1	51	61	48	14
36 FP87	19	426	1a	1	1	1	8	1	45	52	56	12
36 FP87	19	432	1a	5	1	1	8	2	29	63	47	8

36	FP87	19	433	1a	1	1	1	18	5	91	82	80	15
36	FP87	19	434	1a	1	1	1	24	7	44	52	60	13
36	FP87	19	436	1a	1	1	1	3	1	34	42	60	12
36	FP87	19	WS1	1a	1	1	1	24	7	57	56	56	13
36	FR89	19	438	1b	1	1	1			64	51	79	16
36	FP88	17	263	1b	1	1	2			32	40	52	15
36	FP87	19	408	1c	5	1	1			64	74	65	12
36	FP87	19	413	1c	1	1	1			34	36	48	18
36	FP87	19	WS2	1c	1	1	1			61	67	66	13
36	FP88	17	261	2a	1	1	1	7	1	46	65	55	12
36	FP87	19	406	2c	1	1	1			62	62	80	15
36	FP88	17	258	2c	2	1	1			73	60	53	21
36	FP88	17	259	2c	2	1	2			26	37	53	15

Flakes with denticulate retouch

32	FP88	15	205	1a	5	1	1	1	6	120	80	80	17
33	FQ88	9	531	2a	1	1	2	8	1	84	100	52	15
36	FP87	19	405	1a	1	1	1	23	7	106	71	86	15
36	FP87	19	425	1a	1	1	1	3	1	15	43	42	7

Flakes with width/thickness reduction

20	FQ83	2	1180	1a	1	1	1	1	7	399	123	78	38
20	FQ83	2	WS1	1a	1	1	3	4	1	129	92	69	17
21	FQ83	11	3311	1a	1	1	2	4	1	217	110	68	31
22	FQ89	7	36	1a	1	1	1	1	4	806	154	120	53
25	FR87	5	41	1a	1	1	1	4	3	388	101	95	33

Flakes with edge thinning

8	FP88	2	31	1a	1	1	1	5	4	431	85	125	31
21	FQ83	7	WS18	1a	2	1	1	16	1	573	124	129	43
29	FQ83	23	3554	1a	2	1	1	2	1	754	197	107	30
32	FP89	16	253	1a	4	1	1	3	1	70	65	73	17
32	FQ87	11	779	2a	5	1	1	7	7	108	119	57	16
32	FP89	16	277	2c	3	1	2			115	73	83	14
33	FQ87	13	800	1a	1	1	1	7	1	135	62	105	15
36	FP87	19	442	1a	1	1	1	1	1	101	65	97	13

Flakes with steep retouch

20	FP89	10	163	1c	1	1	1			147	85	93	13
20	FQ83	2	1185	2a	1	1	1	5	7	168	72	79	13
21	FQ83	11	3275	1c	1	1	1			254	93	92	22
32	FP87	17	346	1a	1	1	1	3	1	331	104	150	30
32	FP87	18	380	1a	1	1	1	1	4	568	129	96	42
32	FP87	18	395	1a	5	1	1	3	7	134	104	85	14
32	FP88	15	210	1a	5	1	2	3	7	150	123	62	15
32	FP88	15	216	1a	5	1	1	7	7	133	72	82	17
32	FP89	15	206	1a	2	1	1	10	4	107	74	72	17
32	FQ89	10	141	1b	5	1	1			25	24	72	13
32	FQ89	10	156	1b	1	1	2			10			
32	FQ89	10	138	1c	1	3	1			14	24	50	9
32	FP89	15	189	1c	5	1	2			266	95	105	18
32	FP88	16	244	2a	1	1	1	7	2	196	84	87	27
32	FP89	15	202	2c	5	1	2			19	40	32	11
33	FQ83	19	3539	1c	1	1	1			1624	153	174	47

Key to illustrations

Artefacts:

Ard	ard point
Cl	cleaver
CT	cobble tool
Fac	faceted cobble
FB	flaked blank
FC	flaked cobble
FP	facially pecked cobble
FP/ fac	facially pecked and faceted
FSB	flaked stone bar
FSB/Cob	flaked stone bar made on cobble
FSB/Tab	flaked stone bar made on tabular blank
GS	ground stone
GT	ground-end tool
HC	handled club
HS	hollowed stone
KHB	Knap of Howar borer
KHG	Knap of Howar grinder
Lam	chipped laminated material
M	mortar
MD	manufacturing debris
Misc	miscellaneous
PC	plain cobble
Pol	cobble with polish
SB	stone ball
Sc	sculpted stone
SD	stone disc
SK	Skaill knife

Sites

BH	Barnhouse
Keb	Kebister
KOH	Knap of Howar
MG	Mavis Grind
P	Pool
PQ	Pierowall Quarry
Quan	Quanterness
SB	Skara Brae
SOB	Scord of Brouster
Sumb	Sumburgh
TN	Tofts Ness
US	Upper Scalloway
WM/LON	West Midden, Links of Noltland

Contexts;

C	clay
F/D	floor deposits
L	other layers
M	midden
MT	midden/tip
Occ	occupation deposits
OGS	old ground surface
R	rubble
S	sand
SM	sandy midden
So	soil
St	structural

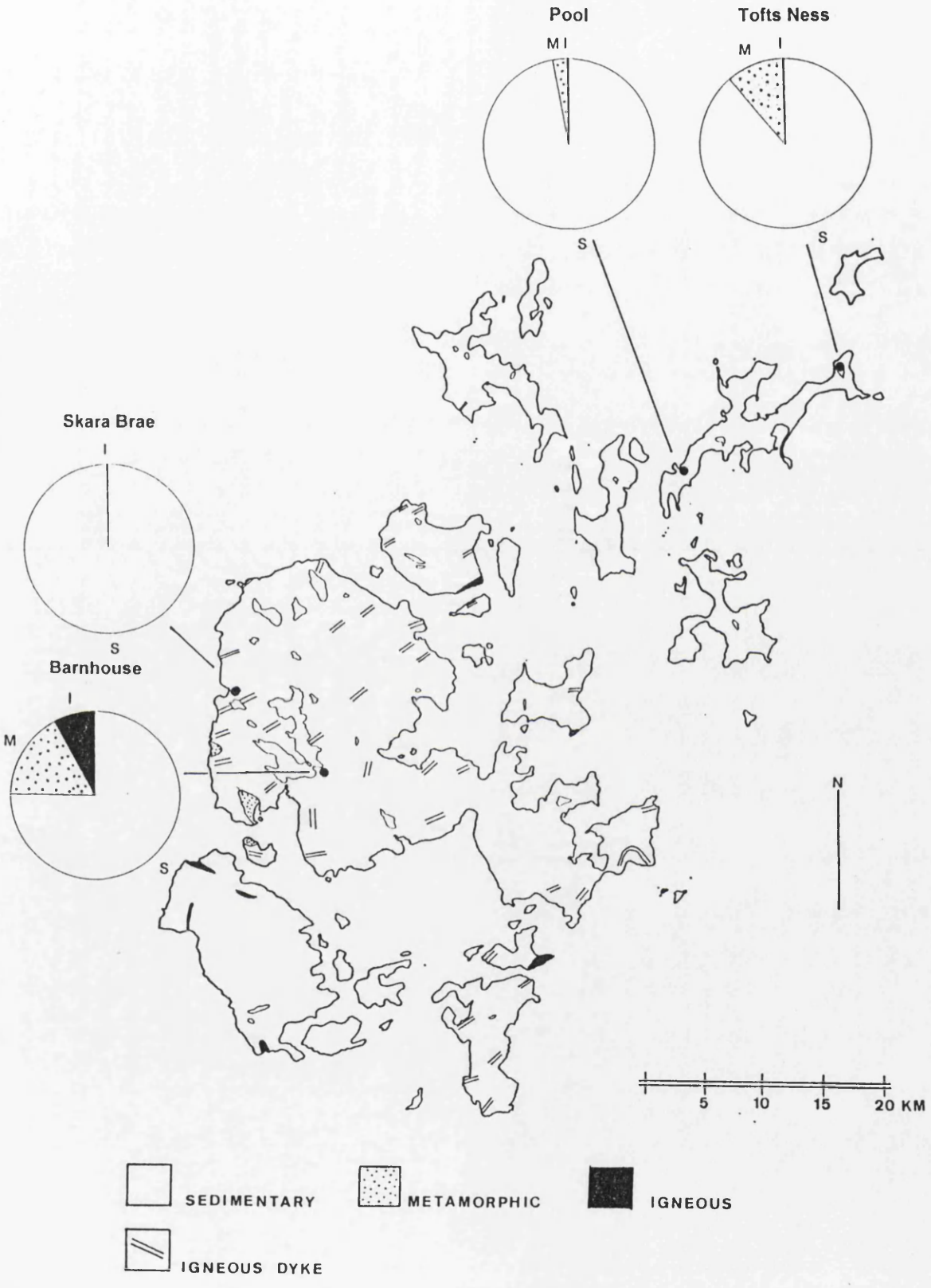

Figure 3.1 : Orkney: solid geology and raw material composition of selected site assemblages.

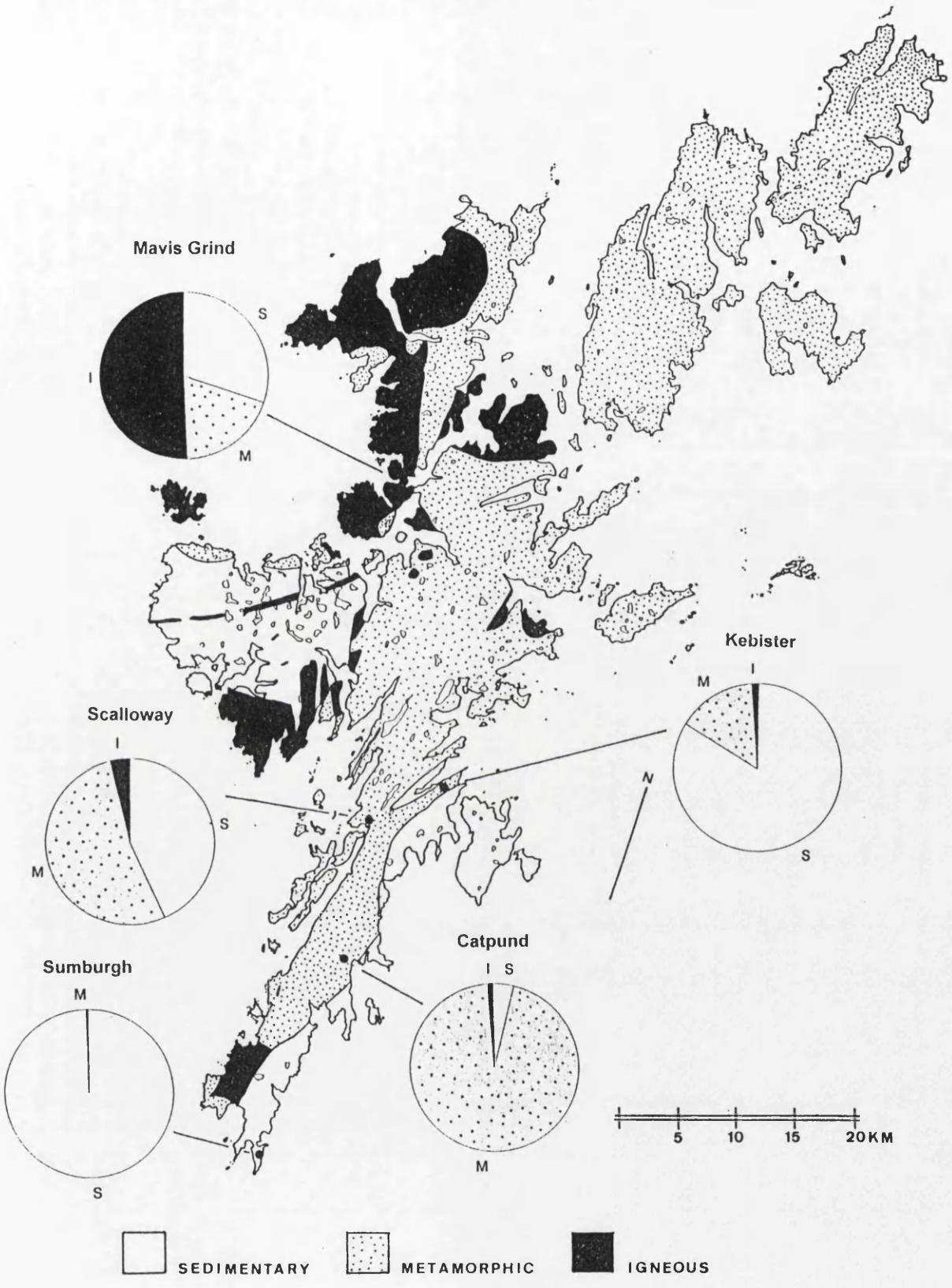

Figure 3.2 : Shetland: solid geology and raw material composition of selected site assemblages.

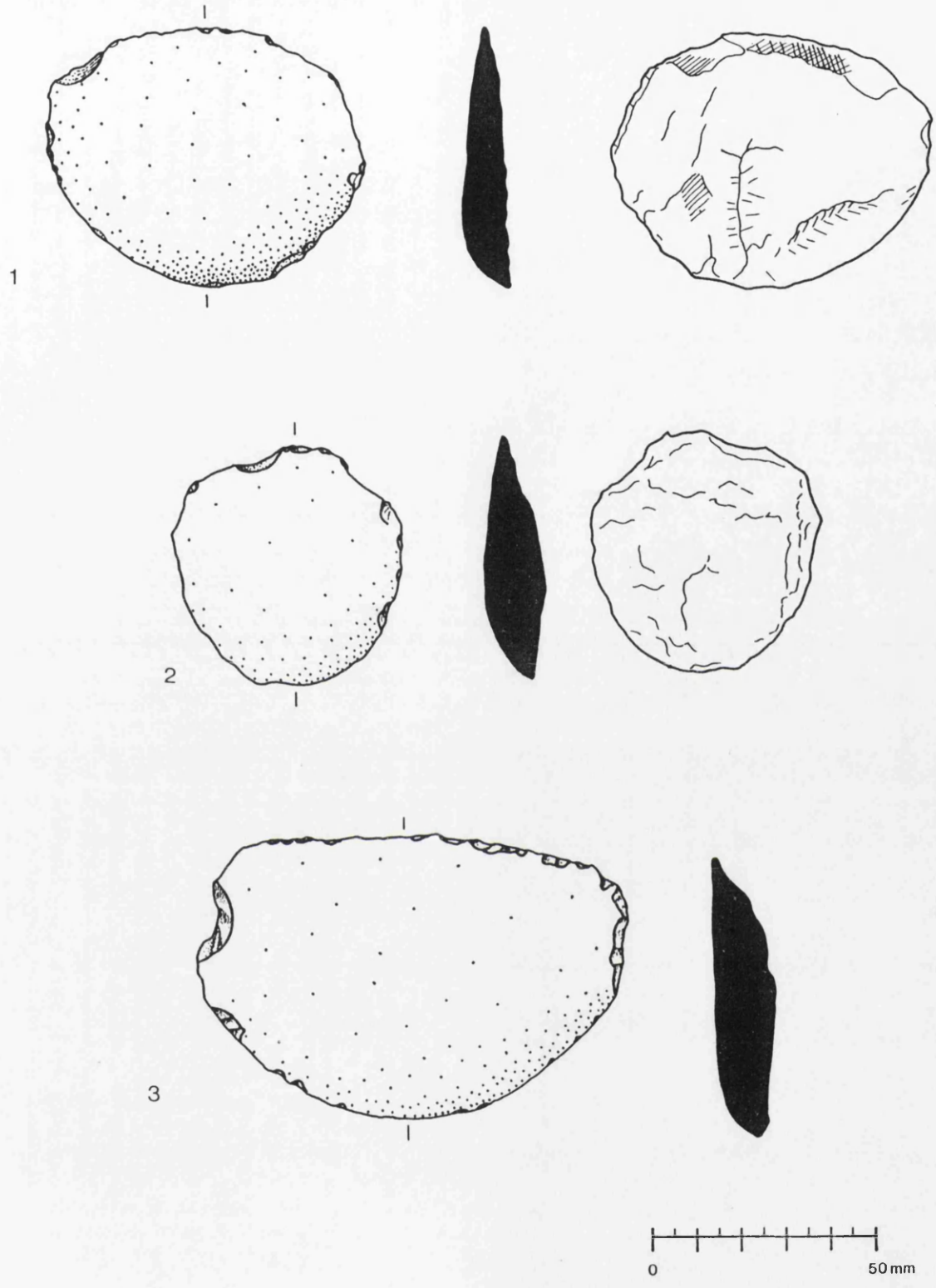

Figure 4.1 : Skaill knives showing edge damage. From Links of Noltland. Dorsal face on left, ventral face on right. Flake scar is placed at the bottom.

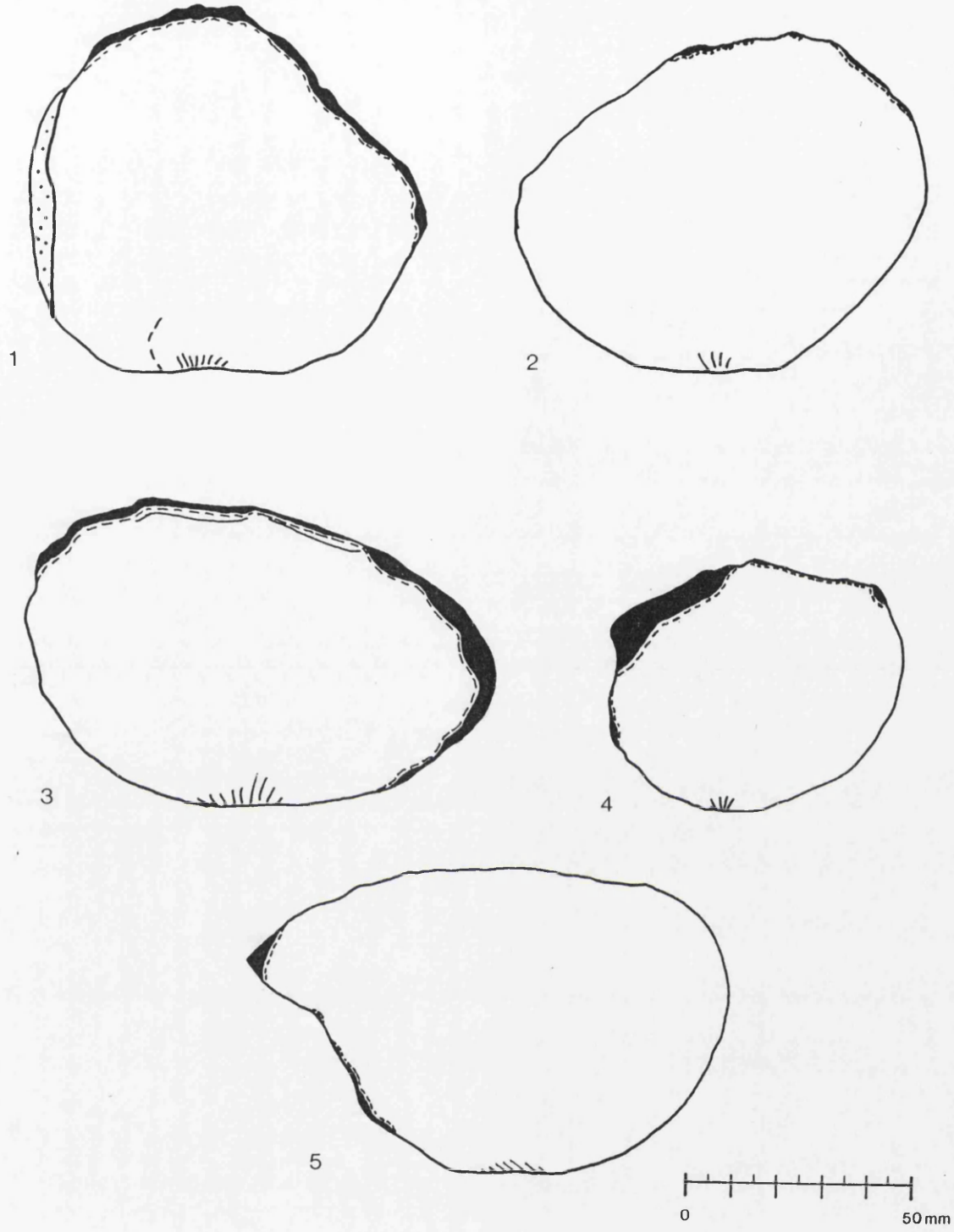

Figure 4.2 : Edge reduction on experimental Skaill knives. Amount of flake edge lost through use is shown in black.

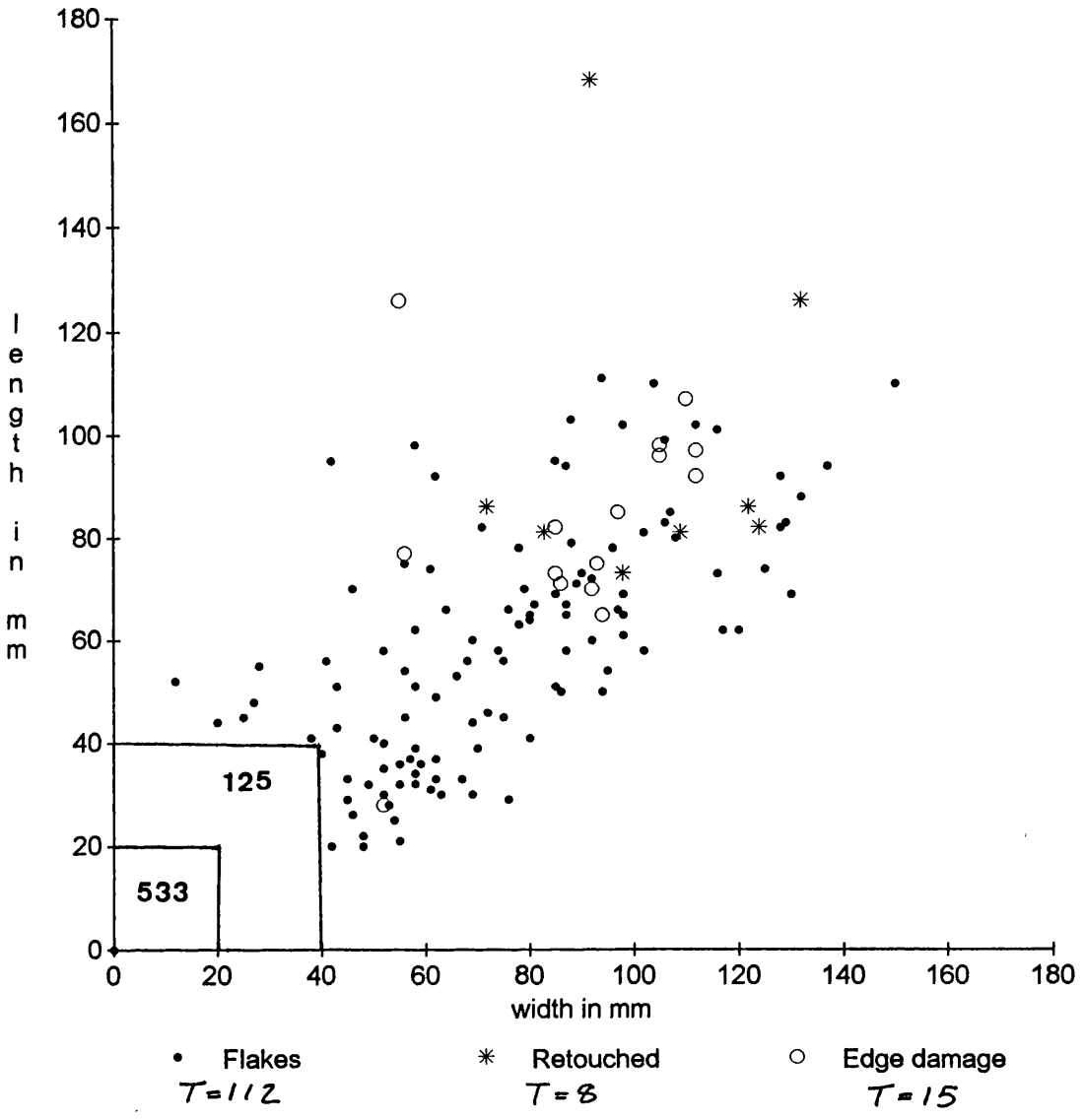

Figure 4.3 : Dimensions of Skaill knives and debitage from Skara Brae, Trench 2, layer 13. The number of flakes less than 40mm and 20mm is indicated in the boxes.

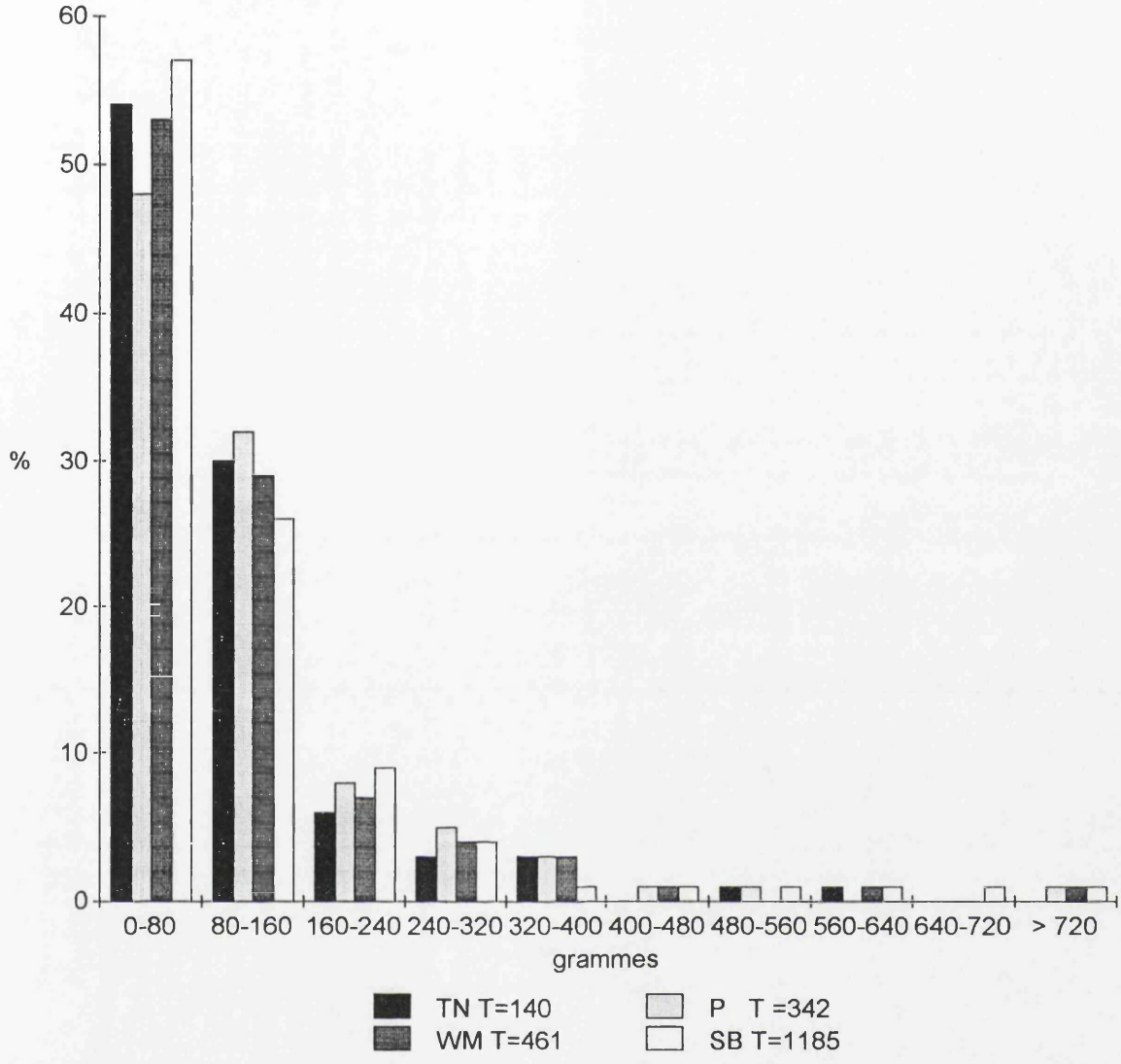

Figure 4.4 : Weight ranges of Skaill knives, by site.

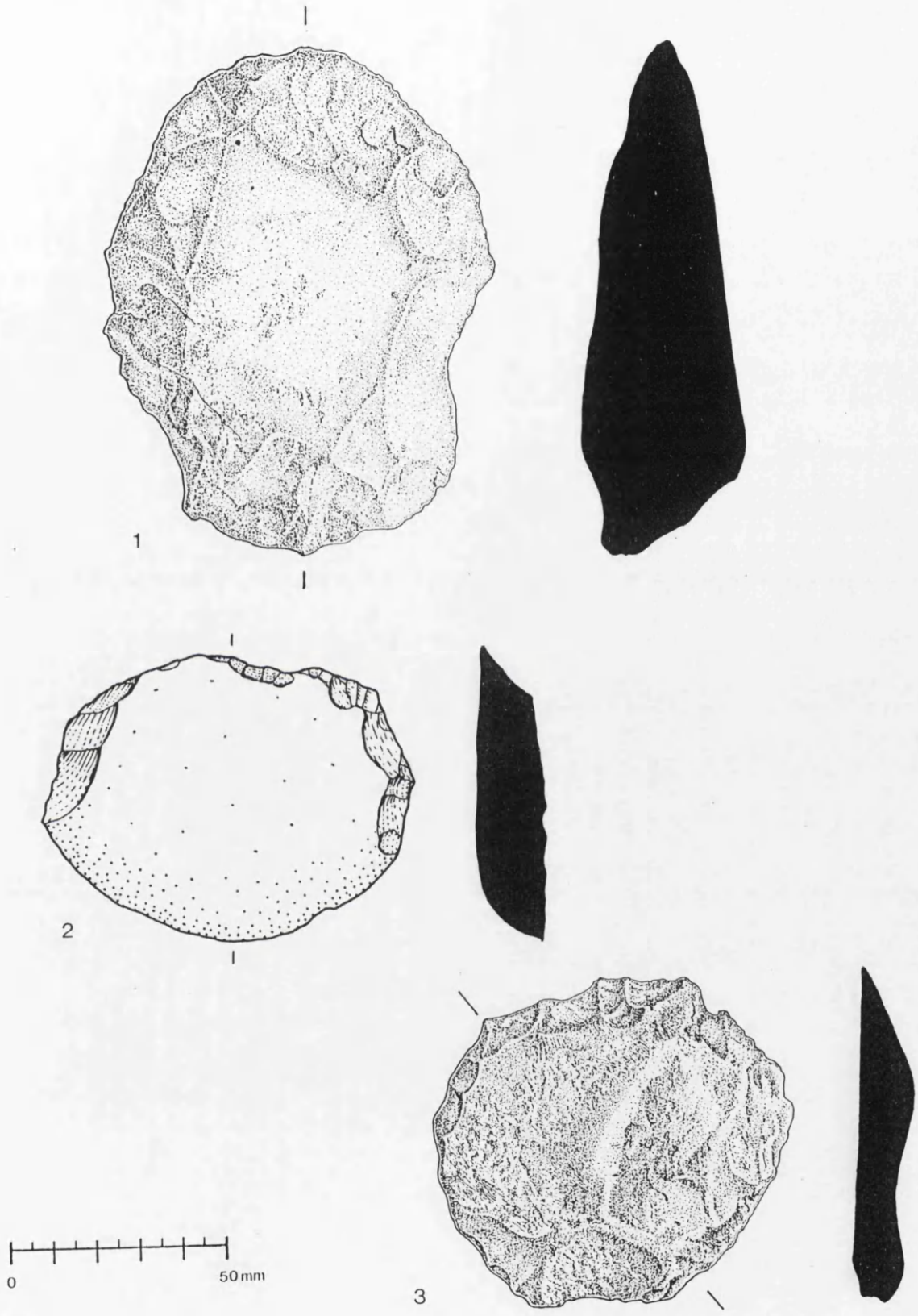

Figure 4.5 : Retouched Skaill knives. 1 and 3 showing ventral face, both from Pool; 2 showing dorsal face, from Links of Noltland.

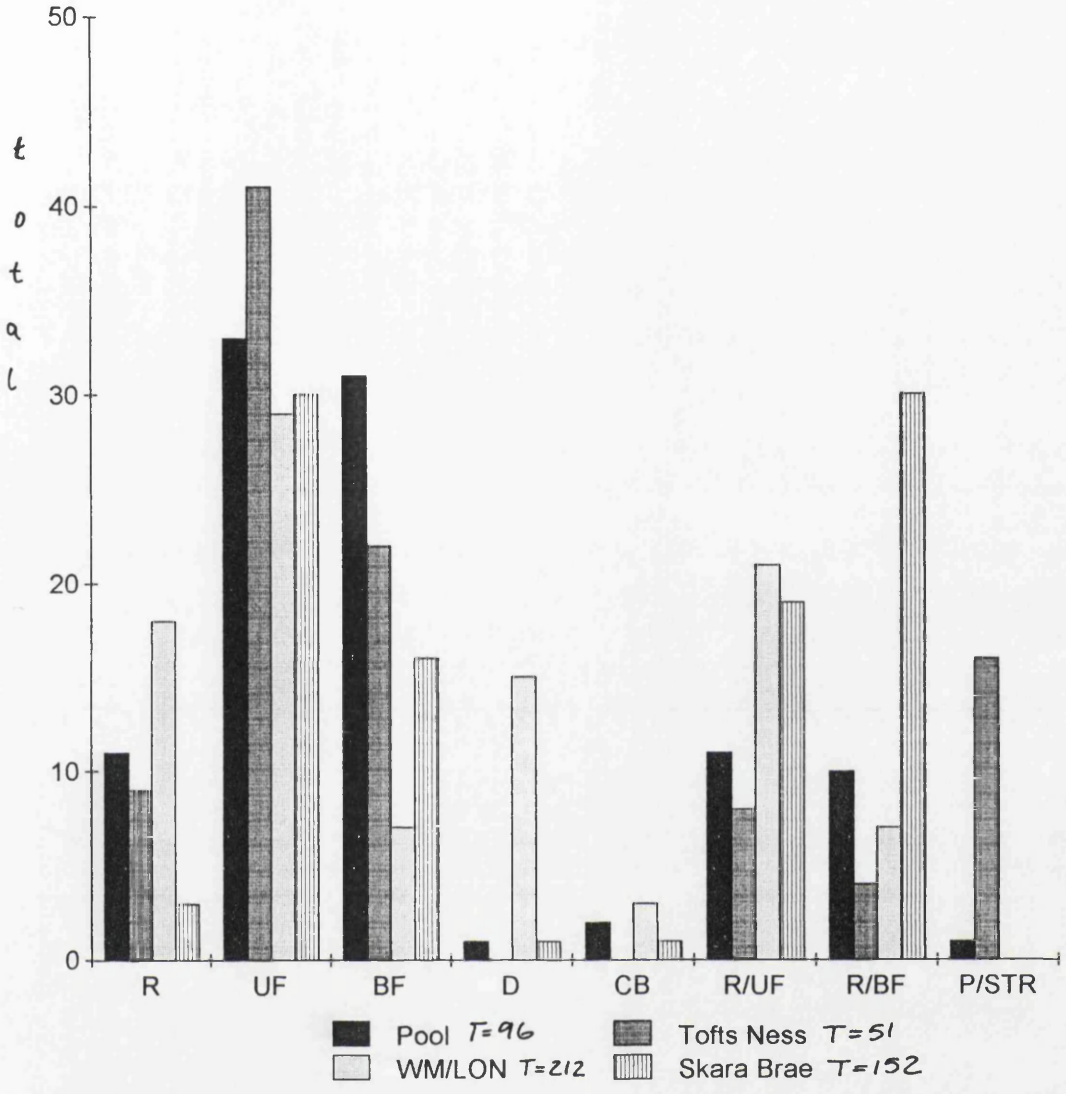

Figure 4.6 : Types of edge damage on Skaill knives, by site.

R: rounded, UF: unifacially flaked, BF: bifacially flaked, D: denticulated, CB: crushed/ battered, P/STR: polish/ striations.

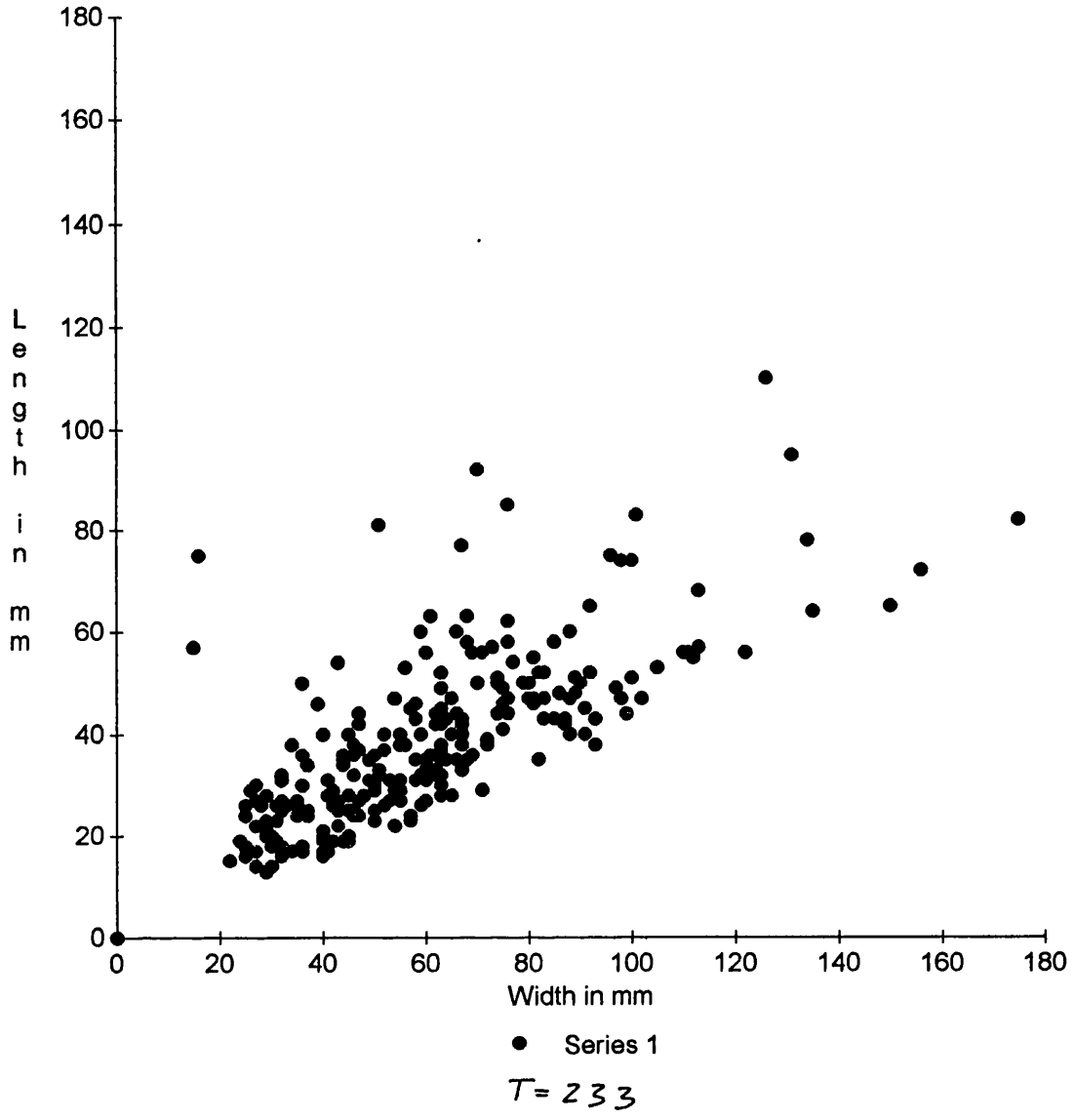

Figure 4.7 : Dimensions of sandstone flakes from Kebister.

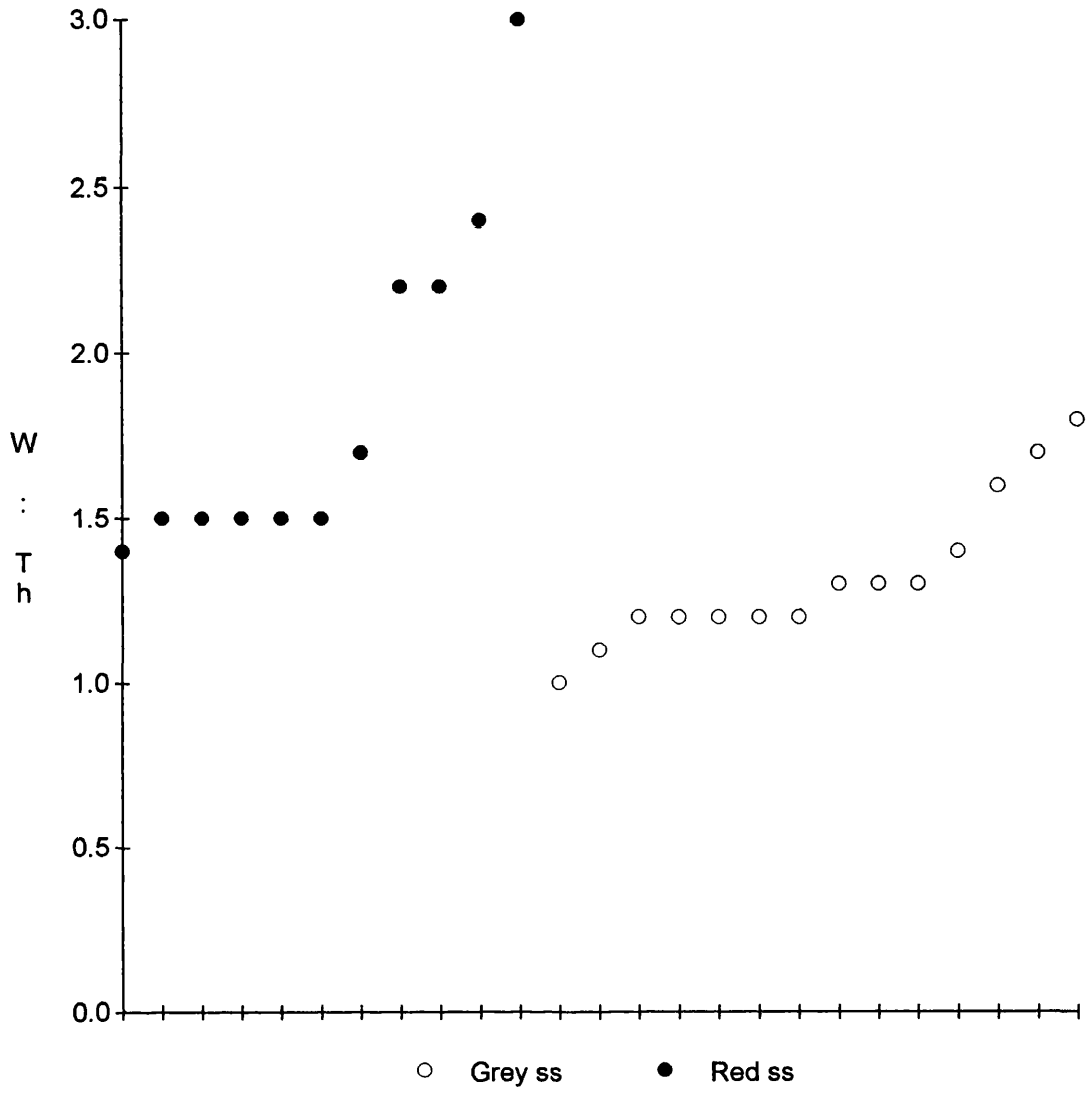

Figure 4.8 : Cross-sections (width:thickness) of complete ard points from Kebister.

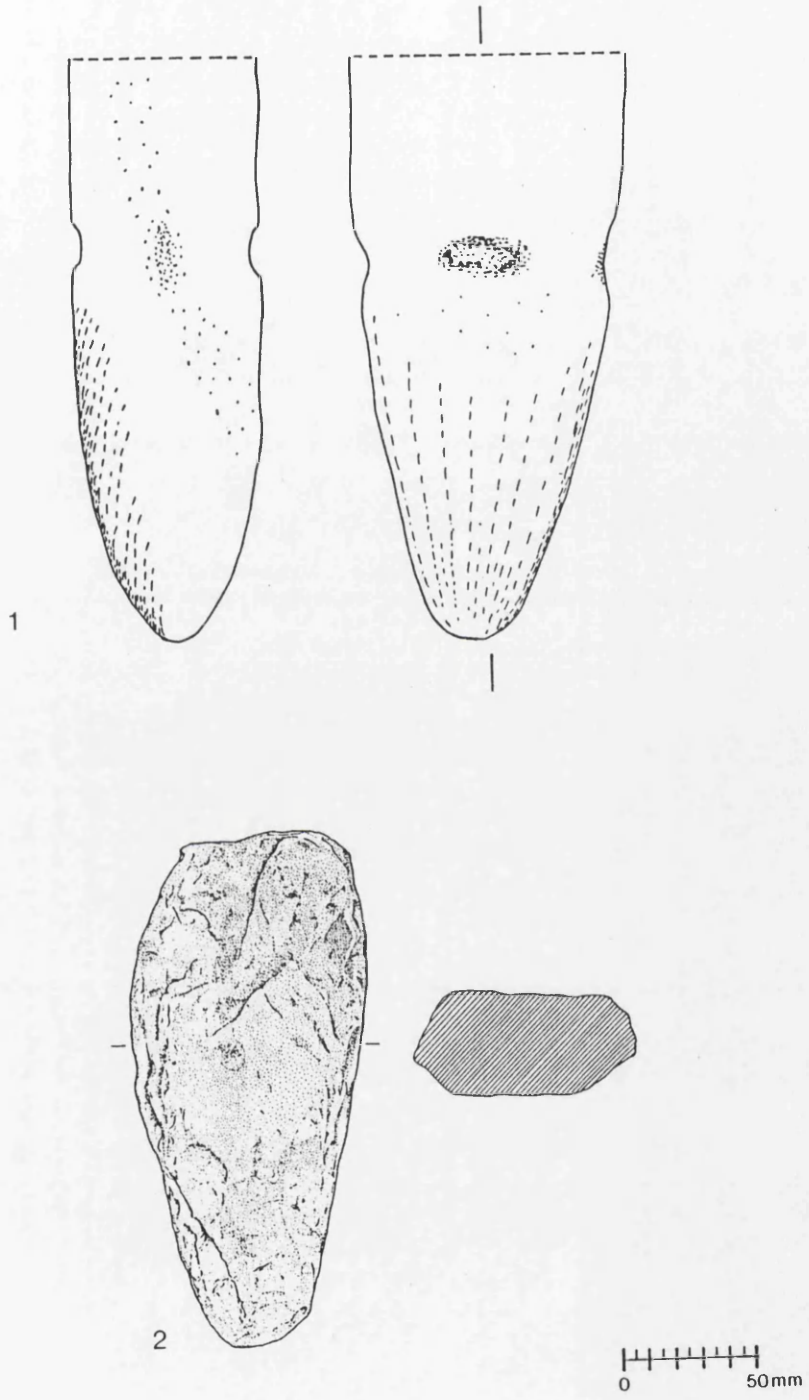

Figure 4.9 : Ard points. 1 schematic representation of an ard point from Sumburgh showing notching. 2 red sandstone ard point from Kebister showing flat cross-section.

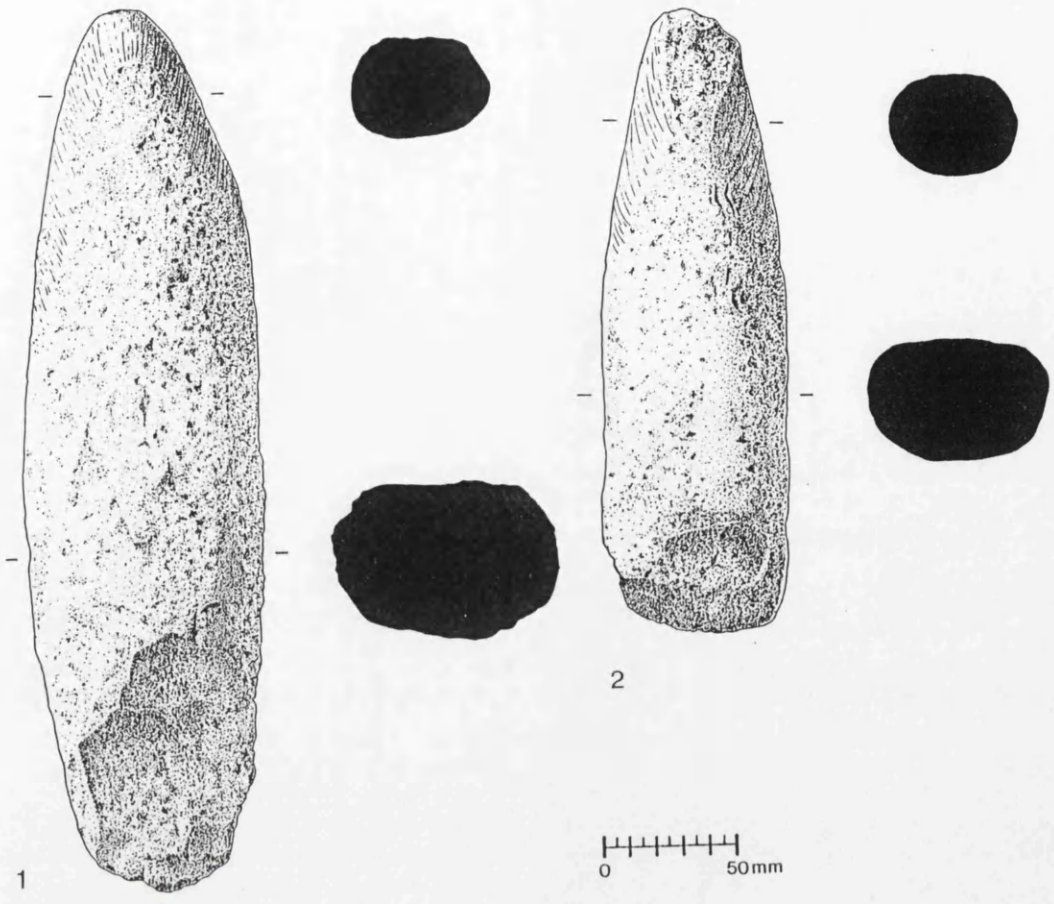

Figure 4.10 : Ard points from Tofts Ness.

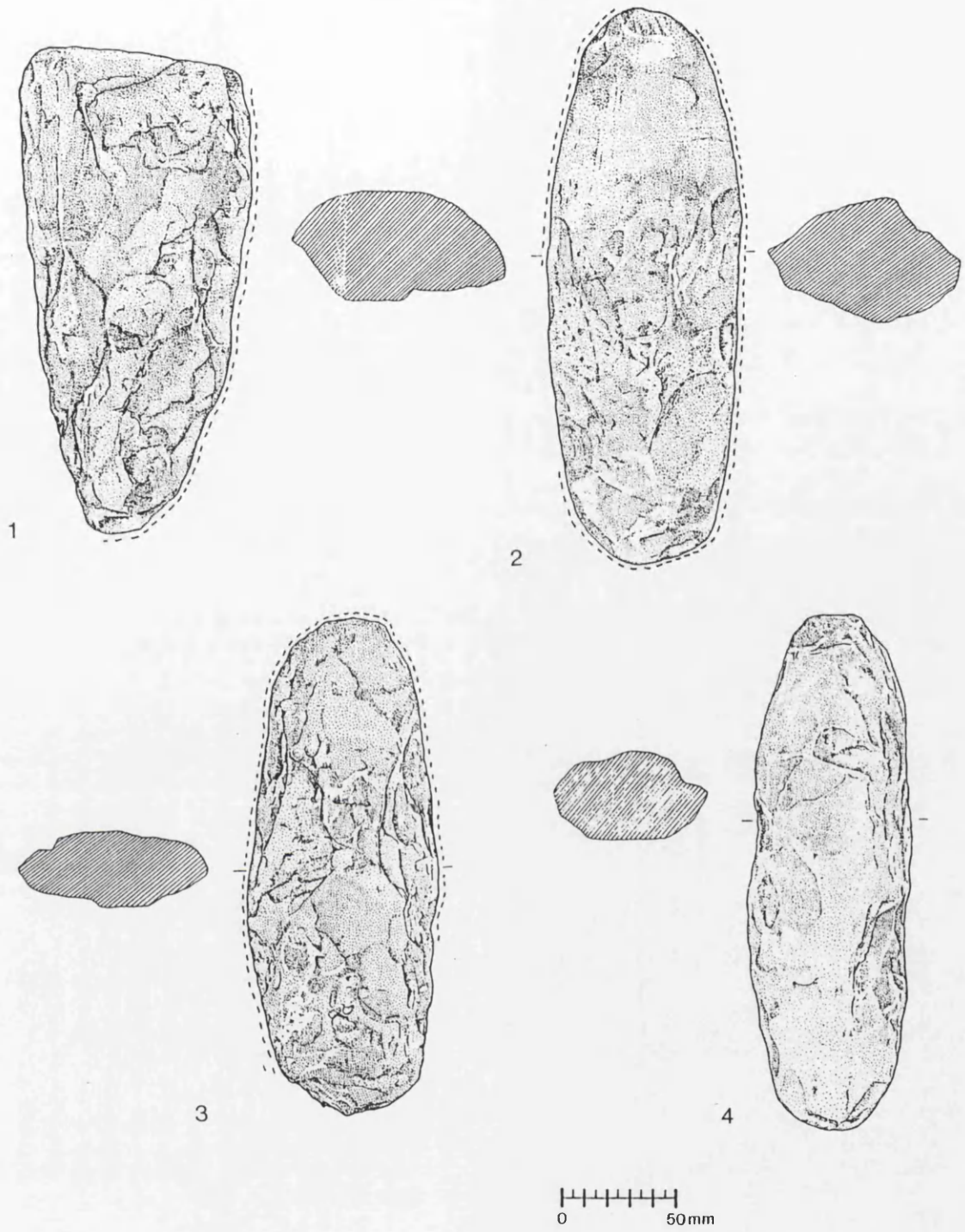

Figure 4.11 : Flaked stone bars from Kebister. Dashed lines indicate extent of edge rounding.

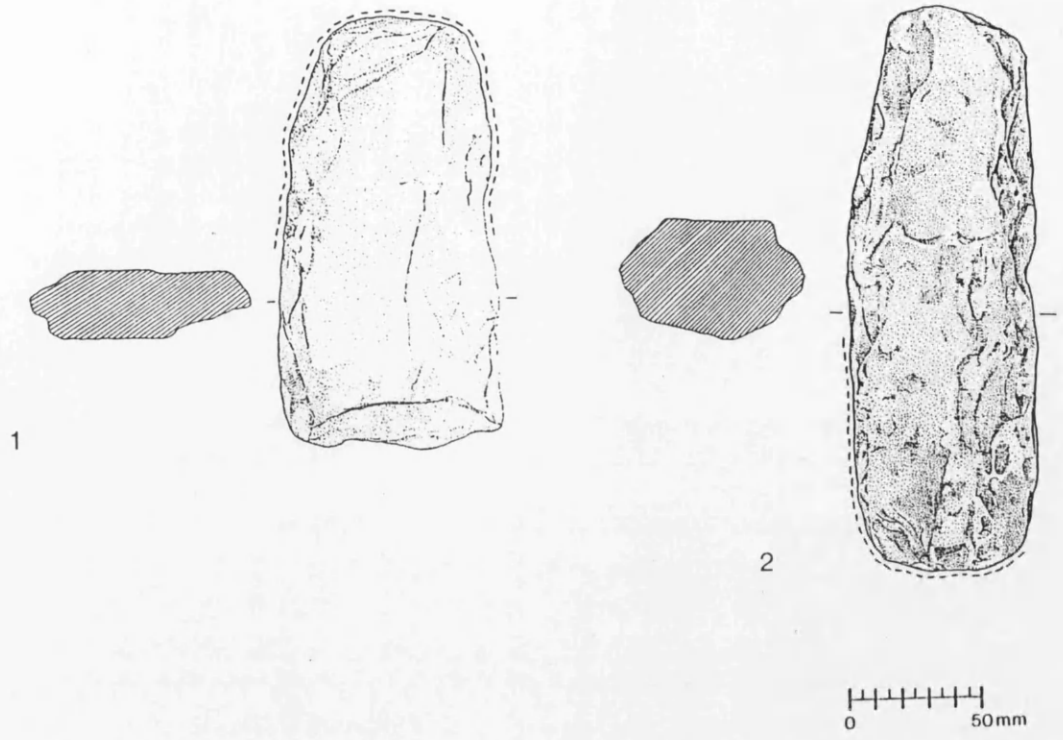

Figure 4.12 : Flaked stone bars from Kebister. Dashed lines indicate extent of edge rounding.

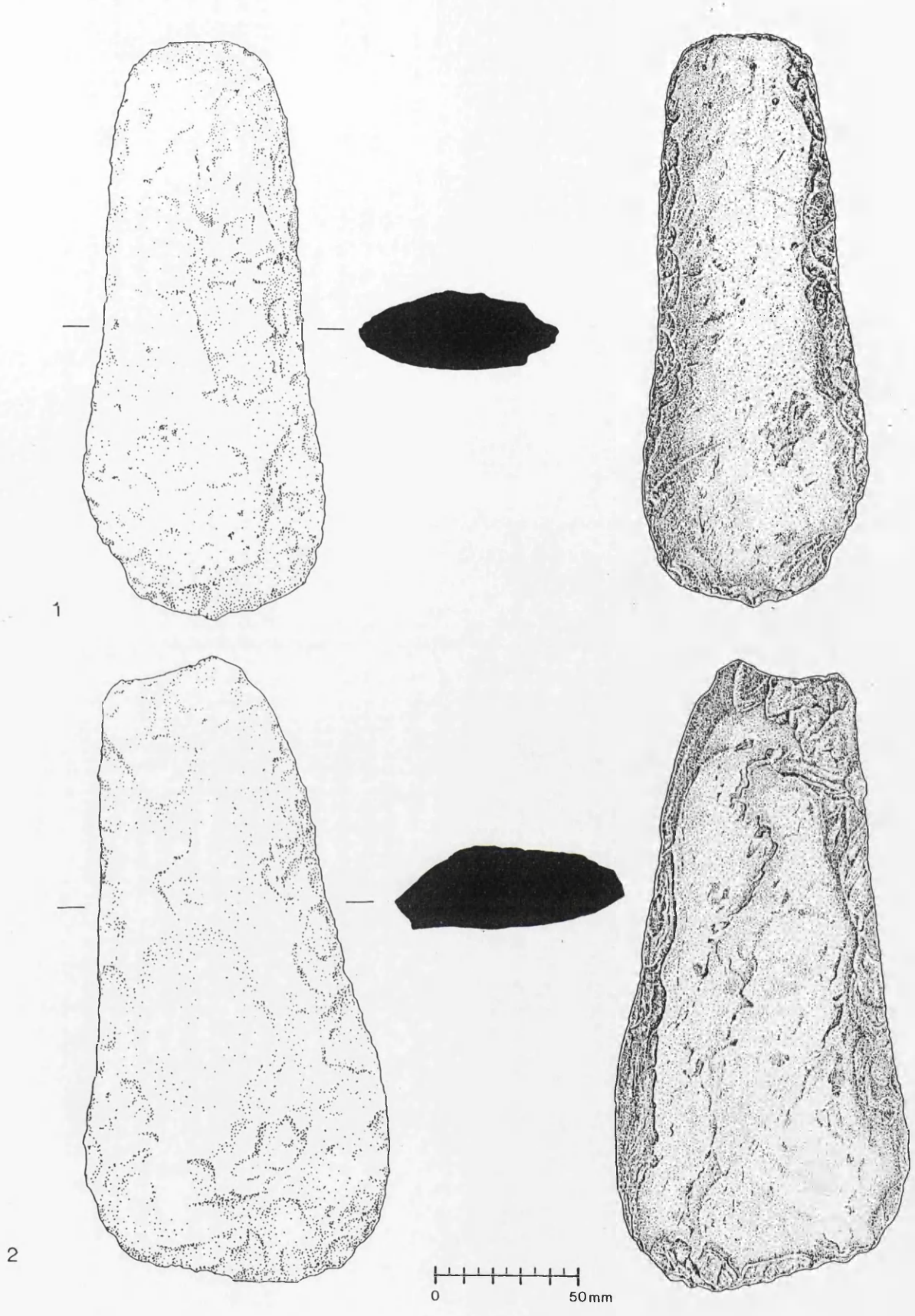

Figure 4.13 : Flaked stone bars from Tofts Ness.

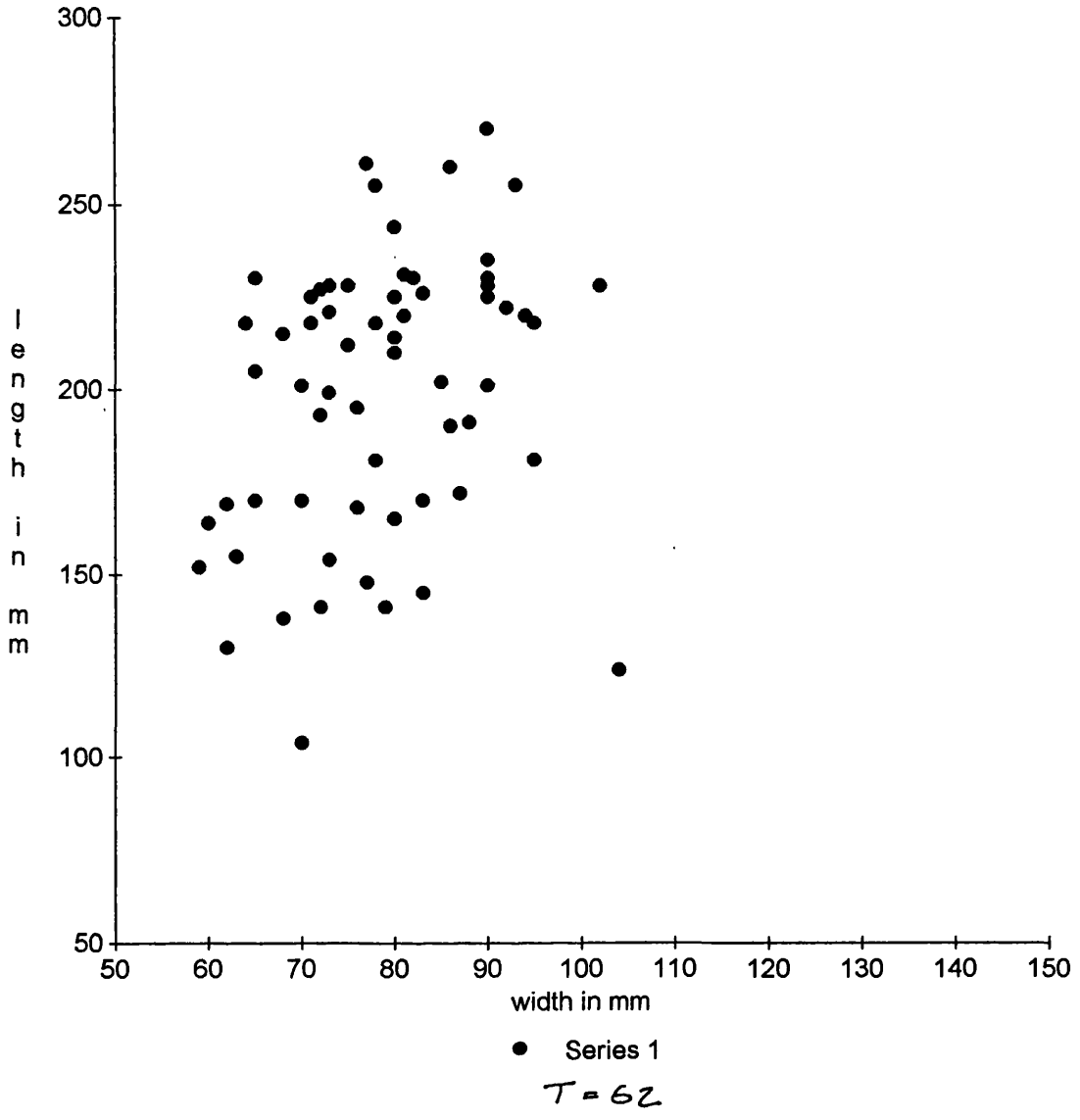

Figure 4.14 : Dimensions of flaked stone bars from Kebister.

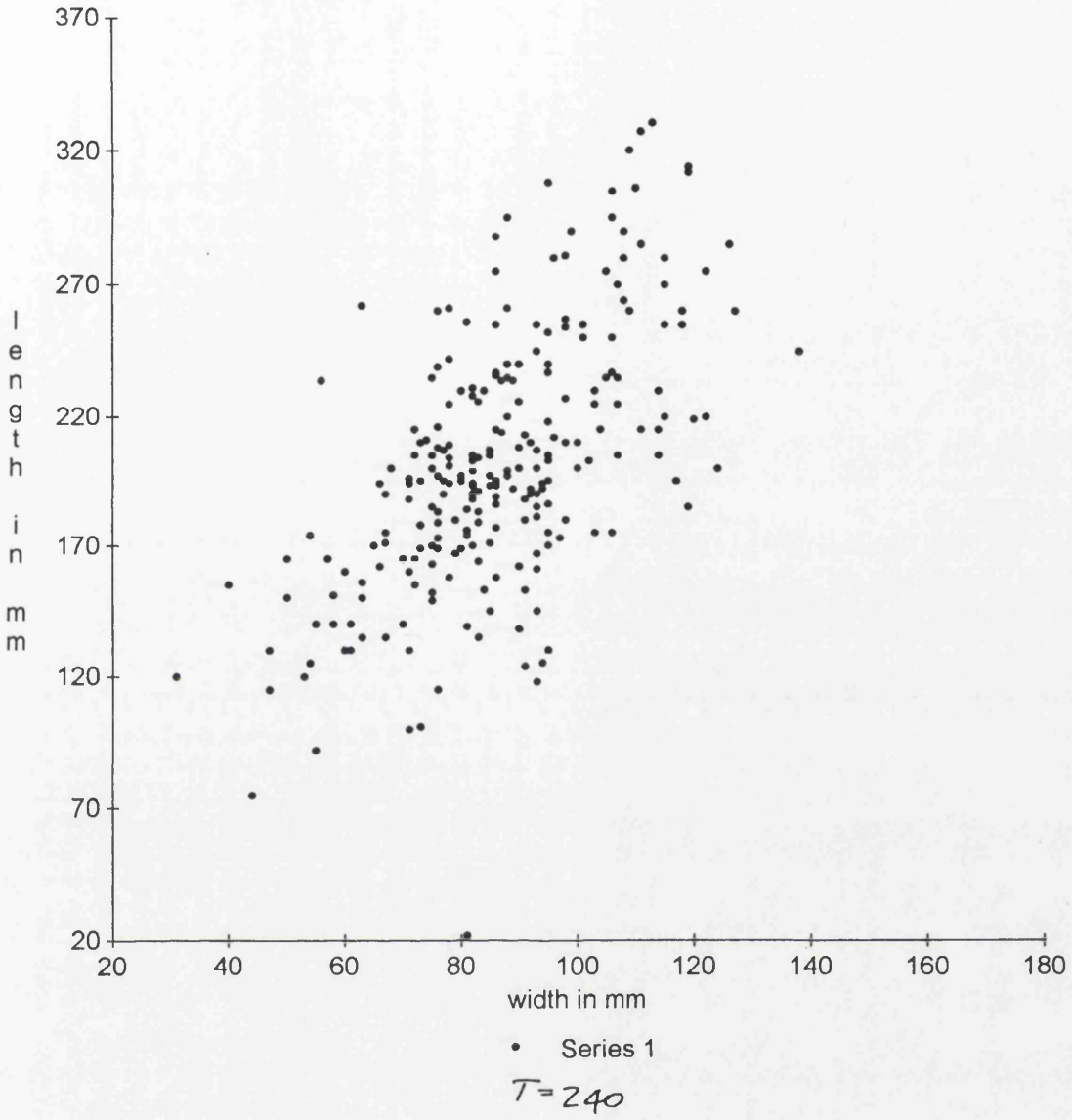

Figure 4.15 : Dimensions of flaked stone bars from Sumburgh.

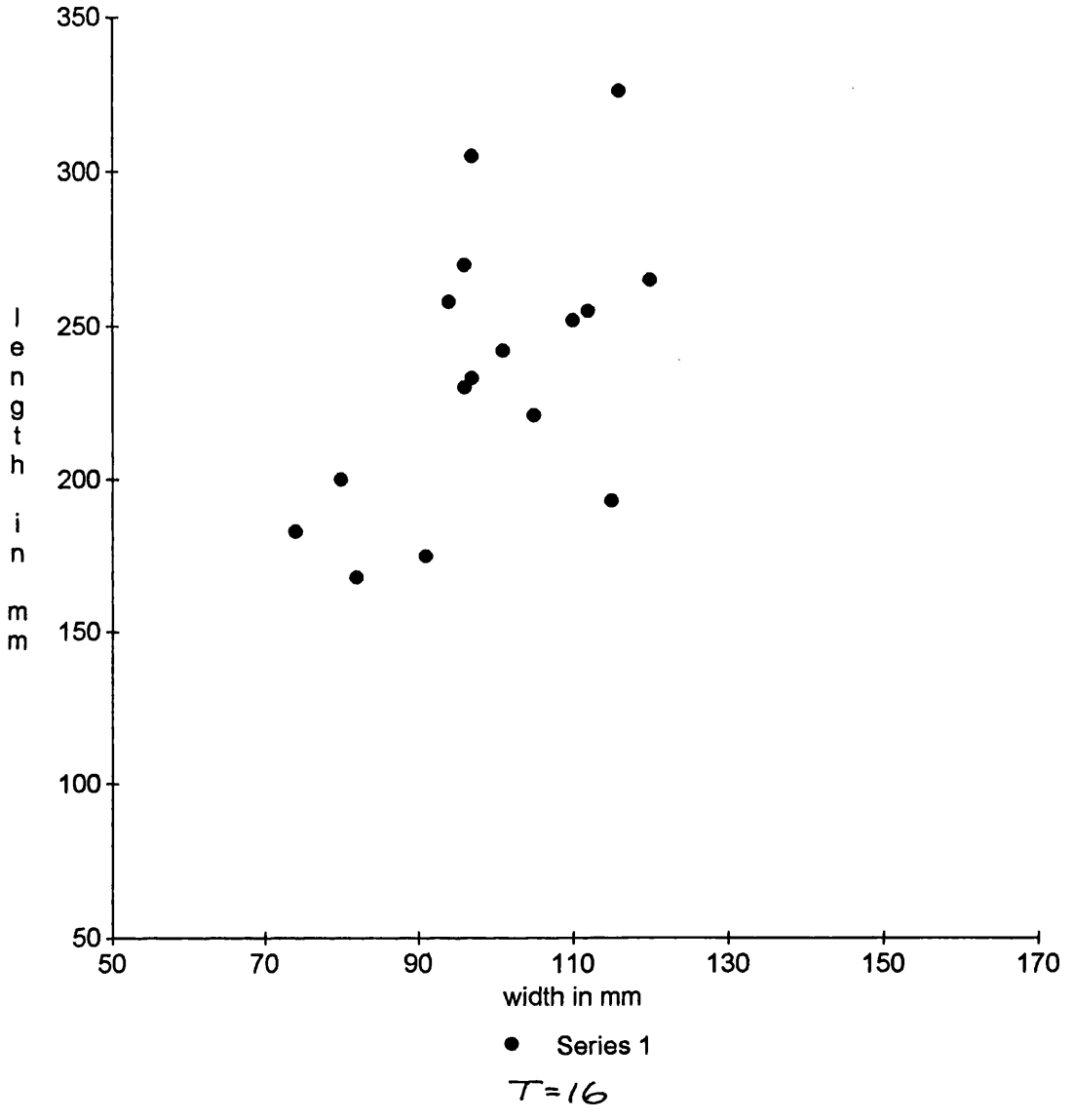

Figure 4.16 : Dimensions of flaked stone bars from Tofts Ness.

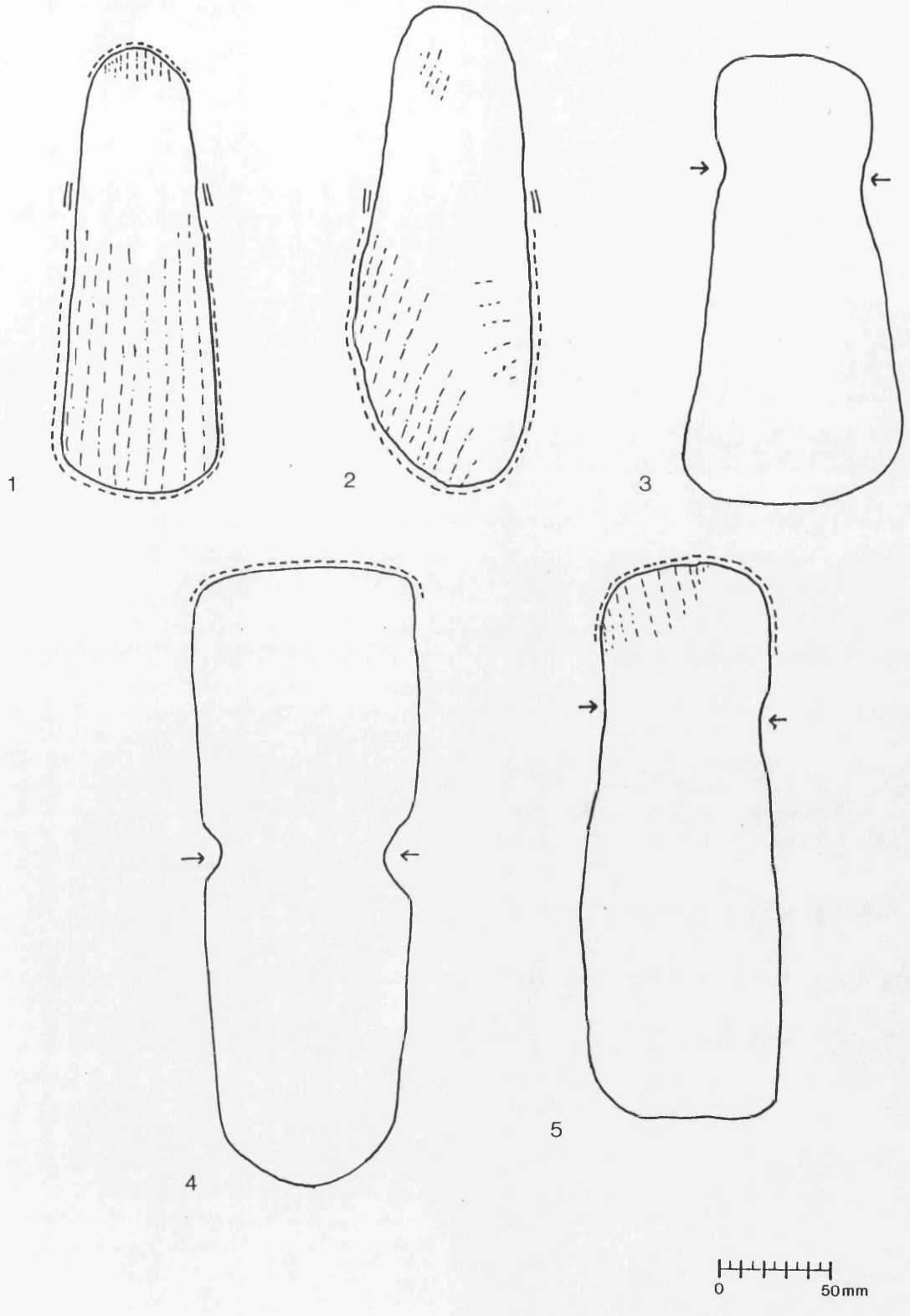

Figure 4.17 : Schematic representations of flaked stone bars from Sumburgh. Arrows indicate notching. Parallel lines indicate location of smoothing and polish on the edges. Dashed lines indicate edge rounding. Dots and dashes indicate areas of smoothing and striations on faces.

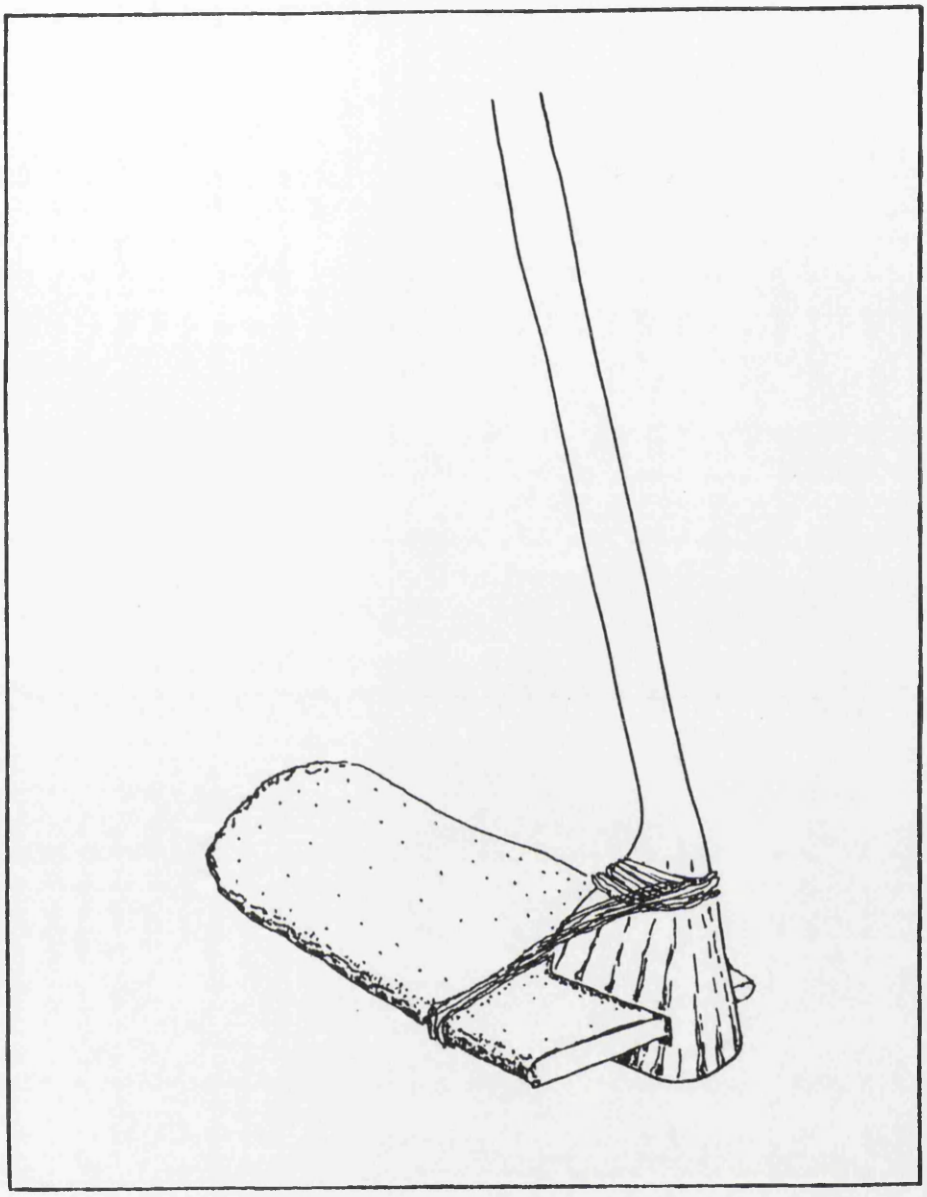

Figure 4.18 : Example of a hafted stone bar. After exhibit in Tankerness House, Kirkwall.

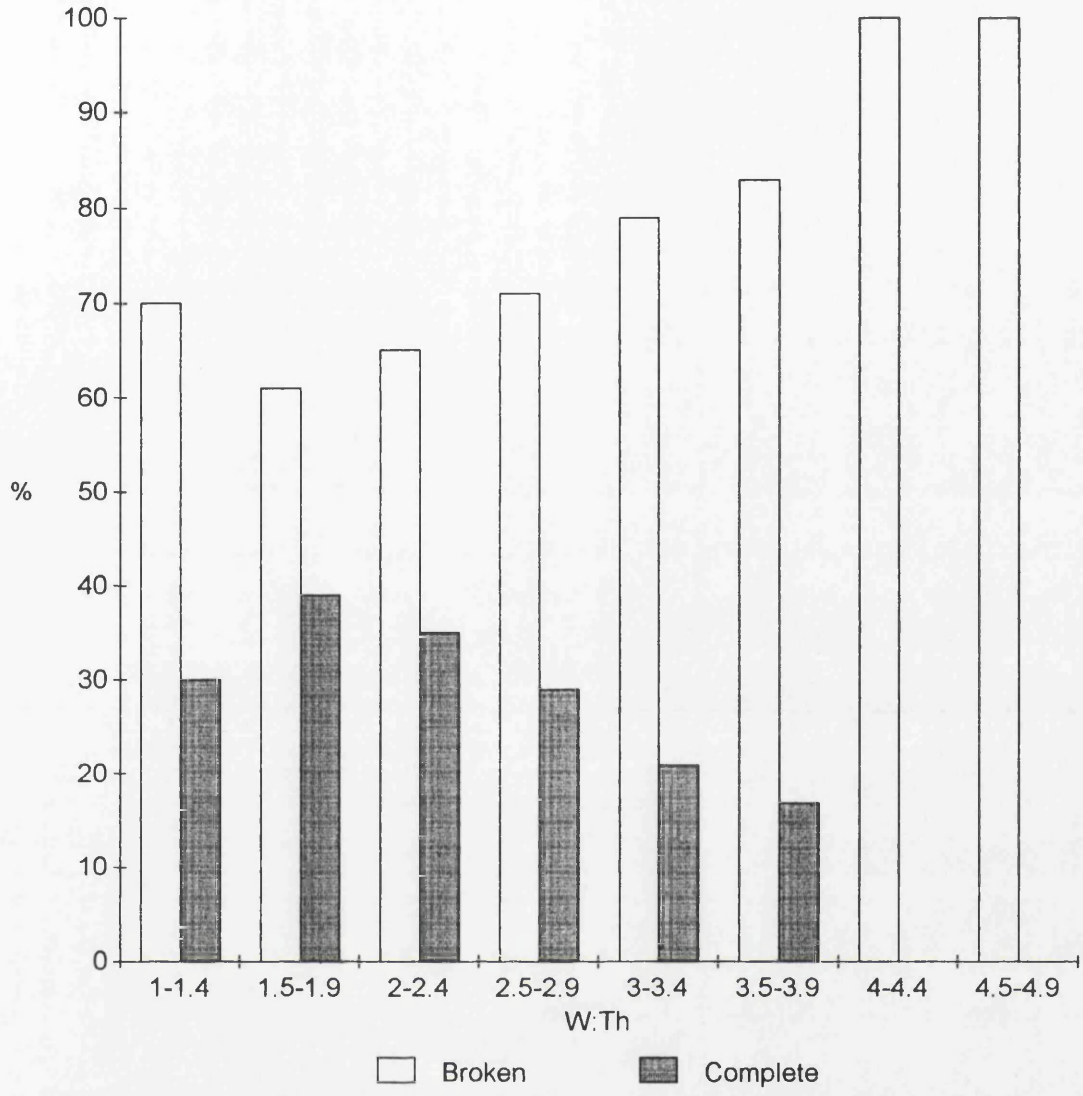

Figure 4.19 : Flaked stone bars from Kebister. Percentage of complete and broken pieces per ratio W:Th (width:thickness).

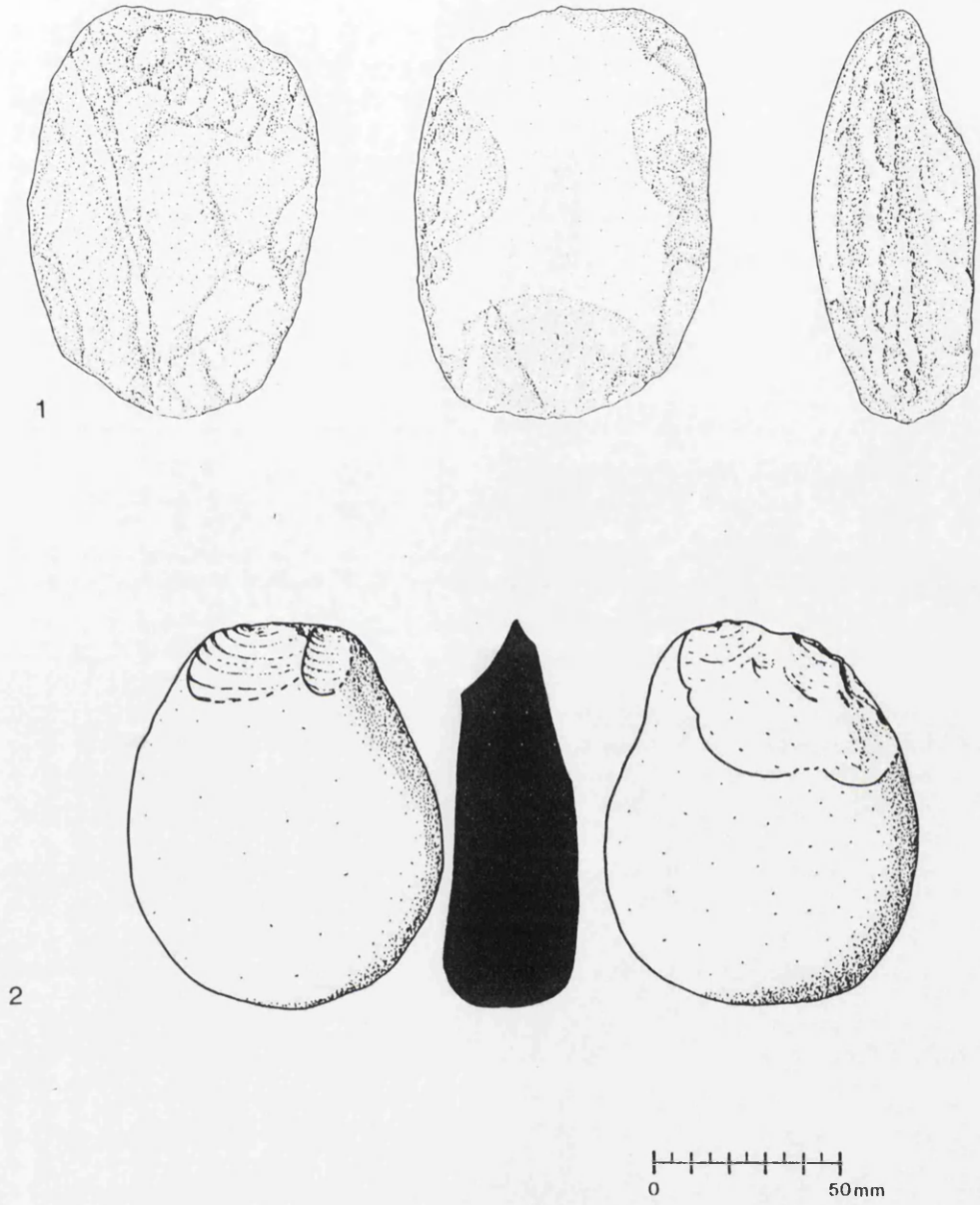

Figure 4.20 : Flaked cobbles. 1 Tofts Ness. 2 Links of Noltland.

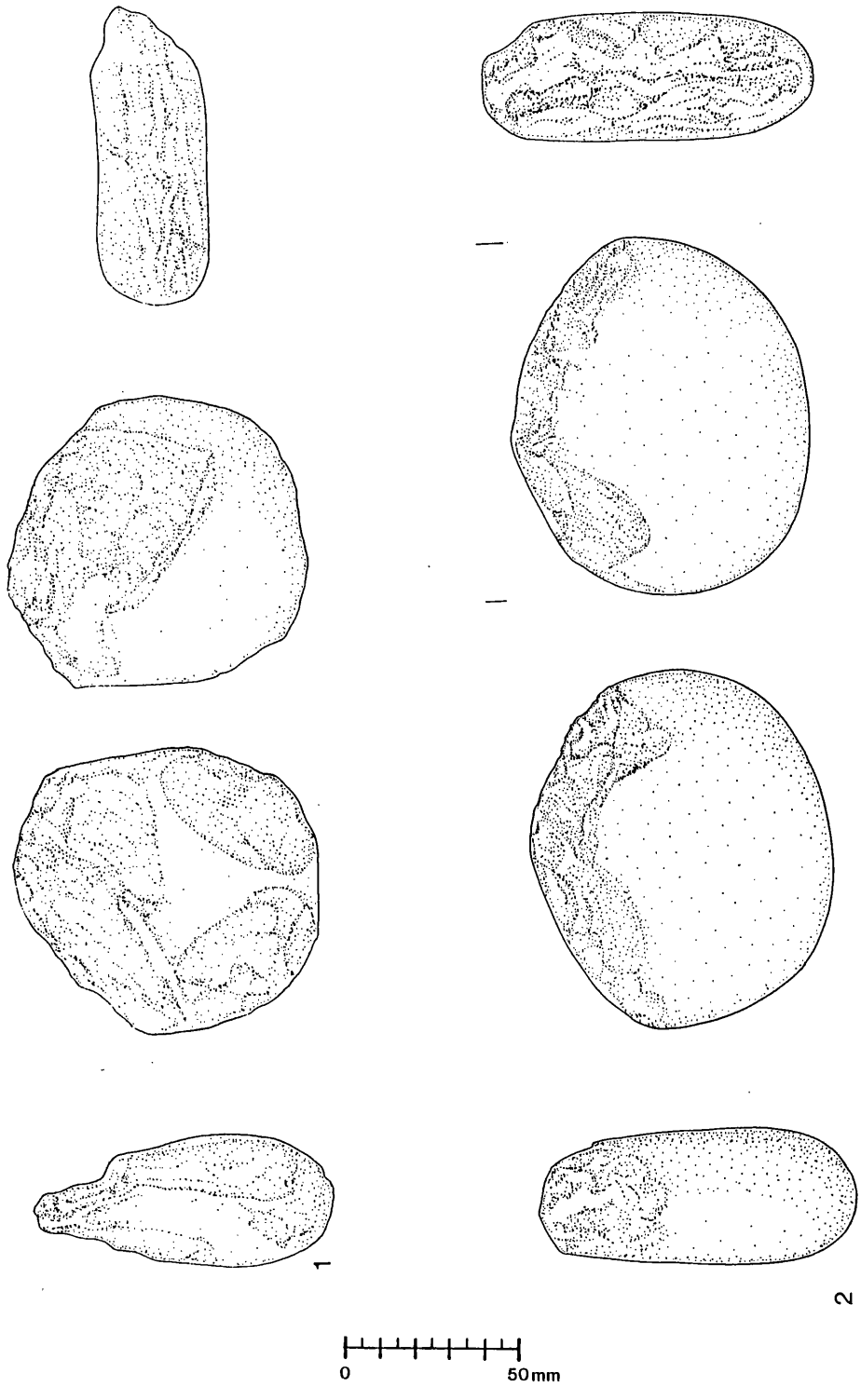

Figure 4.21 : Flaked cobbles from Tofts Ness.

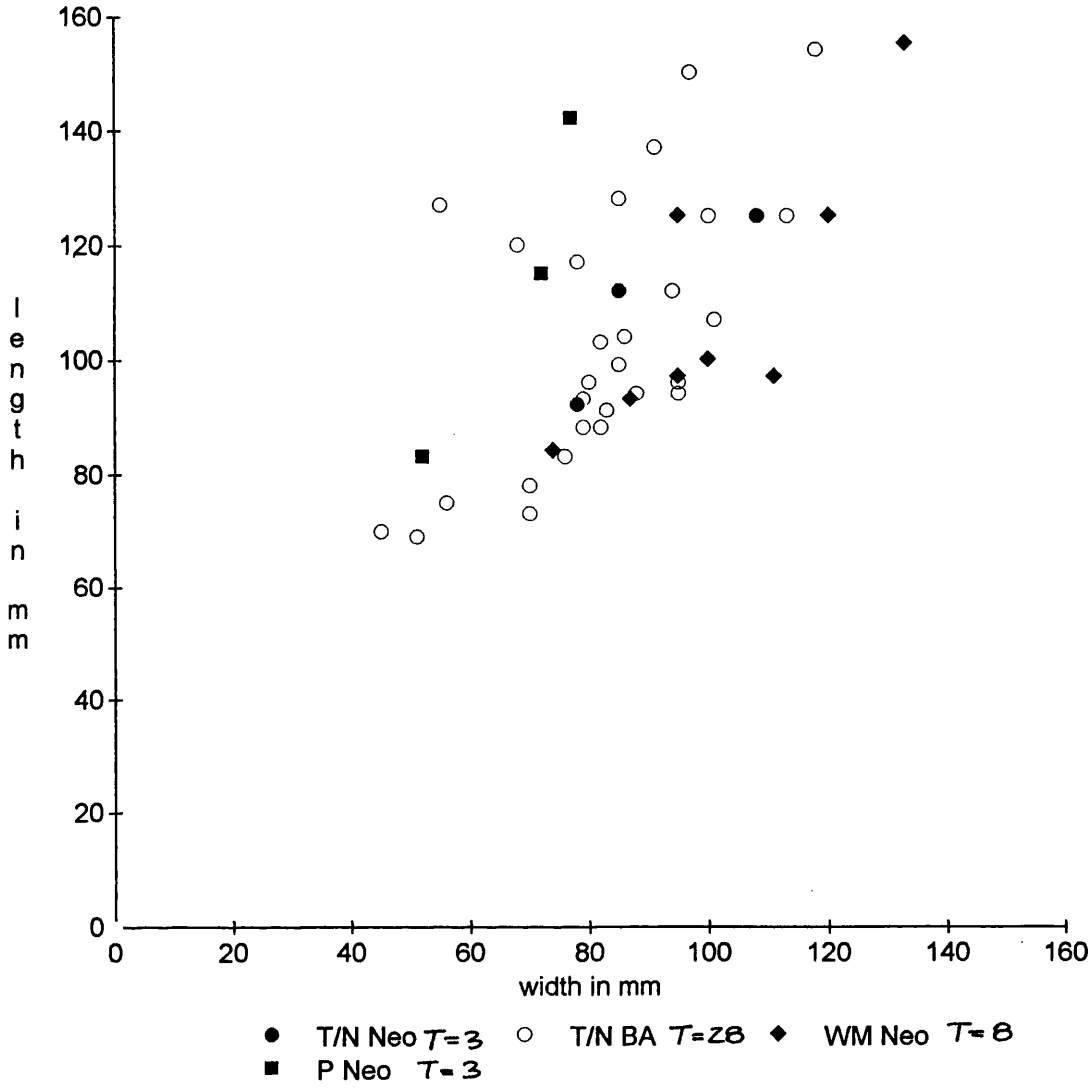

Figure 4.22 : Dimensions of flaked cobbles, by site and phase.

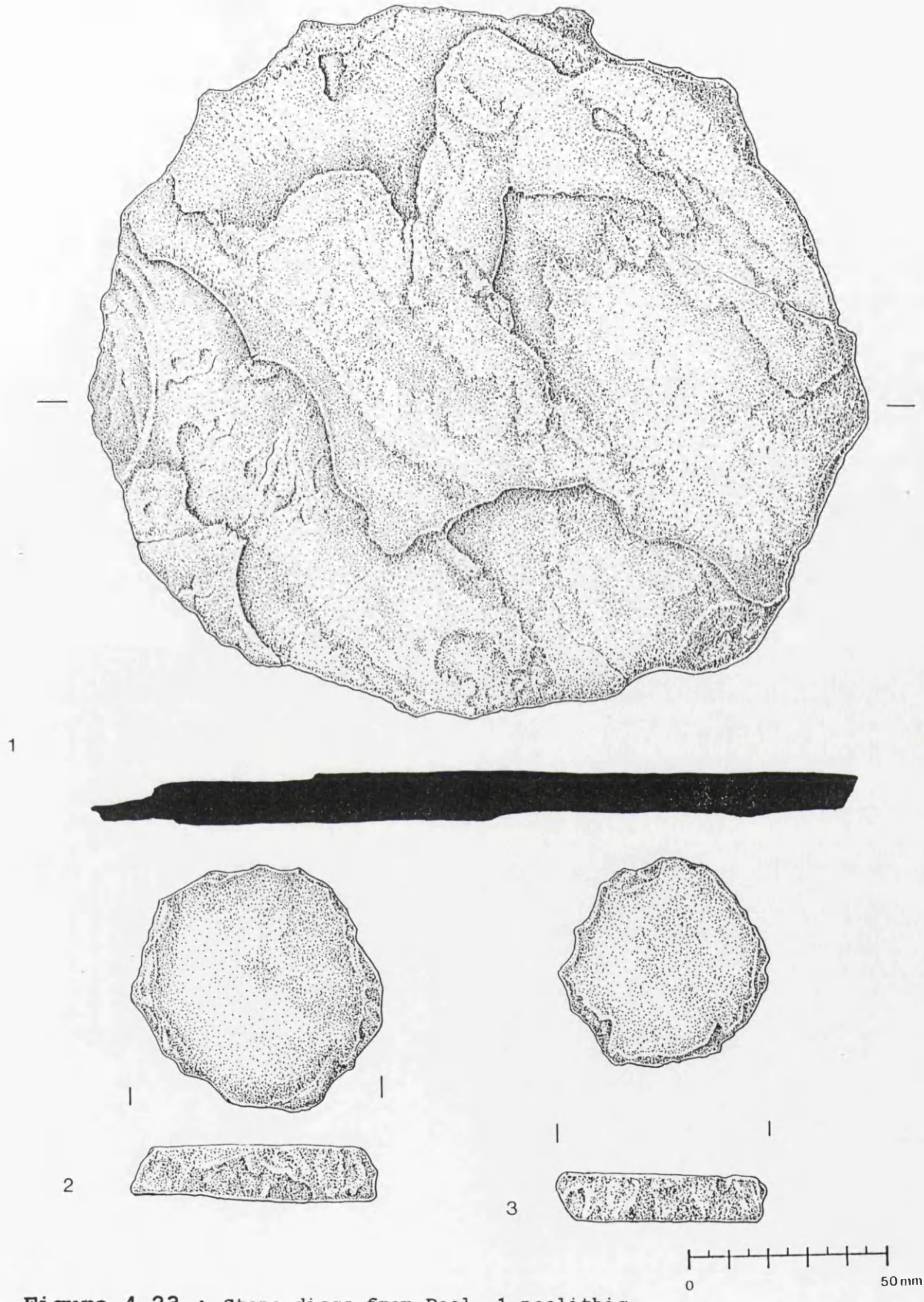

Figure 4.23 : Stone discs from Pool. 1 neolithic.
2, 3 iron age.

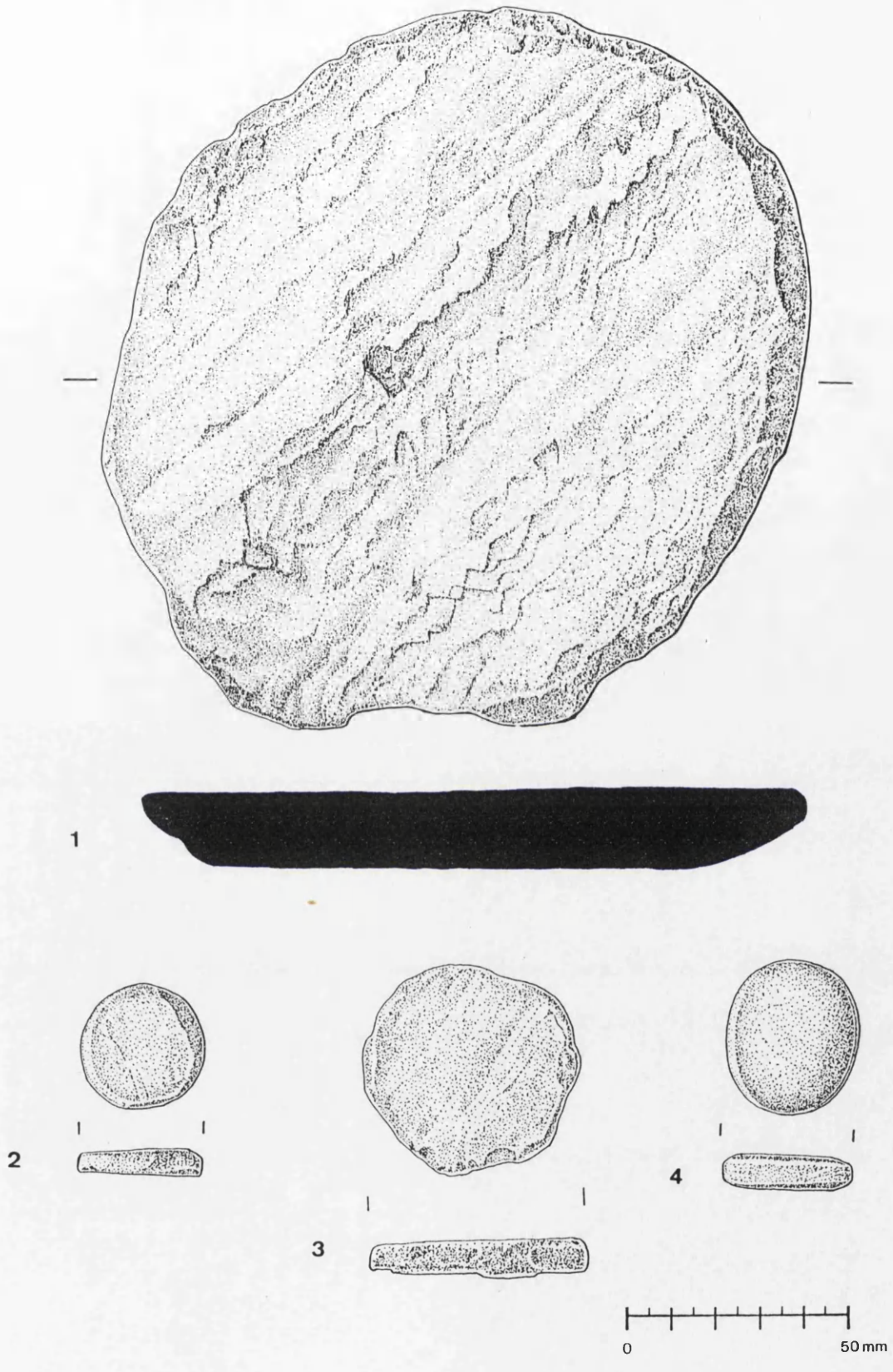

Figure 4.24 : Stone discs from iron age Pool. 2, 4 ground all over. 3 edge ground.

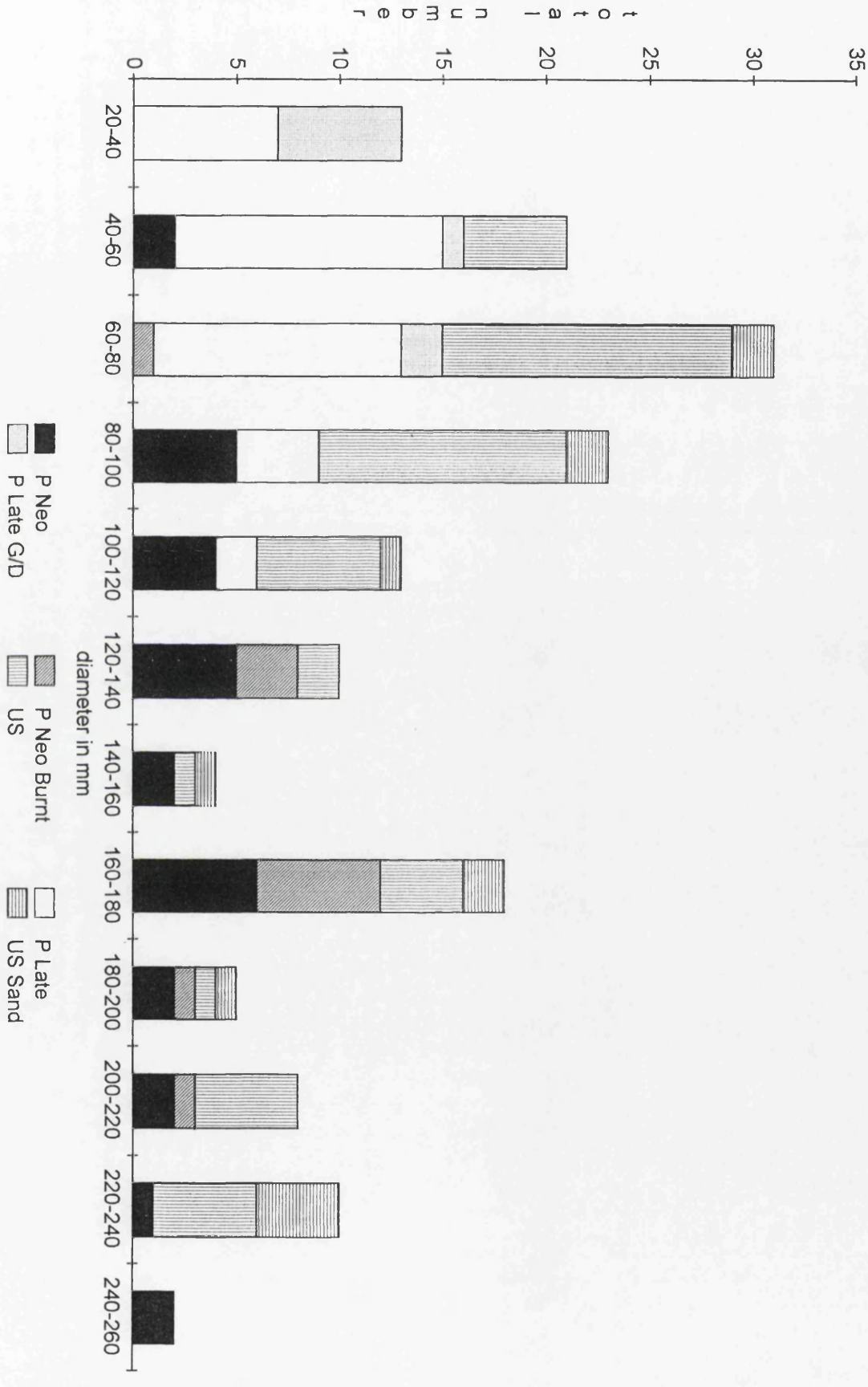

Figure 4.25 : Dimensions of stone discs from Pool (P) and Upper Scalloway (US). G/D: ground, Sand: sandstone.

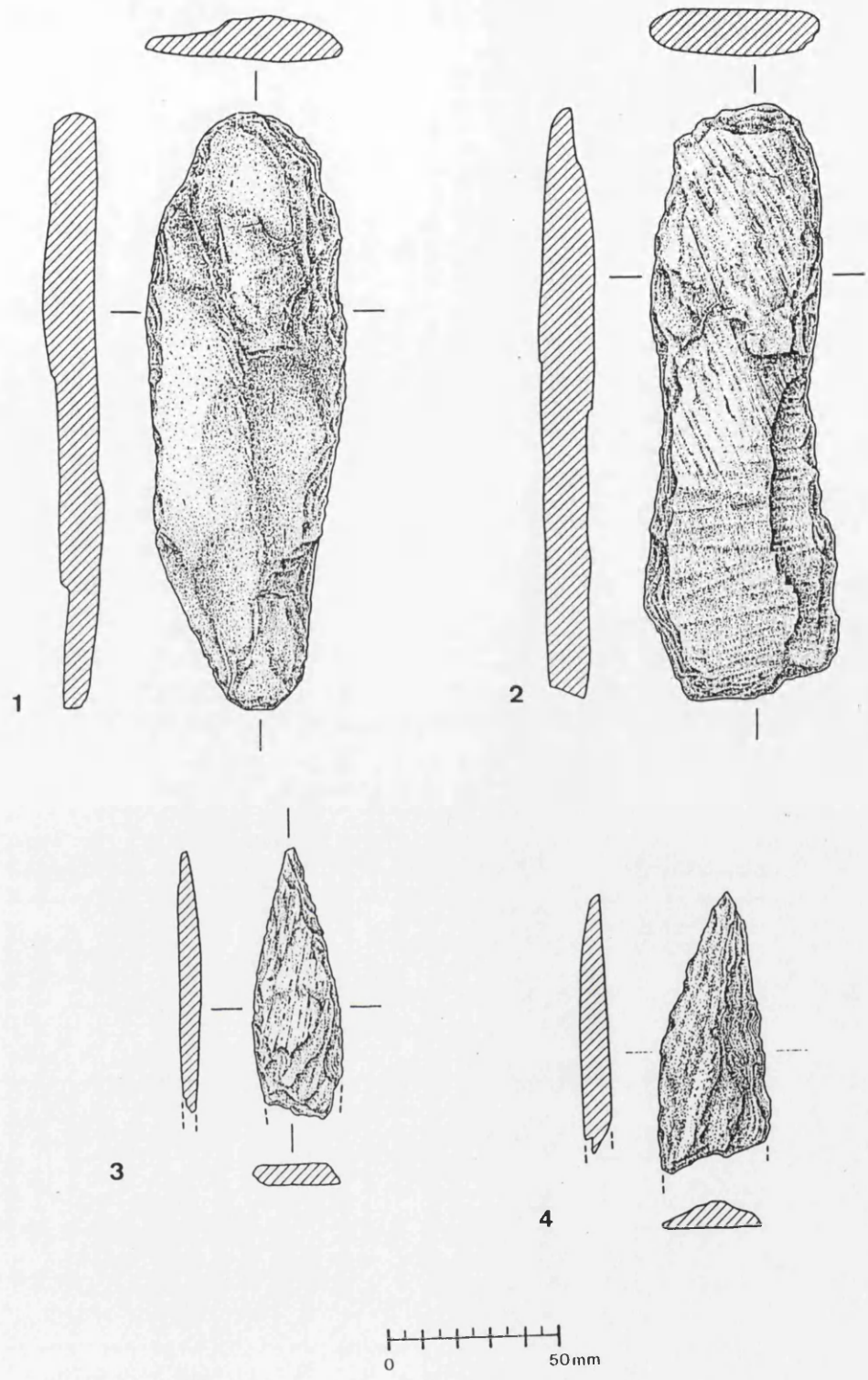

Figure 4.26 : Chipped laminated material. 1, 2 rectangles. 3, 4 points. All from Kebister.

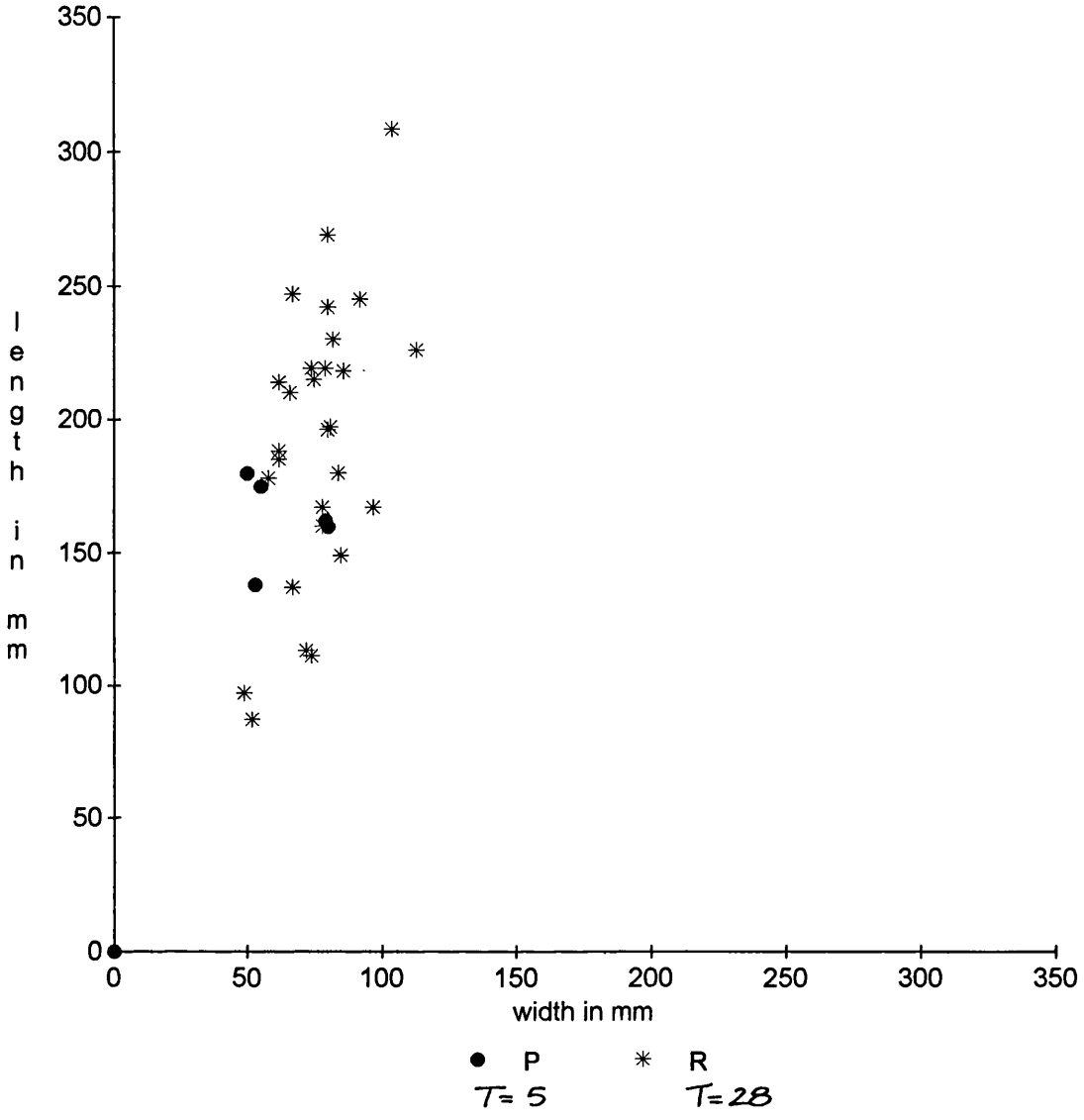

Figure 4.27 : Dimensions of rectangles (R) and points (P) from Kebister.

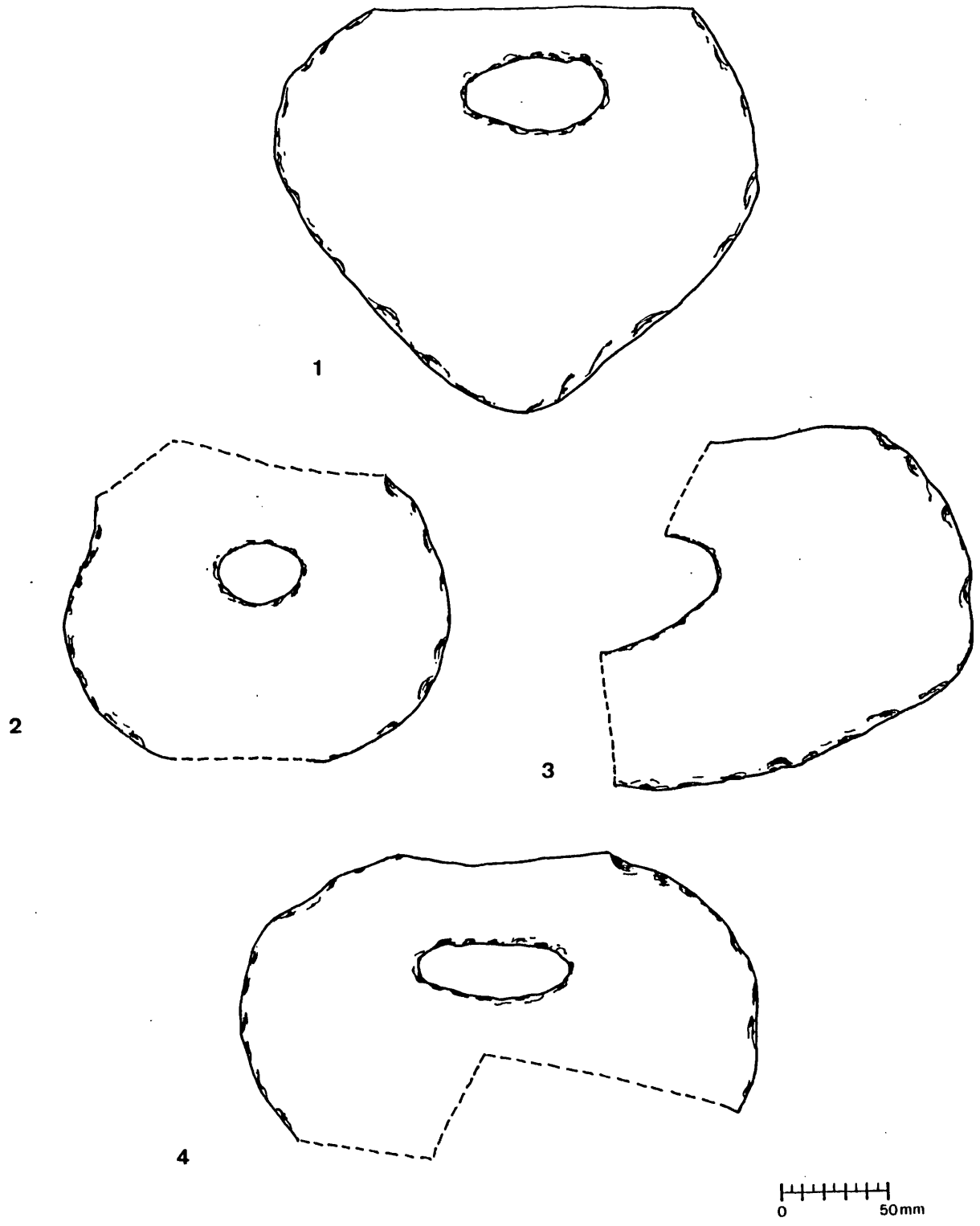

Figure 4.28 : 'Heart-shaped' objects from Sumburgh.

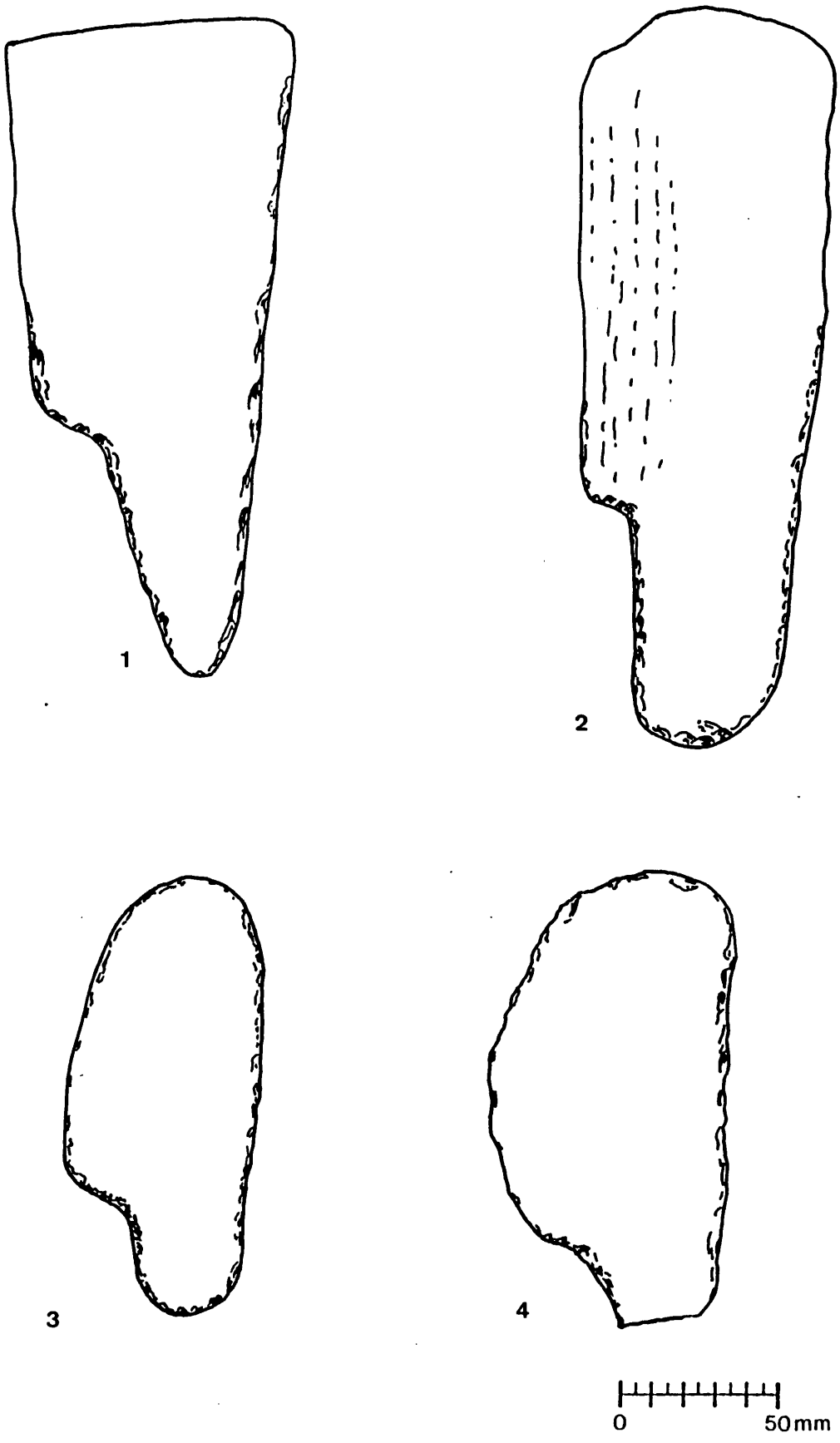

Figure 4.29 : 1, 2 'cleavers'. 3, 4 'knives'. 1, 2 and 3 from Sumburgh, 4 from Kebister.

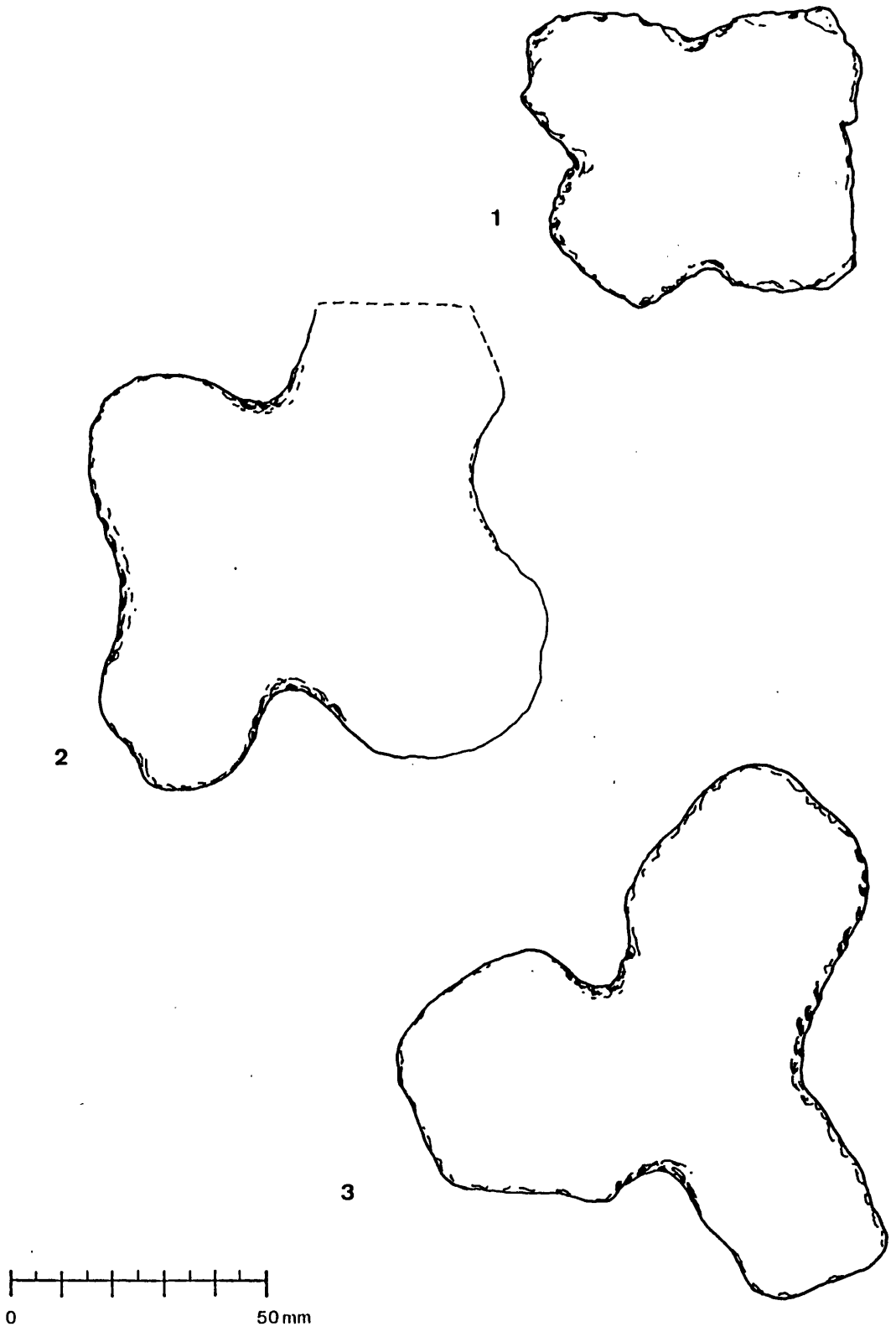

Figure 4.30 : Lobate objects. 1 Kebister, 2 Sumburgh, 3 Skara Brae.

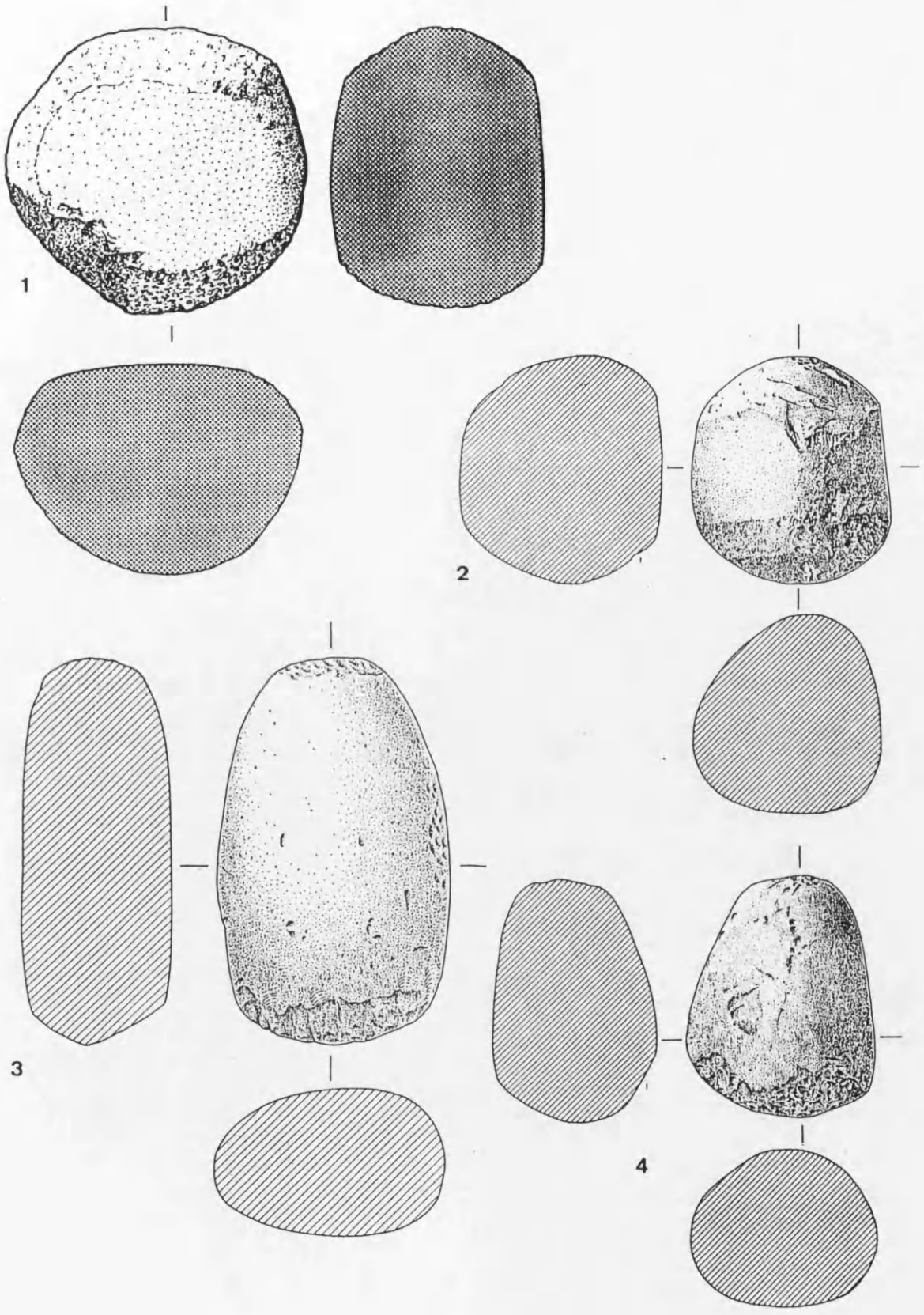

Figure 4.31 : Pounder/grinders. 1 Scalloway, 2 - 4 Kebister. 1 and 3 scale 7:10, 2 and 4 scale 1:2.

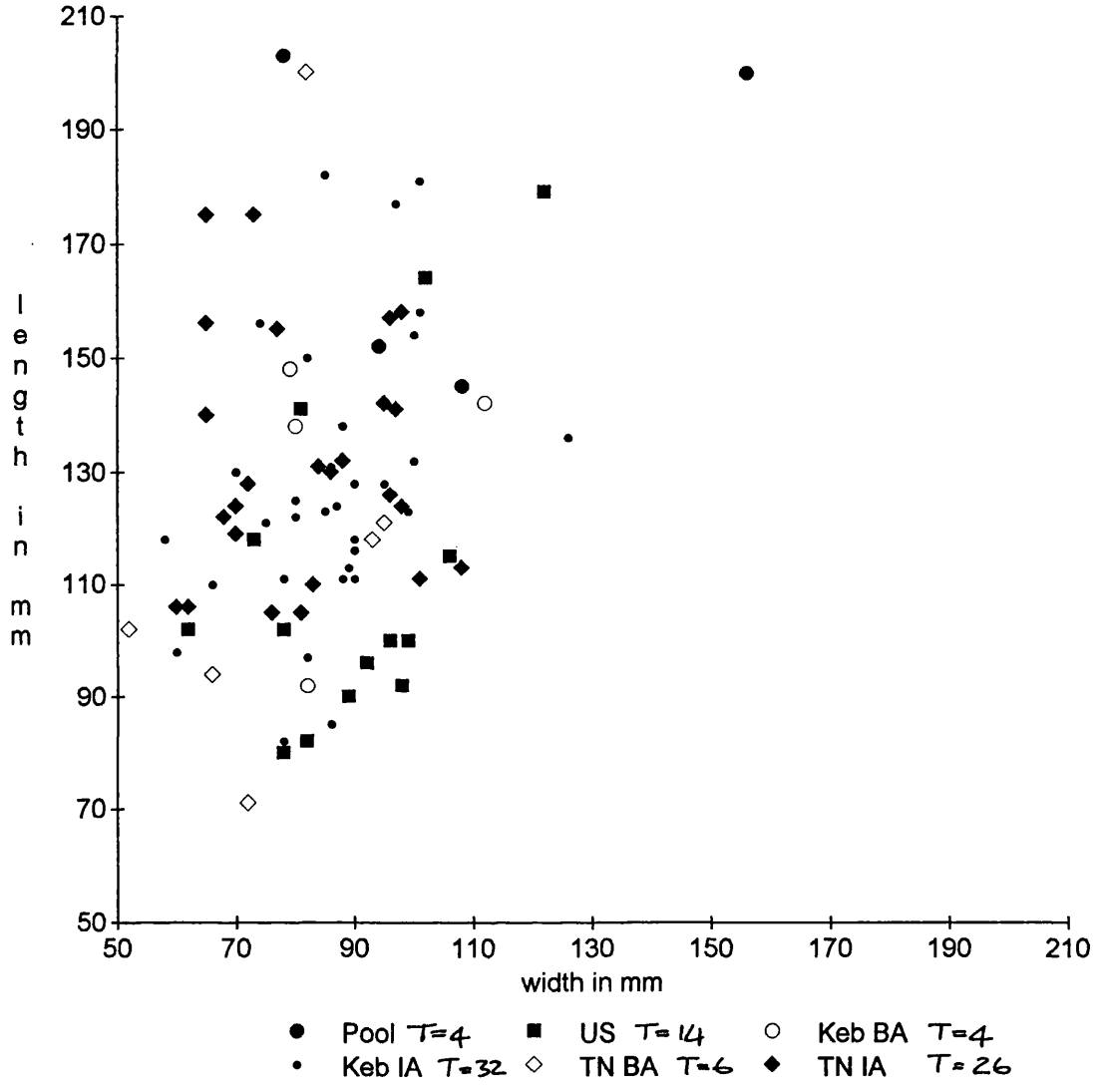

Figure 4.32 : Dimensions of pounder/ grinders, by site and phase.

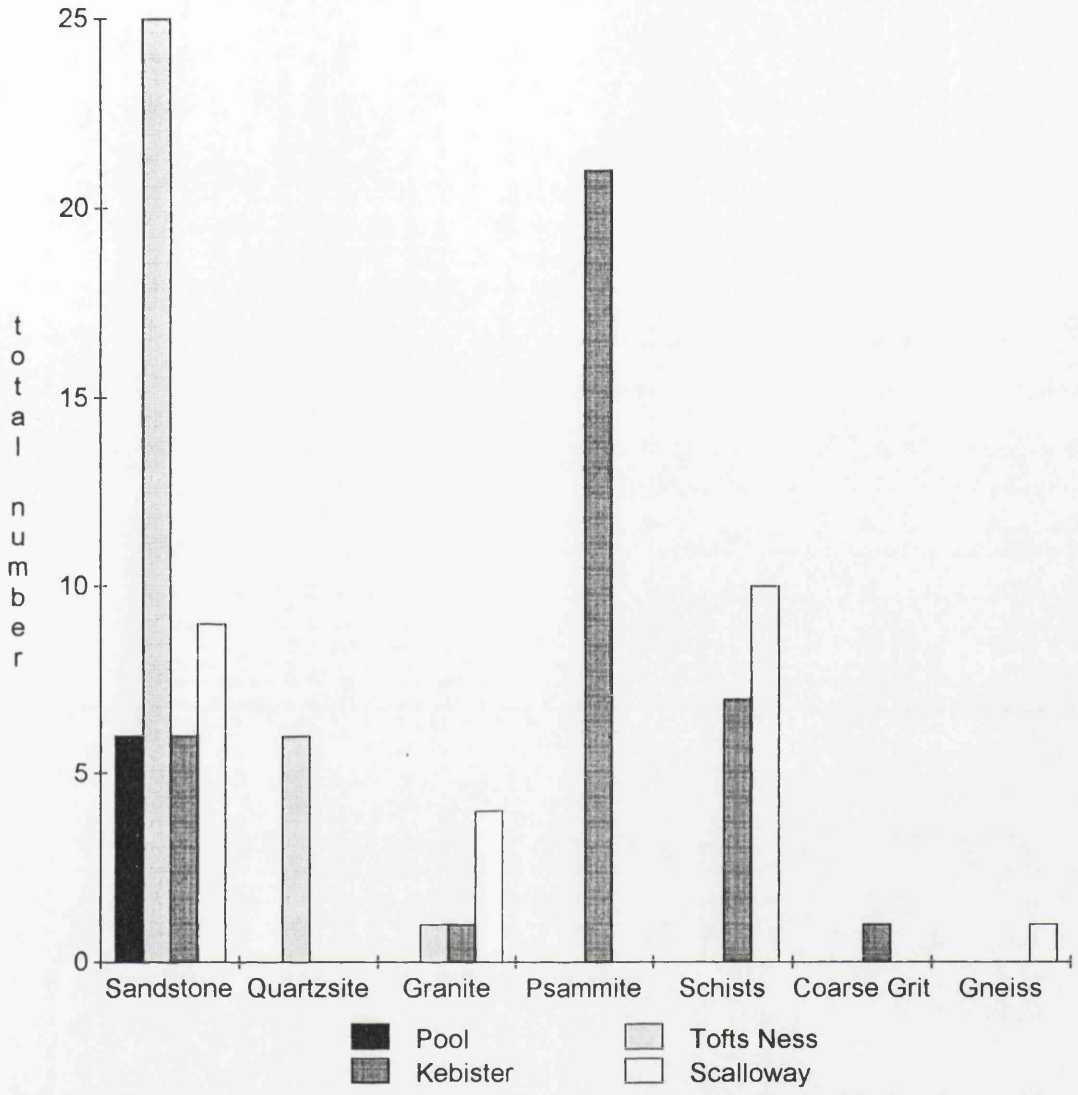

Figure 4.33 : Pounder/ grinders: raw materials, by site.

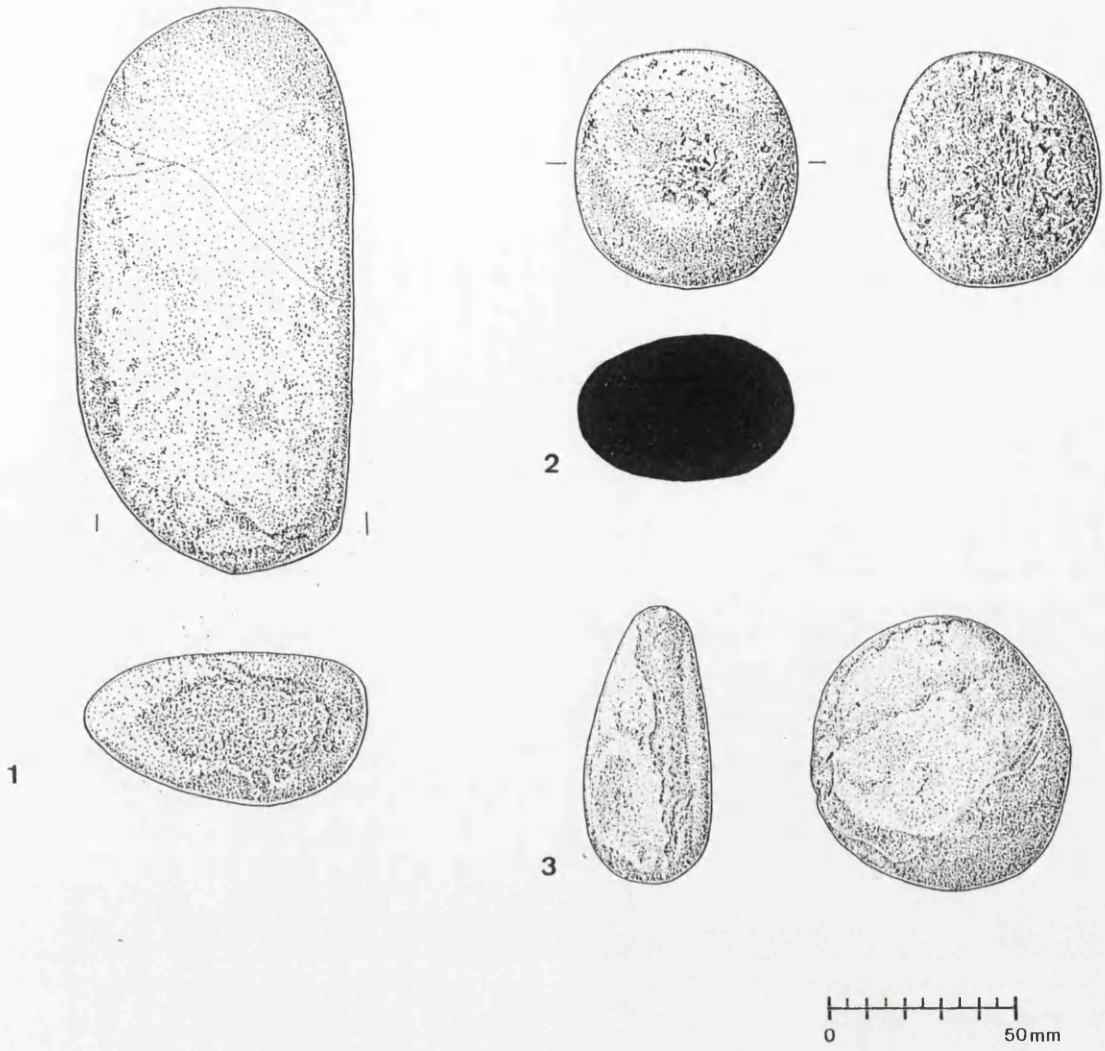

Figure 4.34 : 1 and 3 faceted cobbles, 2 facially pecked cobble. All from Pool.

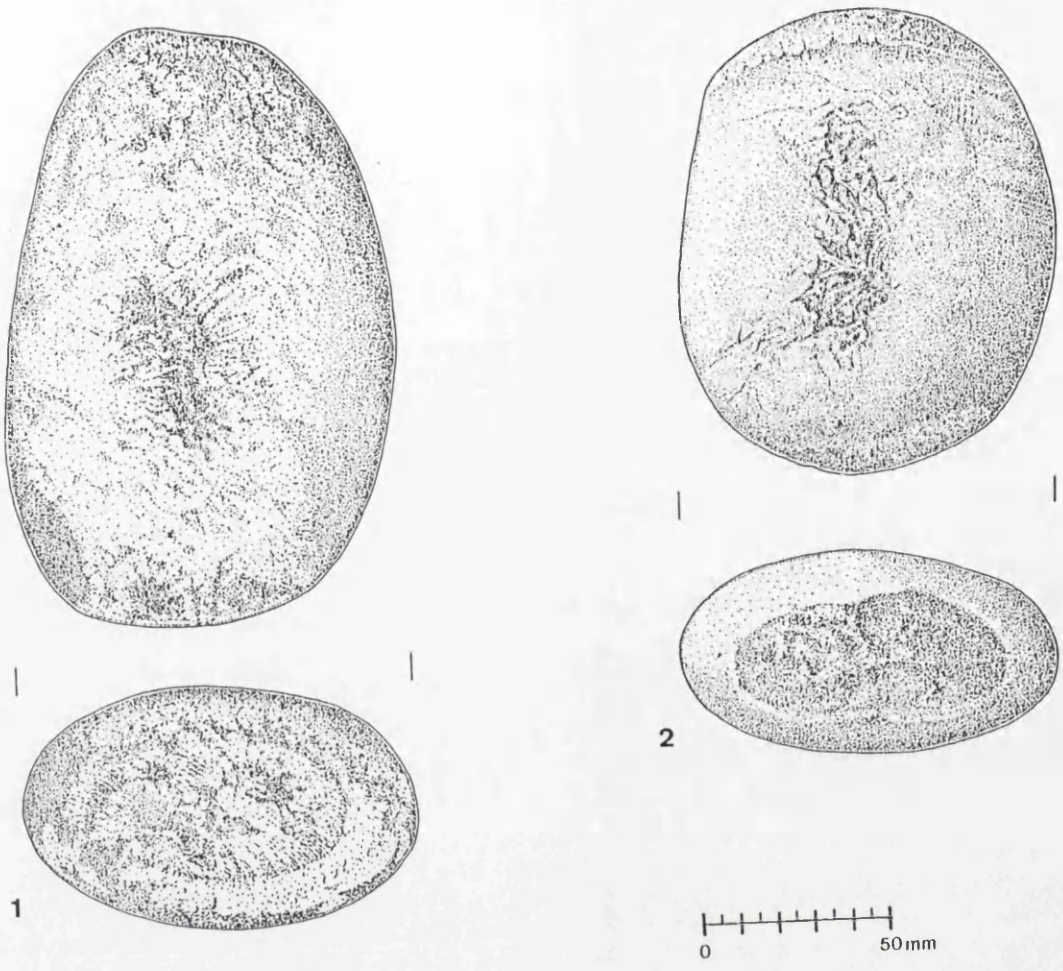

Figure 4.35 : Faceted and facially pecked cobbles from Pool.

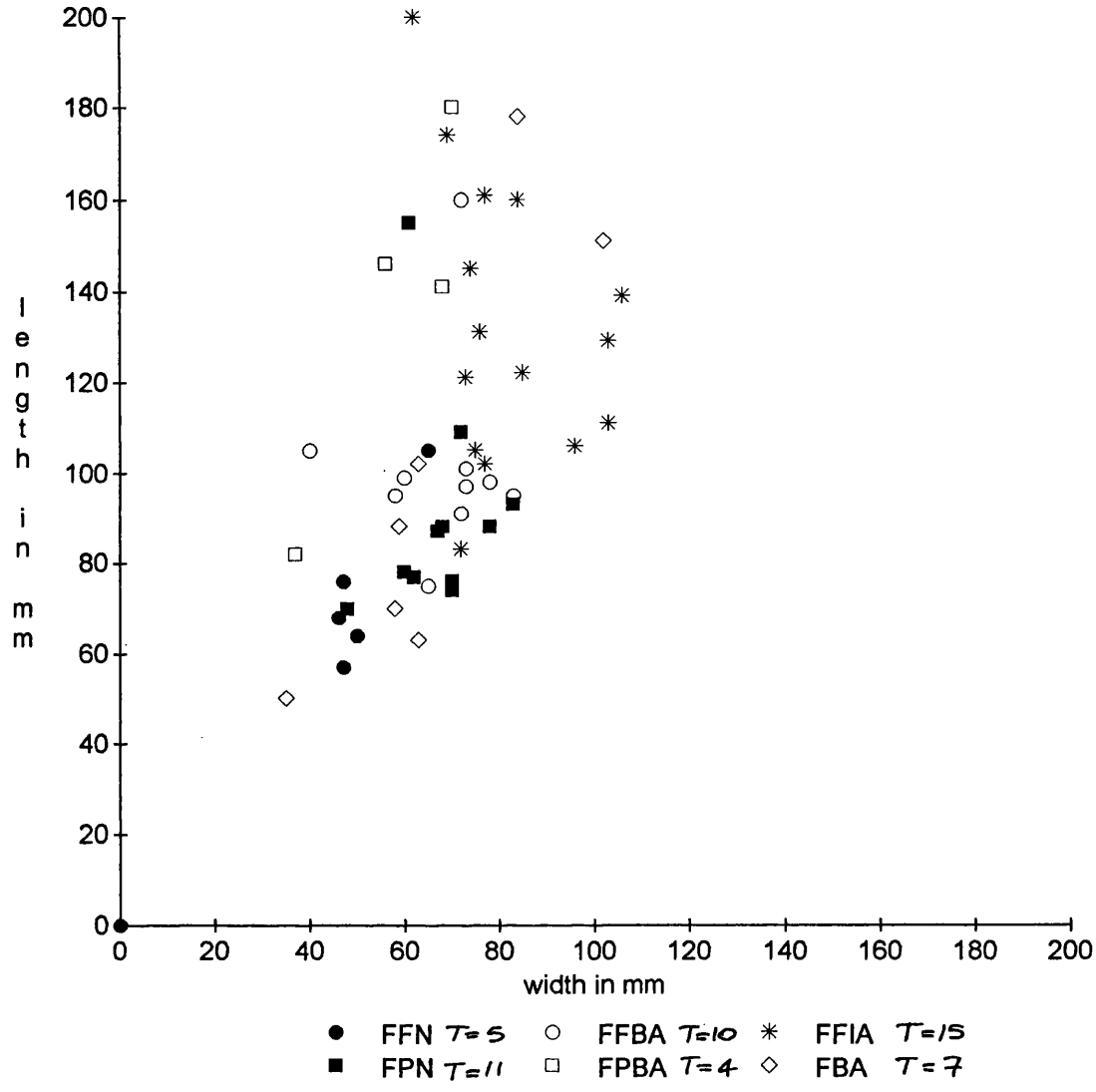

Figure 4.36 : Dimensions of faceted (F), facially pecked (FP) and combination (FF) cobbles from neolithic (N), bronze age (BA) and iron age (IA) phases at Tofts Ness.

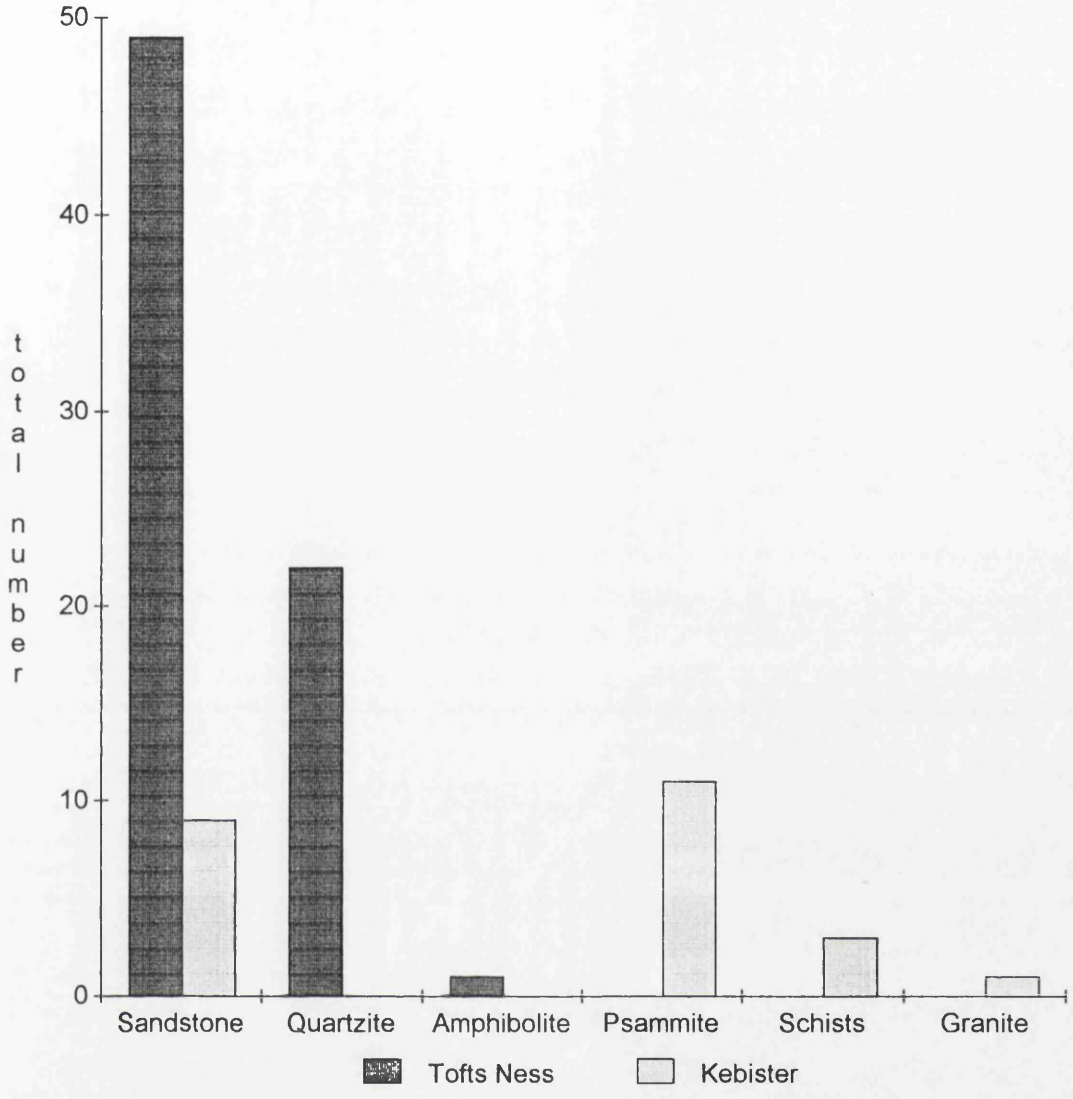

Figure 4.37 : Faceted, facially pecked and combination cobbles: raw materials, by site.

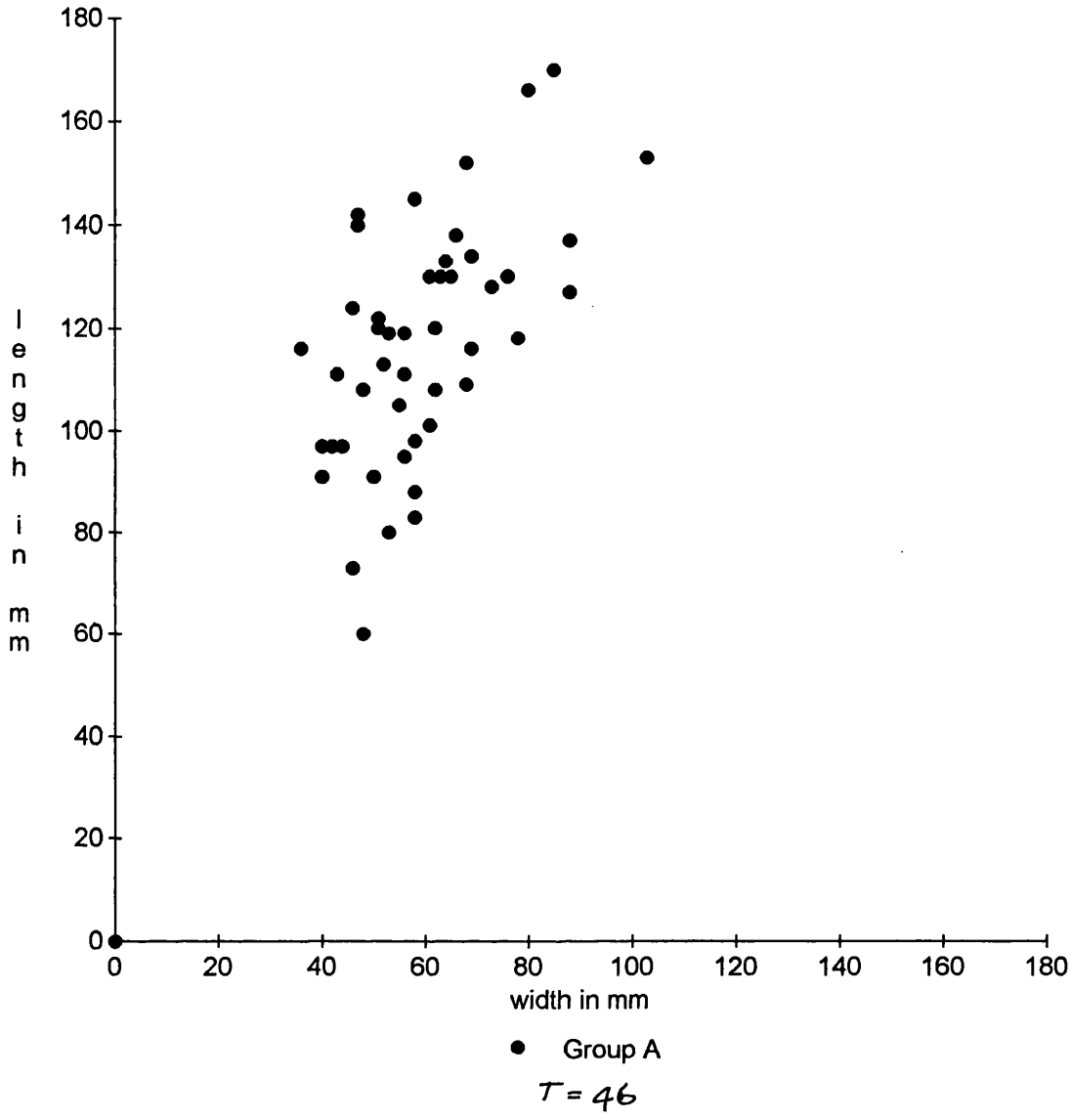

Figure 4.38 : Dimensions of Group A cobbles from Upper Scalloway.

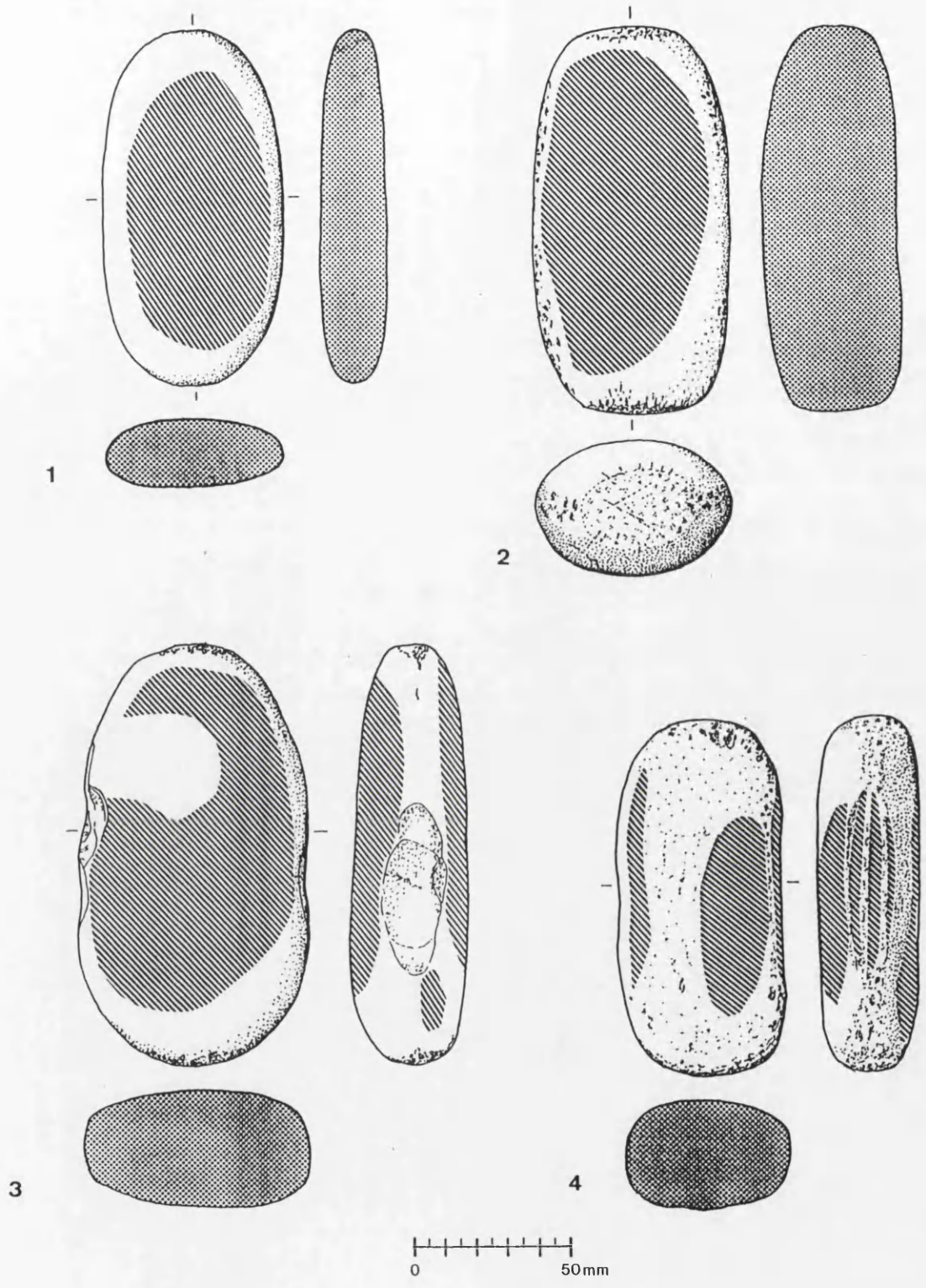

Figure 4.39 : Group A cobbles from Upper Scalloway.
Hatched areas indicate extent of gloss residue.

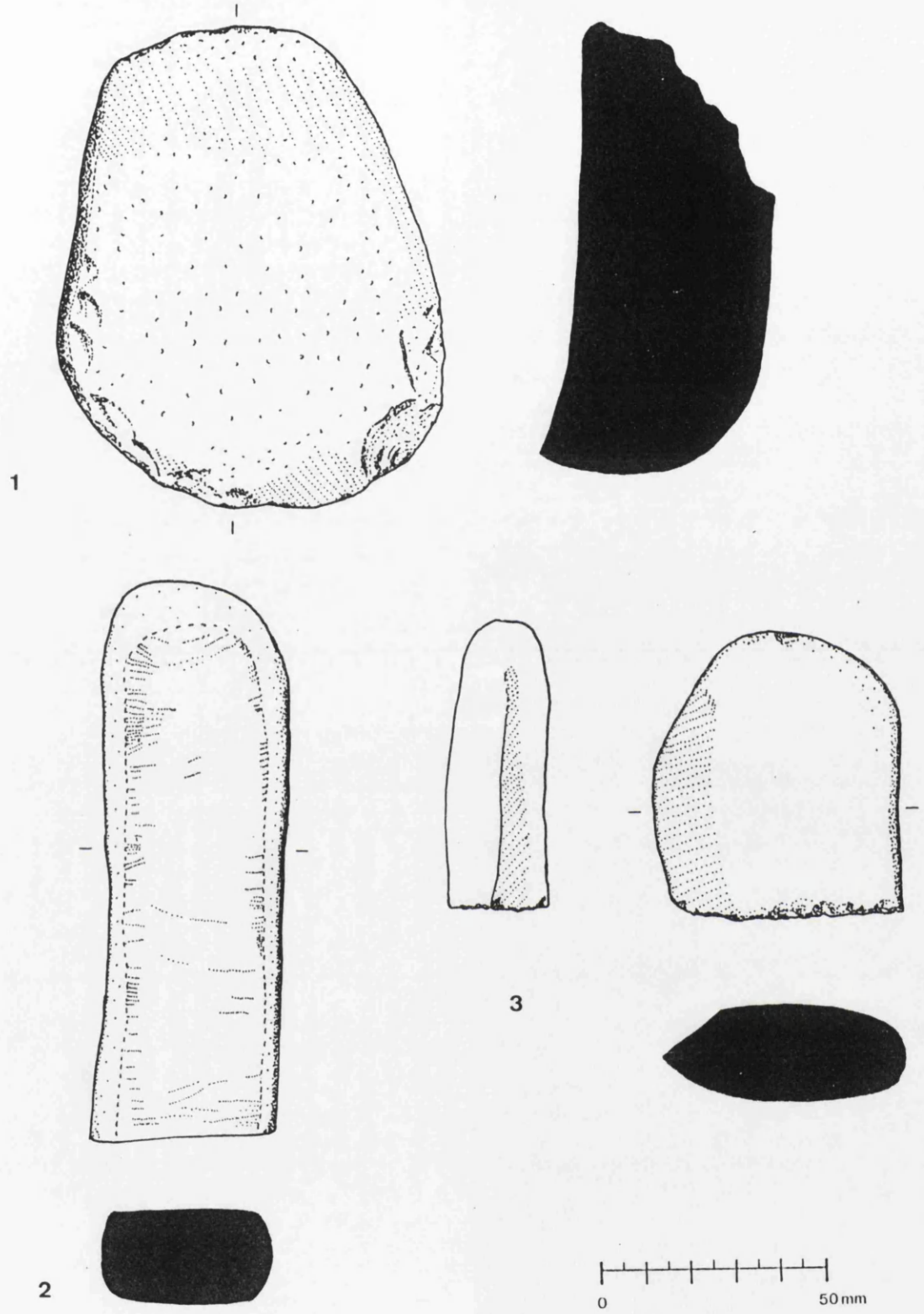

Figure 4.40 : Ground cobbles. All from Barnhouse.

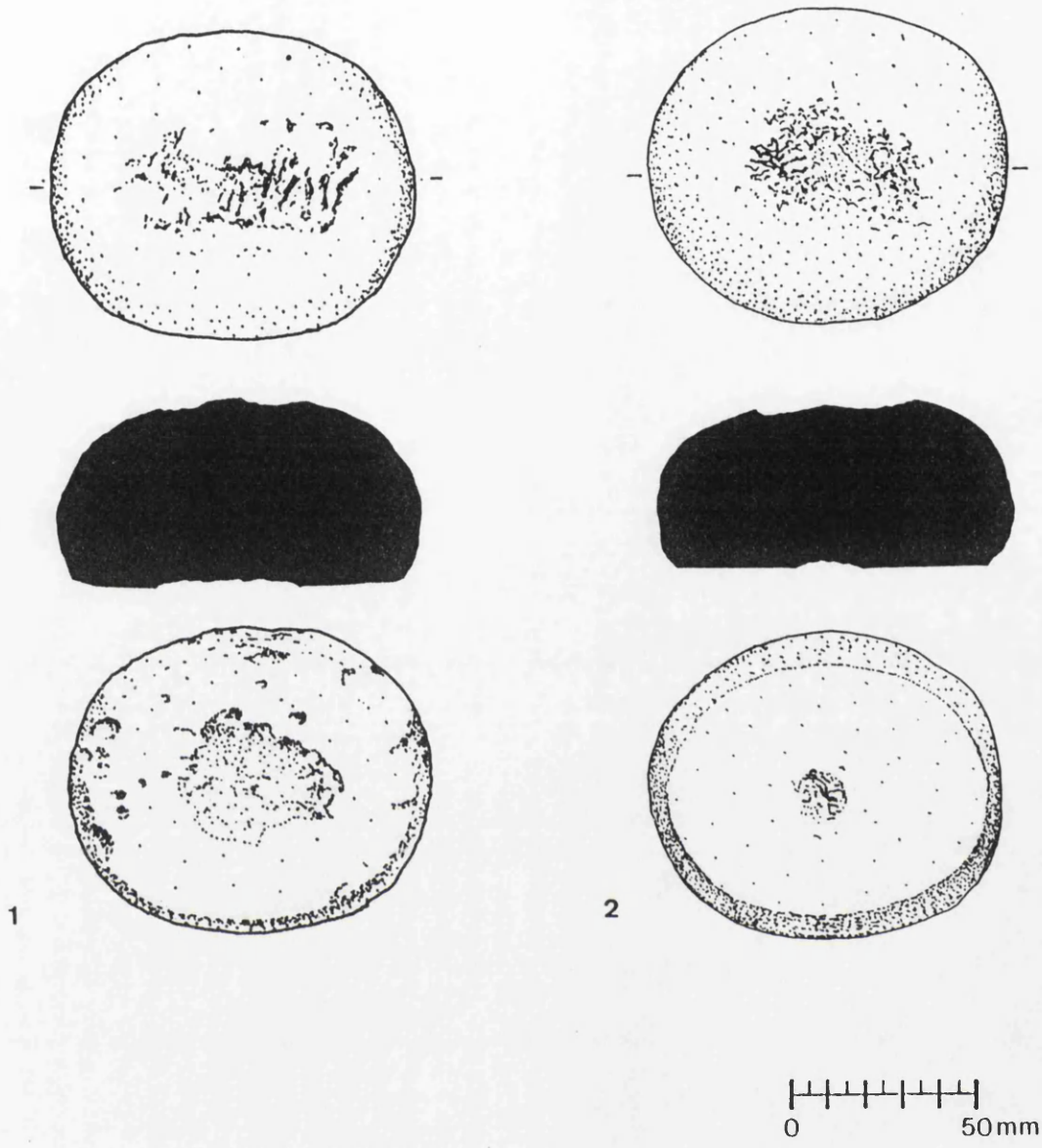

Figure 5.1 : Grinders from Knap of Howar. After Ritchie 1983, fig. 16.

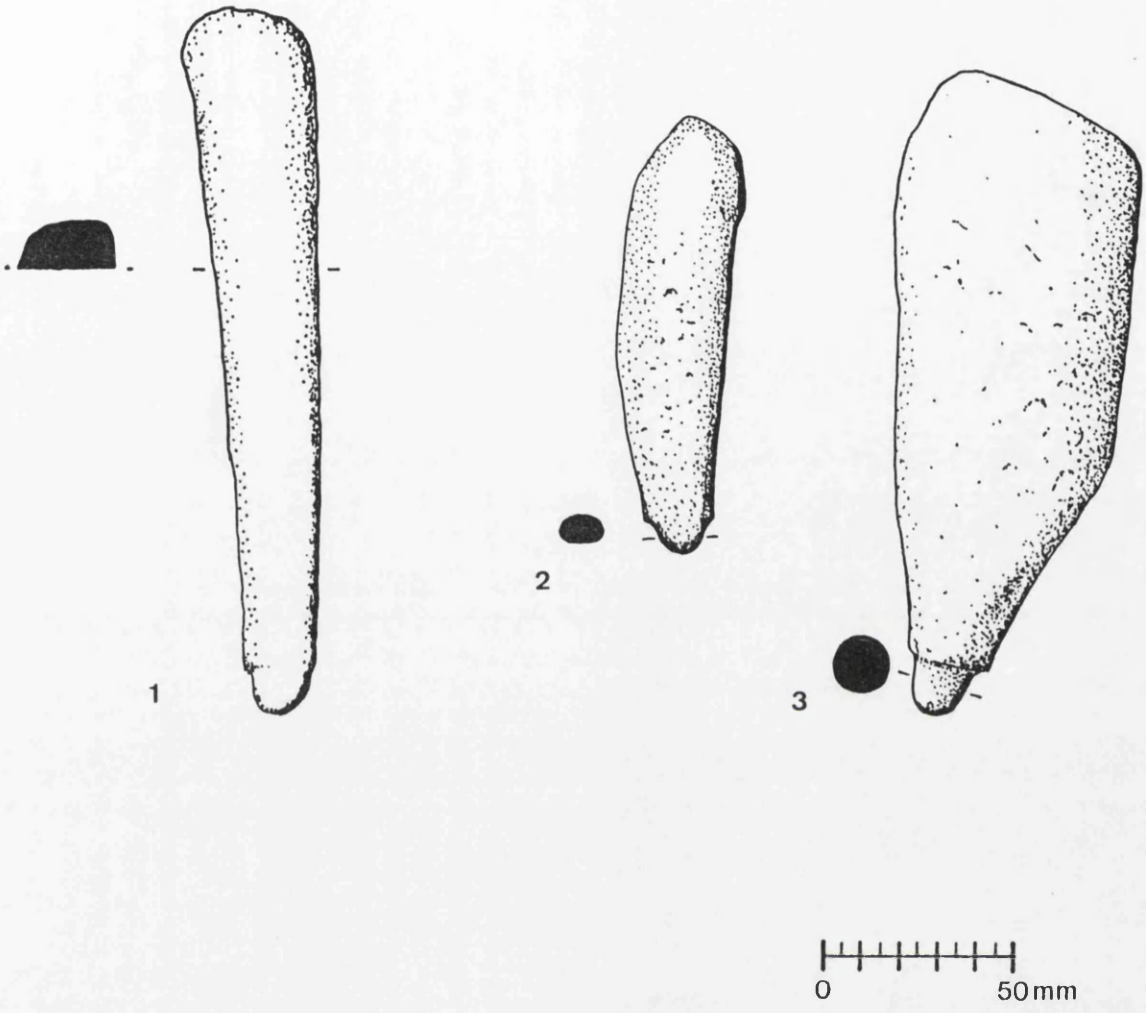

Figure 5.2 : Borers. 1 Pool, 2 and 3 Knap of Howar. 2 and 3 after Ritchie 1983, fig. 15.

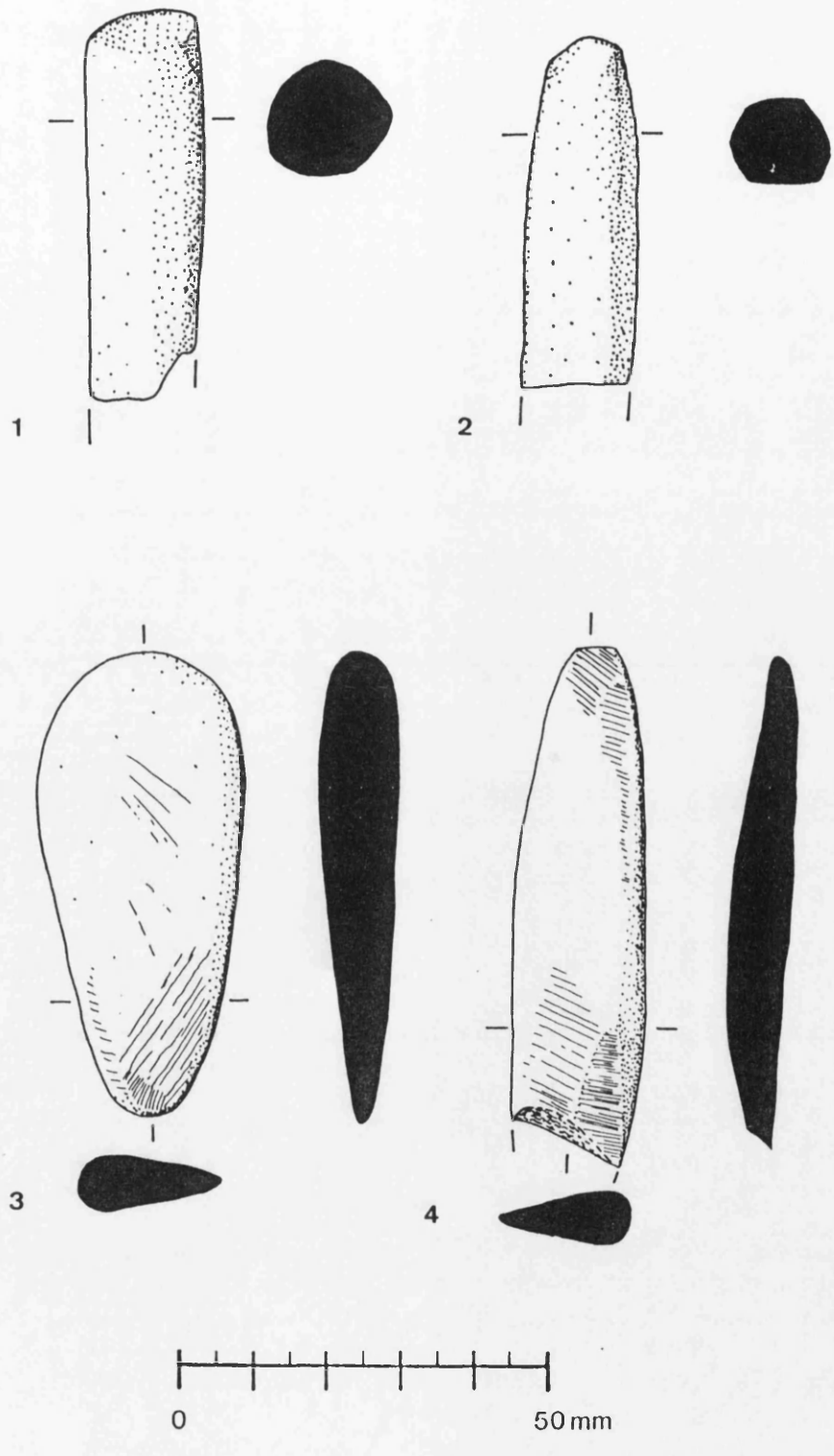

Figure 5.3 : Ground-end tools from Barnhouse.

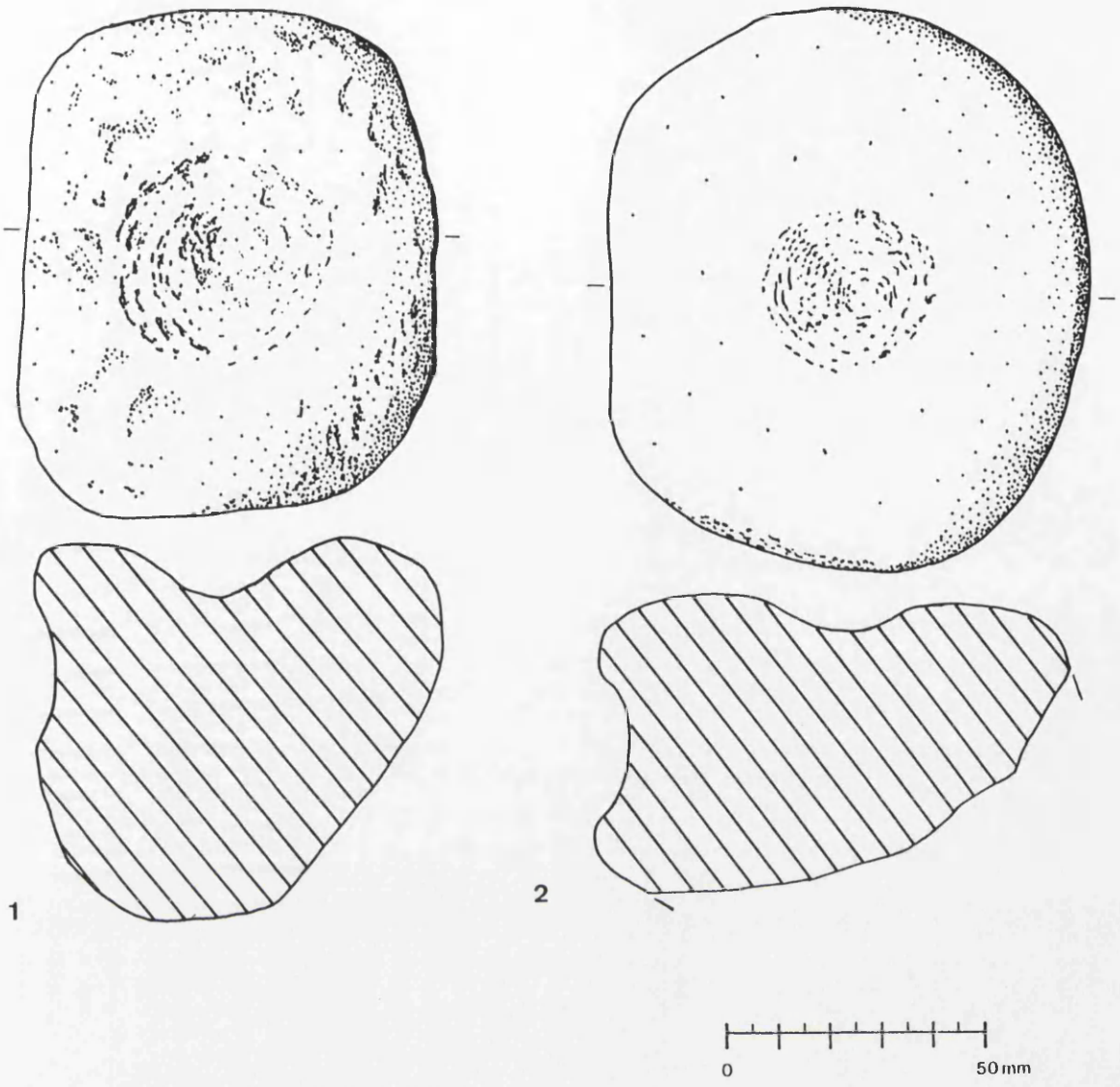

Figure 5.4 : Multi-hollowed cobbles from Barnhouse.

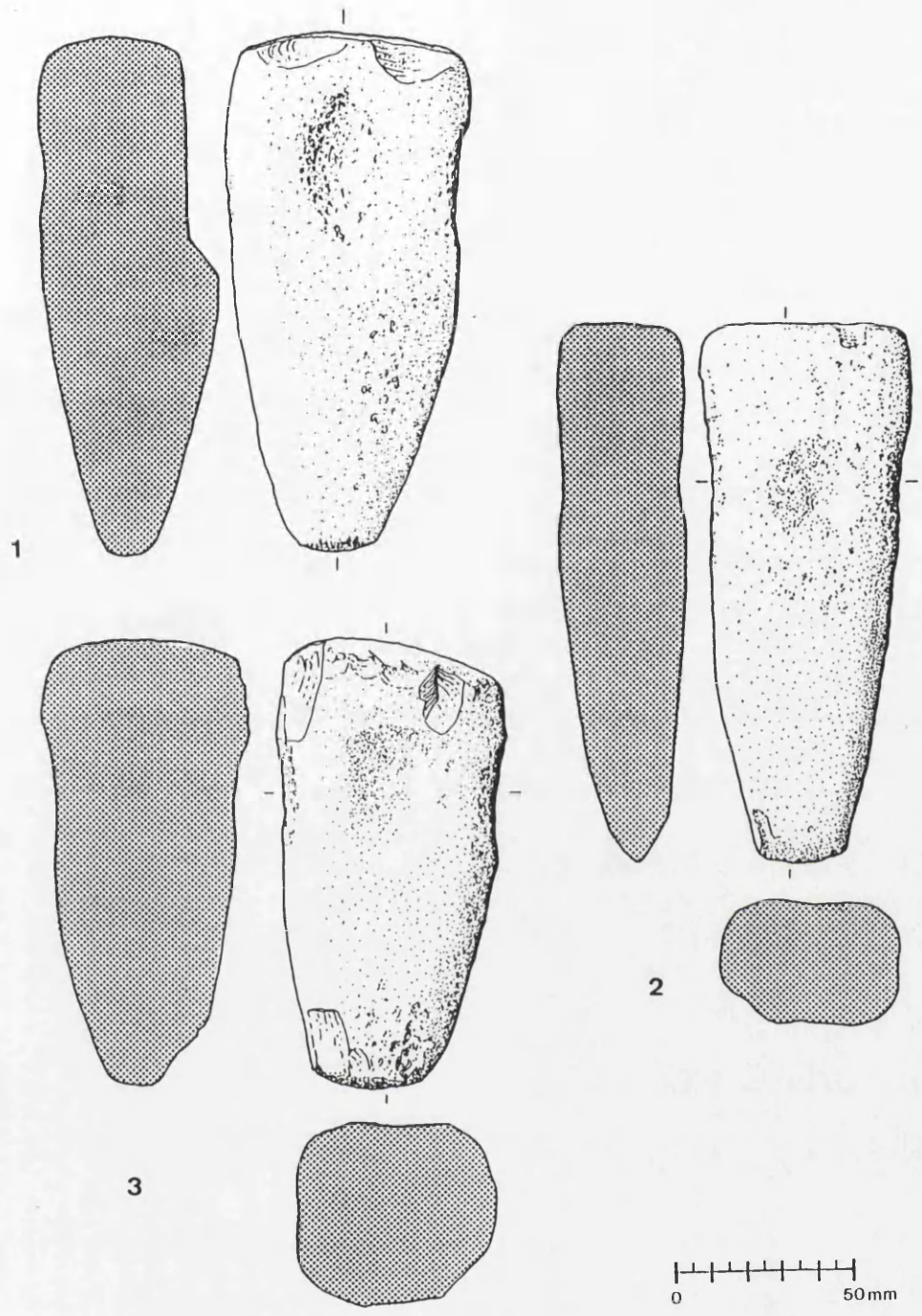

Figure 5.5 : Pestles from Upper Scalloway.

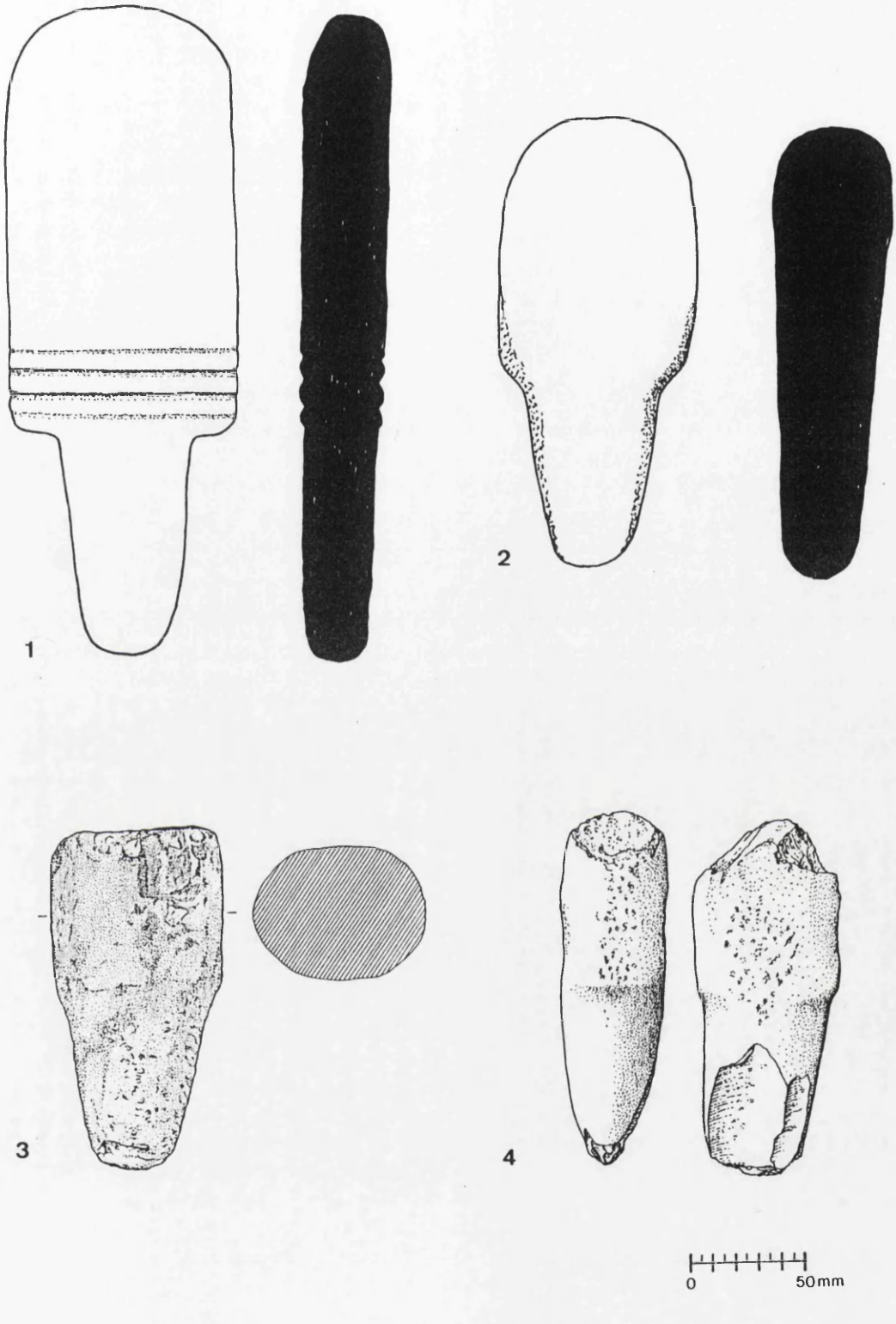

Figure 5.6 : Handled clubs. 1 Lerwick museum, 2 Sumburgh, 3 Kebister, 4 Upper Scalloway.

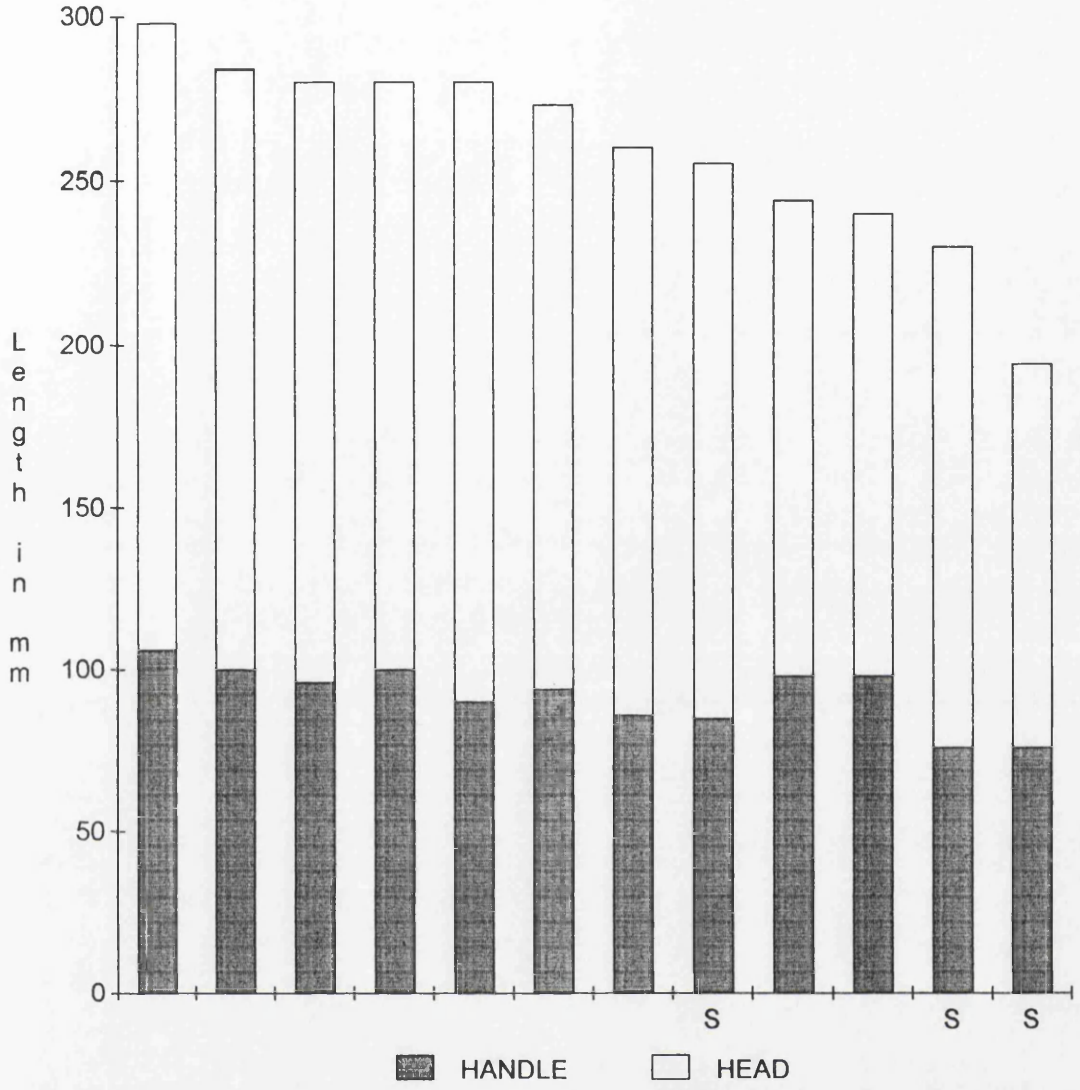

Figure 5.7 : Lengths of complete handled clubs. S = those from Sumburgh, the rest are from Lerwick Museum.

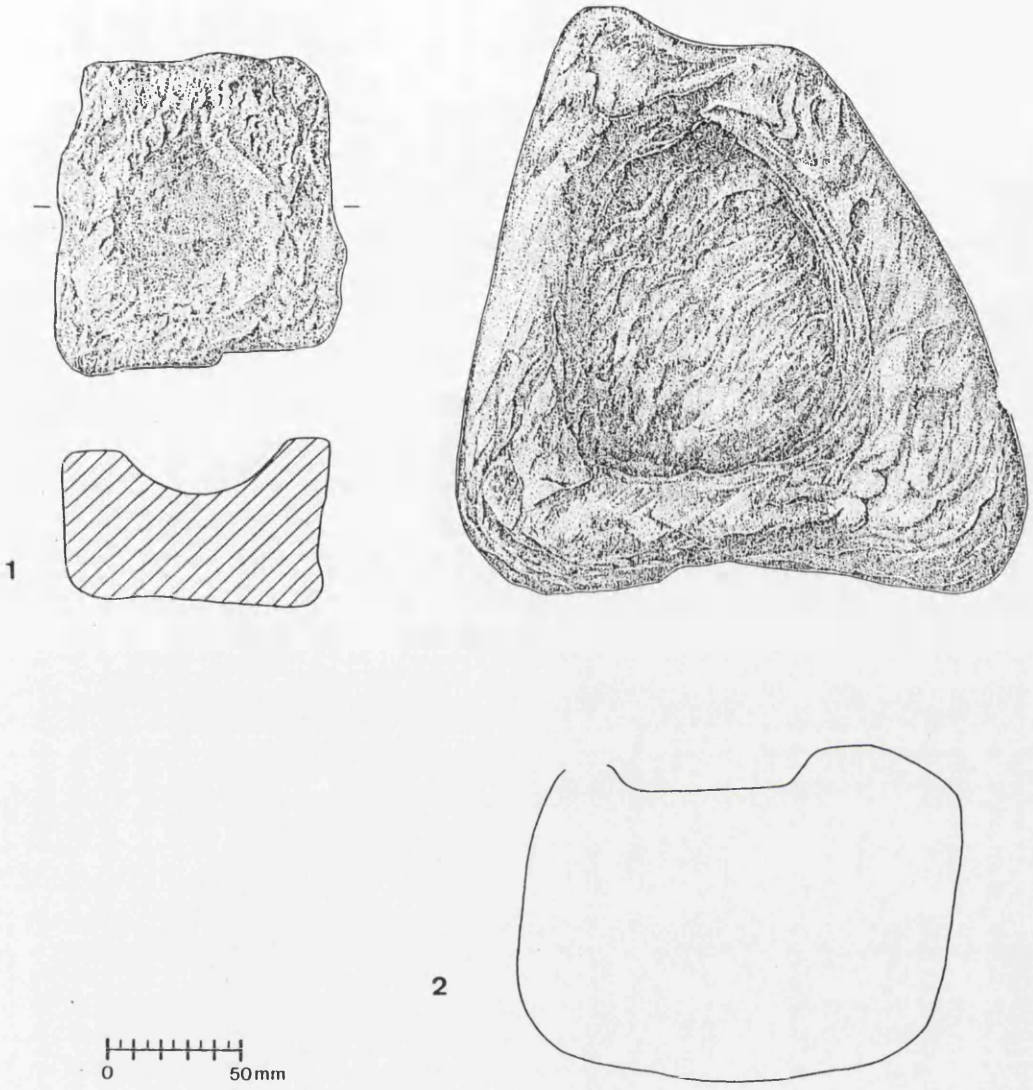

Figure 5.8 : Hollowed stones. 1 neolithic Pool, 2 iron age Pool.

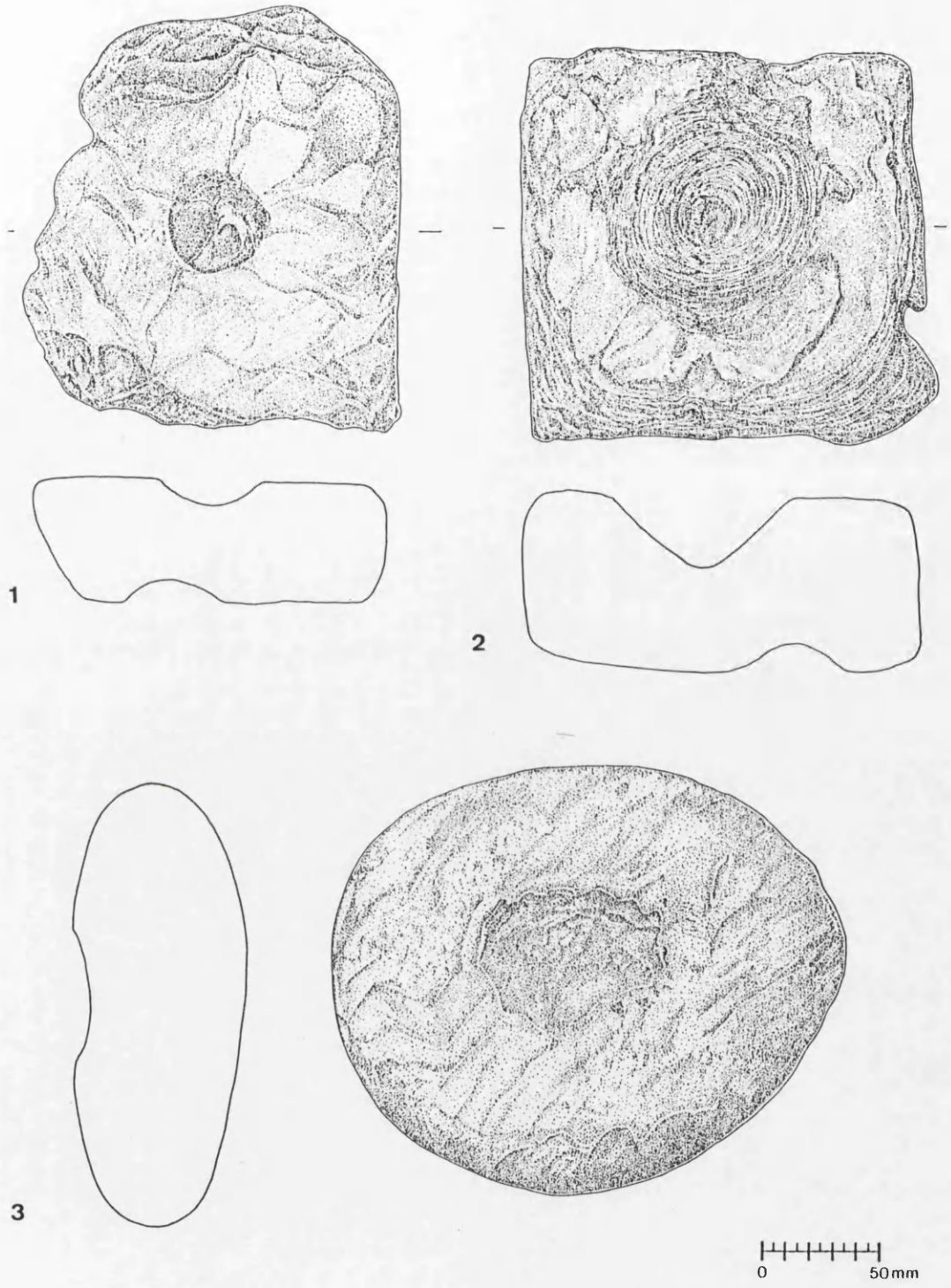

Figure 5.9 : Hollowed stones from iron age Pool.

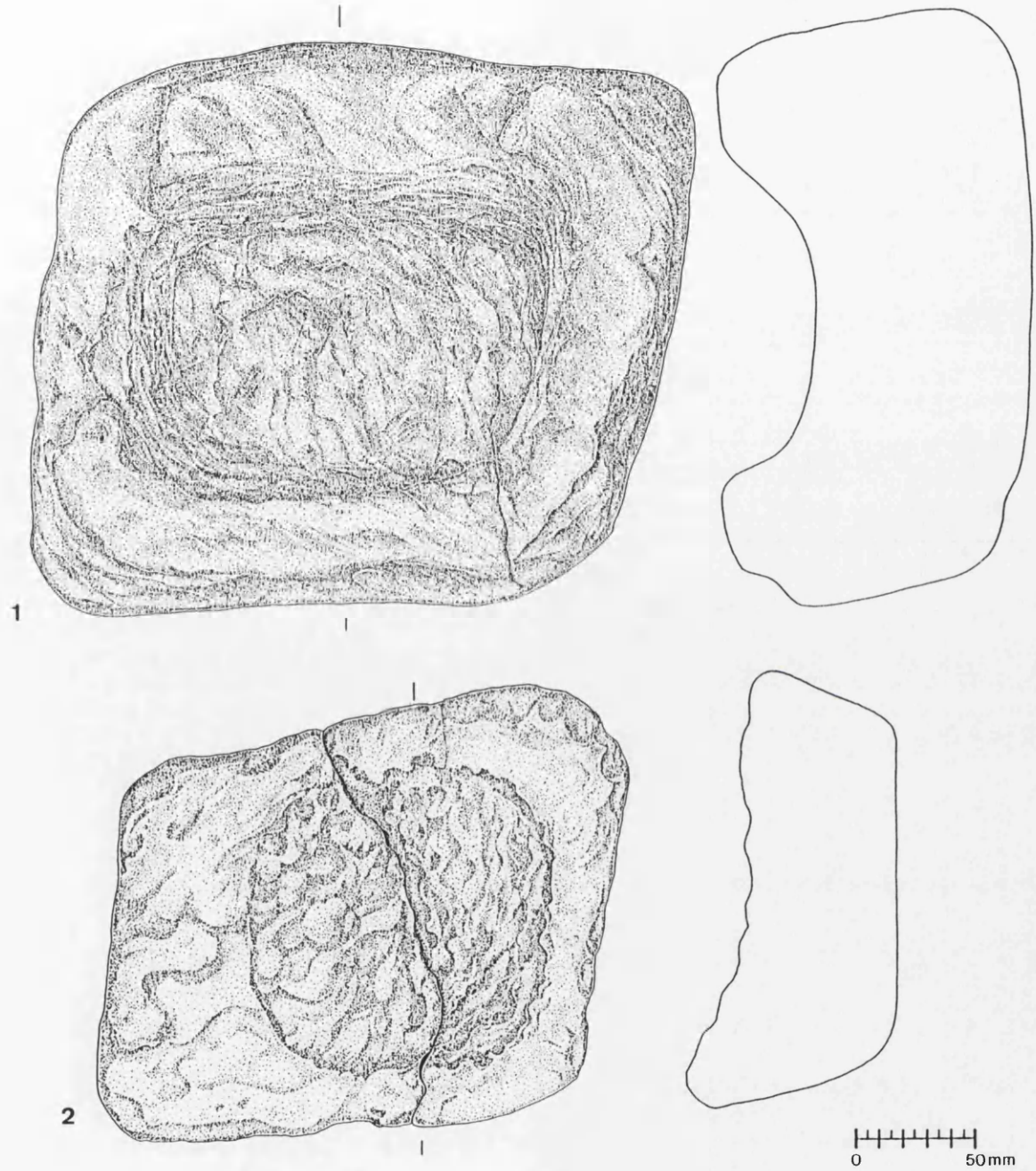

Figure 5.10 : Hollowed stones from iron age Pool.

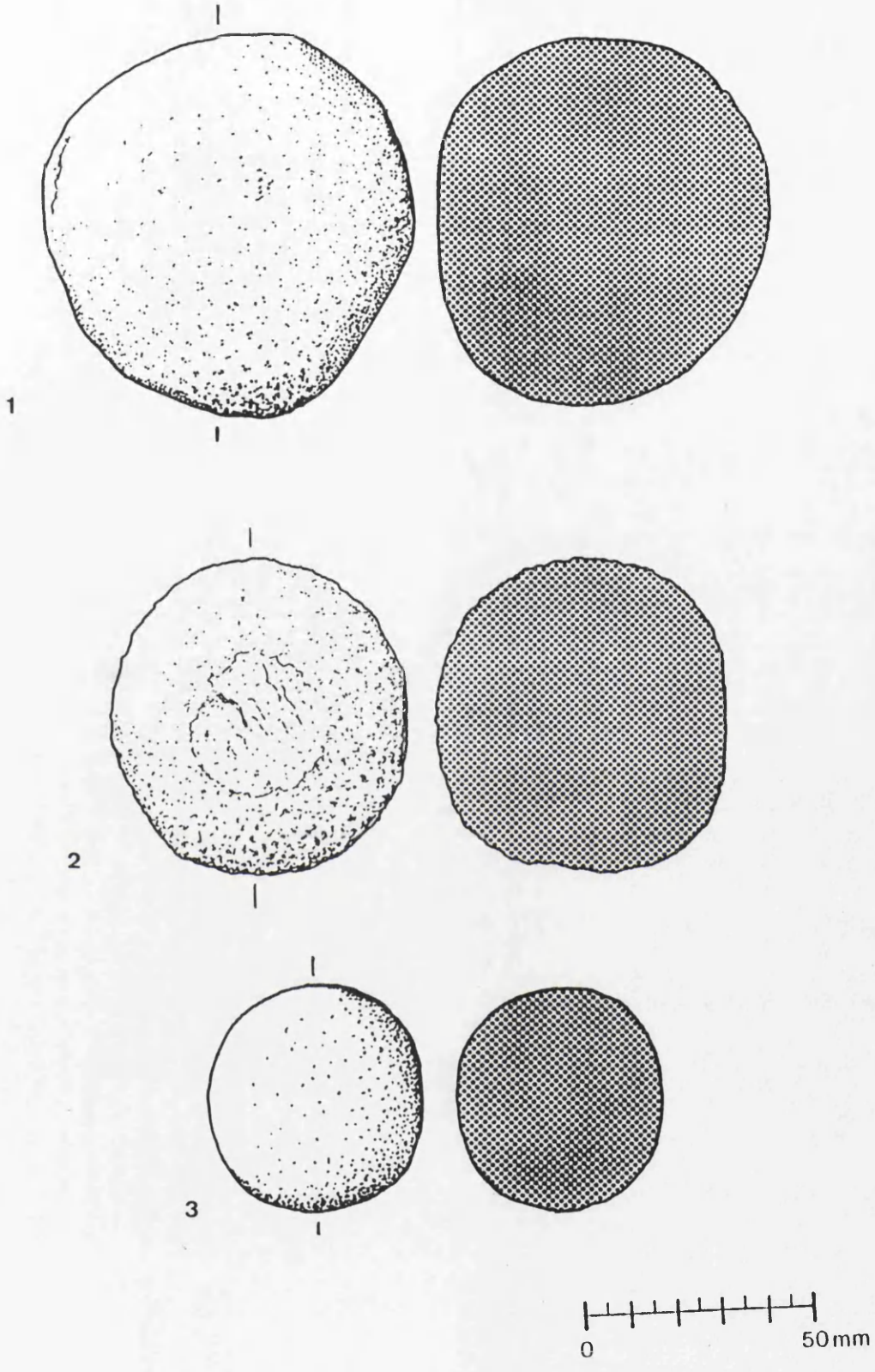

Figure 5.11 : Stone balls from Upper Scalloway.

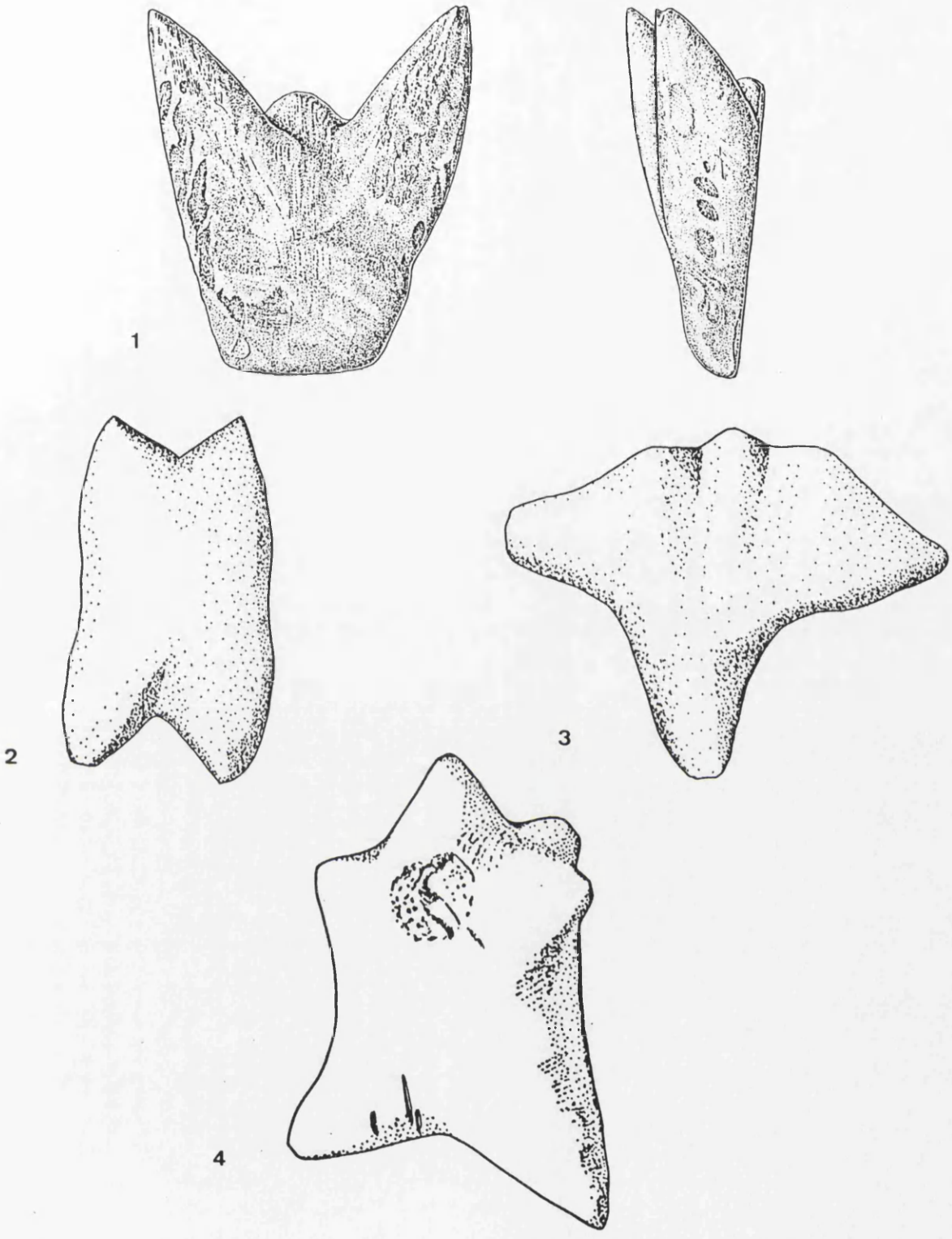

Figure 5.12 : Sculpted objects. 1 and 4 from Pool, scale 7:10. 2 and 3 from Quoyness, scale 1:2 (after Henshall 1963).

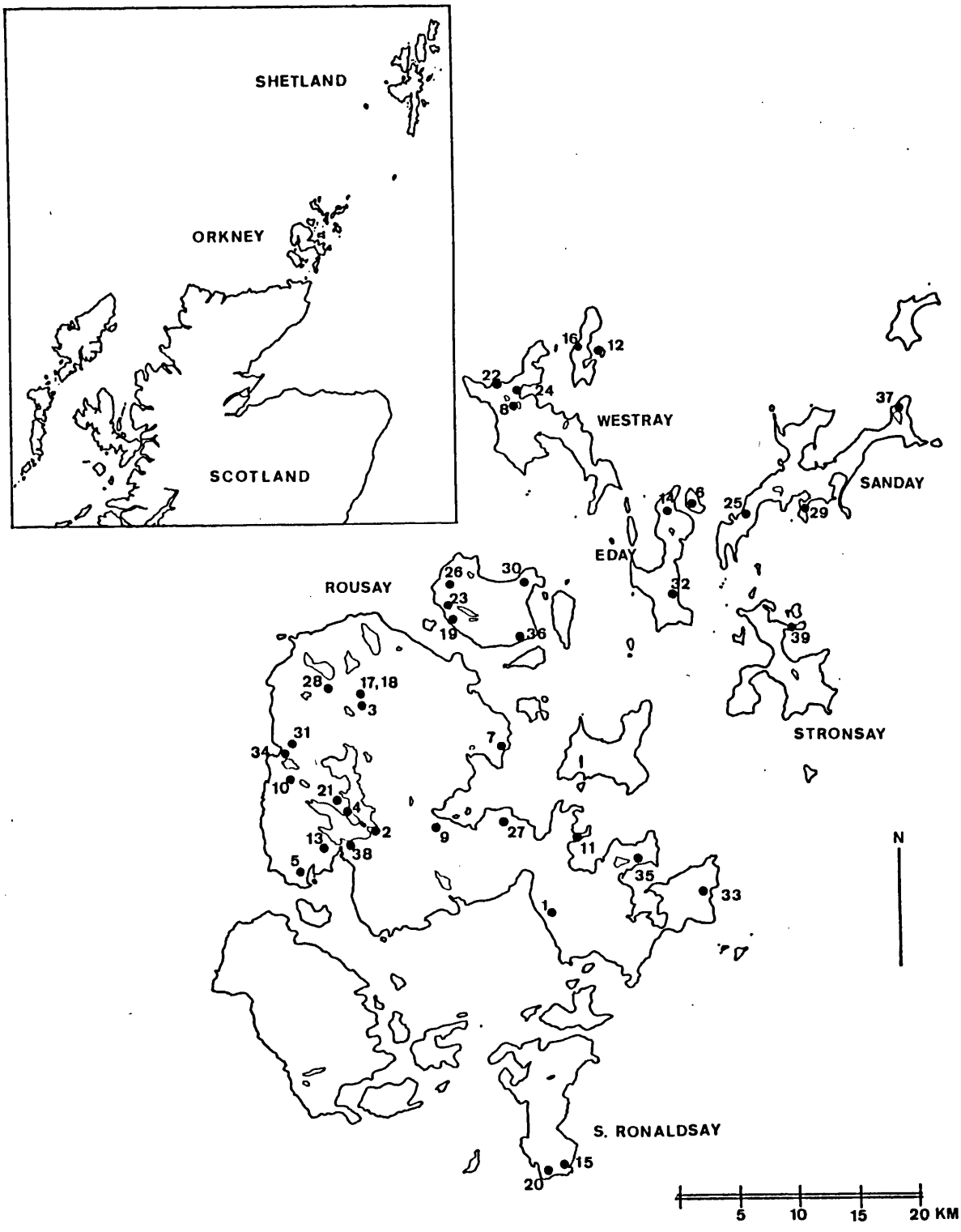

Figure 6.1 : Location of sites mentioned in the text. Key is on following page.

KEY FOR FIGURE 6.1

x domestic contexts
* funereal contexts

1. * Backakeldy, Holm
2. x Barnhouse, Stenness
3. x Beaquoy, Birsay and Harray
4. * Bookan, Sandwick
5. x Bu, Stromness
6. x Calf of Eday, Eday
7. * Castle, Rendall
8. * Corquoy Hill (Ork34), Westray
9. * Cuween Hill (Ork12), Firth
10. * Gyron Hill, Sandwick
11. * Holland, St Ola
12. * Holm of Papa Westray N (Ork21), Papa Westray
13. x Howe, Stromness
14. * Huntersquoy (Ork23), Eday
15. * Isbister (Ork25), S Ronaldsay
16. x Knap of Howar, Papa Westray
17. * Knowes of Cuean, Birsay and Harray
18. * Knowes of Quoyscottie, Birsay and Harray
19. * Knowe of Rowiegar (Ork31), Rousay
20. x Liddle, S Ronaldsay
21. * Linga Fold, Sandwick
22. x Links of Noltand, Westray
23. * Midhowe (Ork37), Rousay
24. x Pierowall Quarry, Westray
25. x Pool, Sanday
26. * Quandale, Rousay
27. *x Quanterness (Ork43), Kirkwall
28. * Queenafjold, Birsay and Harray
29. * Quoyness (Ork44), Sanday
30. x Rinyo, Rousay
31. * Sandfiold, Sandwick
32. * Sandhill Smithy (Ork47), Eday
33. x Skaill, Deerness
34. x Skara Brae, Sandwick
35. * (?Waterhall), St Andrews
36. * Taversoe Tuick (Ork49), Rousay
37. x Tofts Ness, Sanday
38. * Unstan (Ork51), Stenness
39. * Whitehall, Stronsay

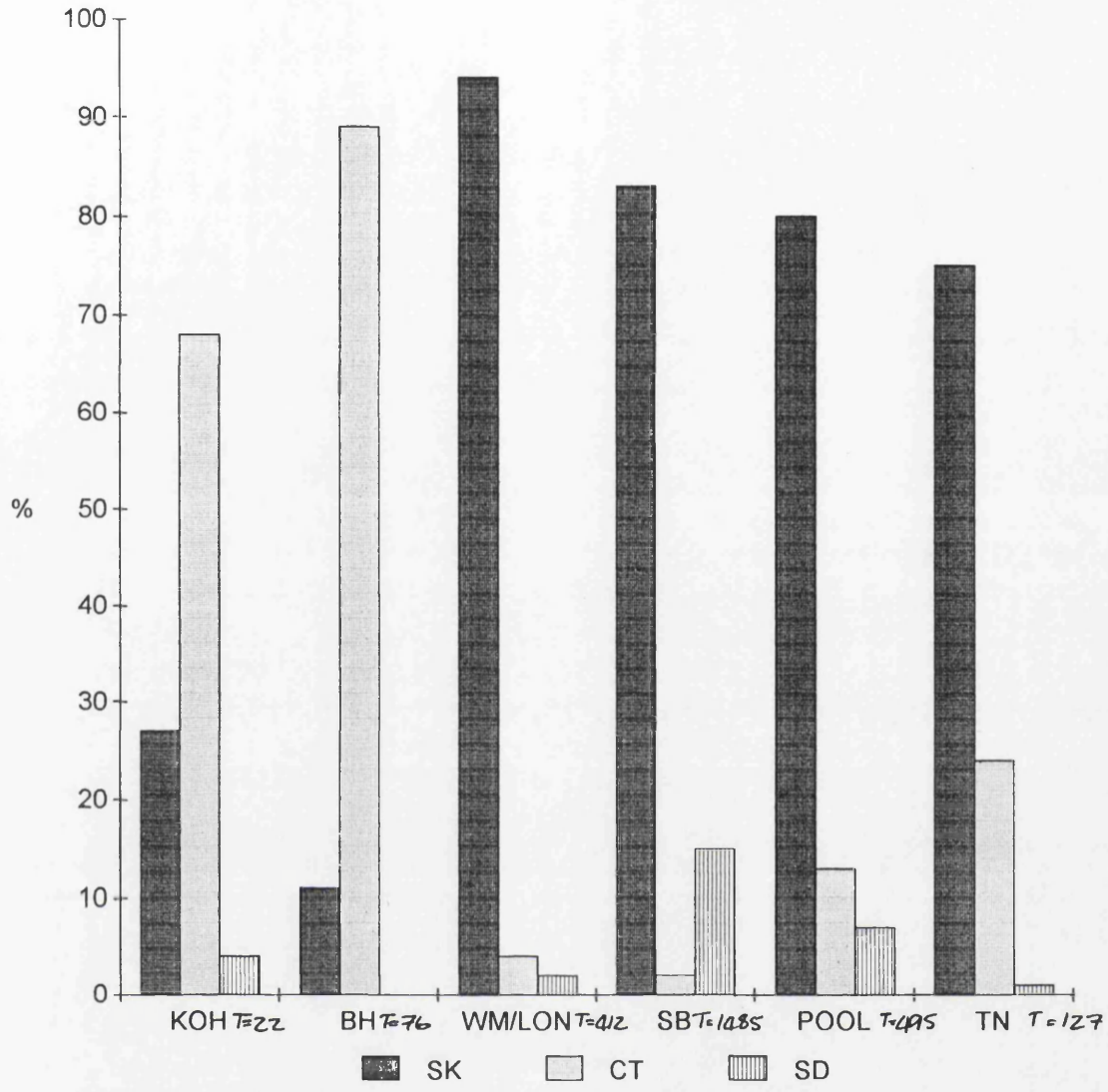

Figure 6.2 : Orkney neolithic: frequency of skaill knives, cobble tools and stone discs.

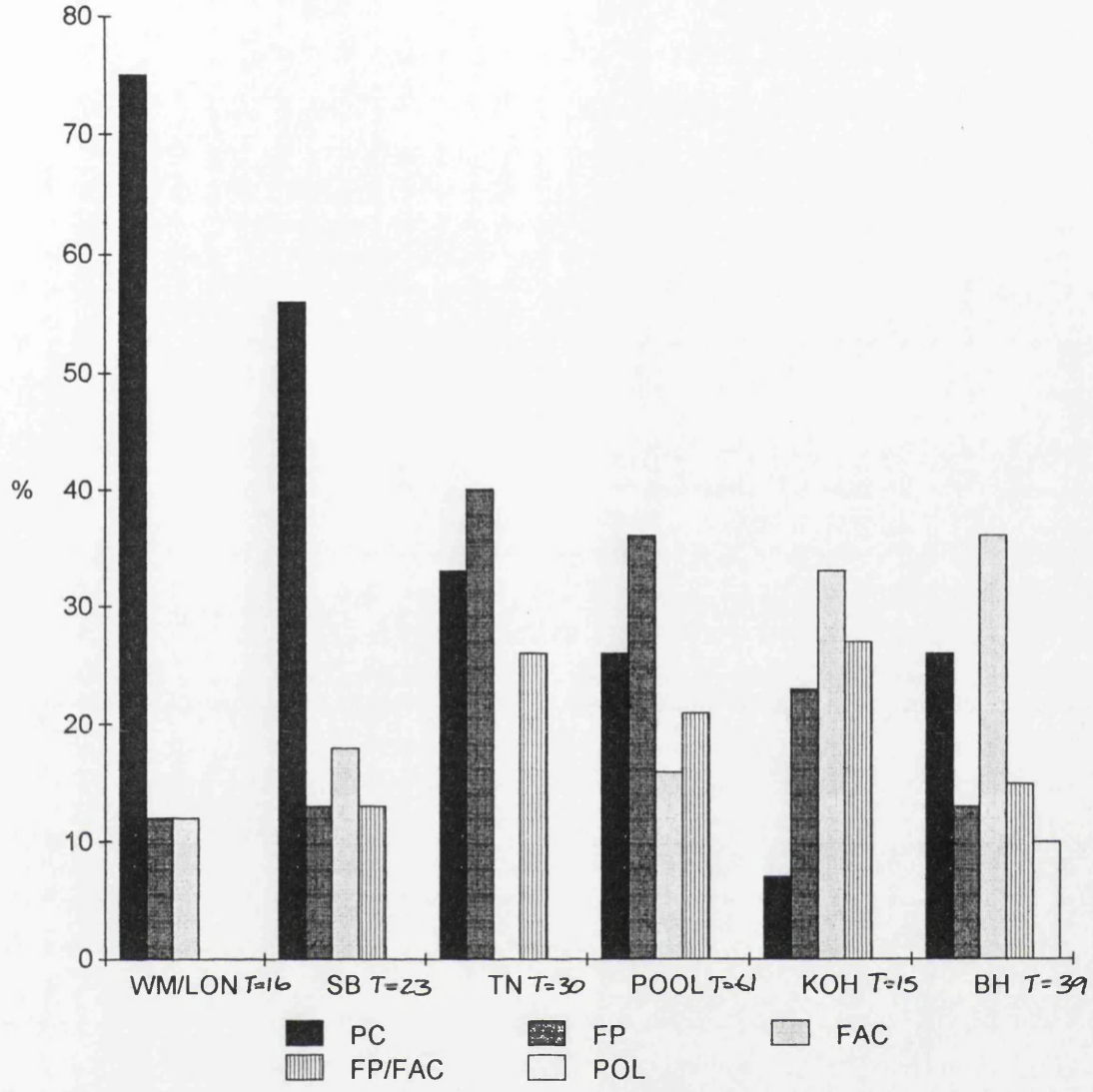

Figure 6.3 : Orkney neolithic: cobble tool types, by site.

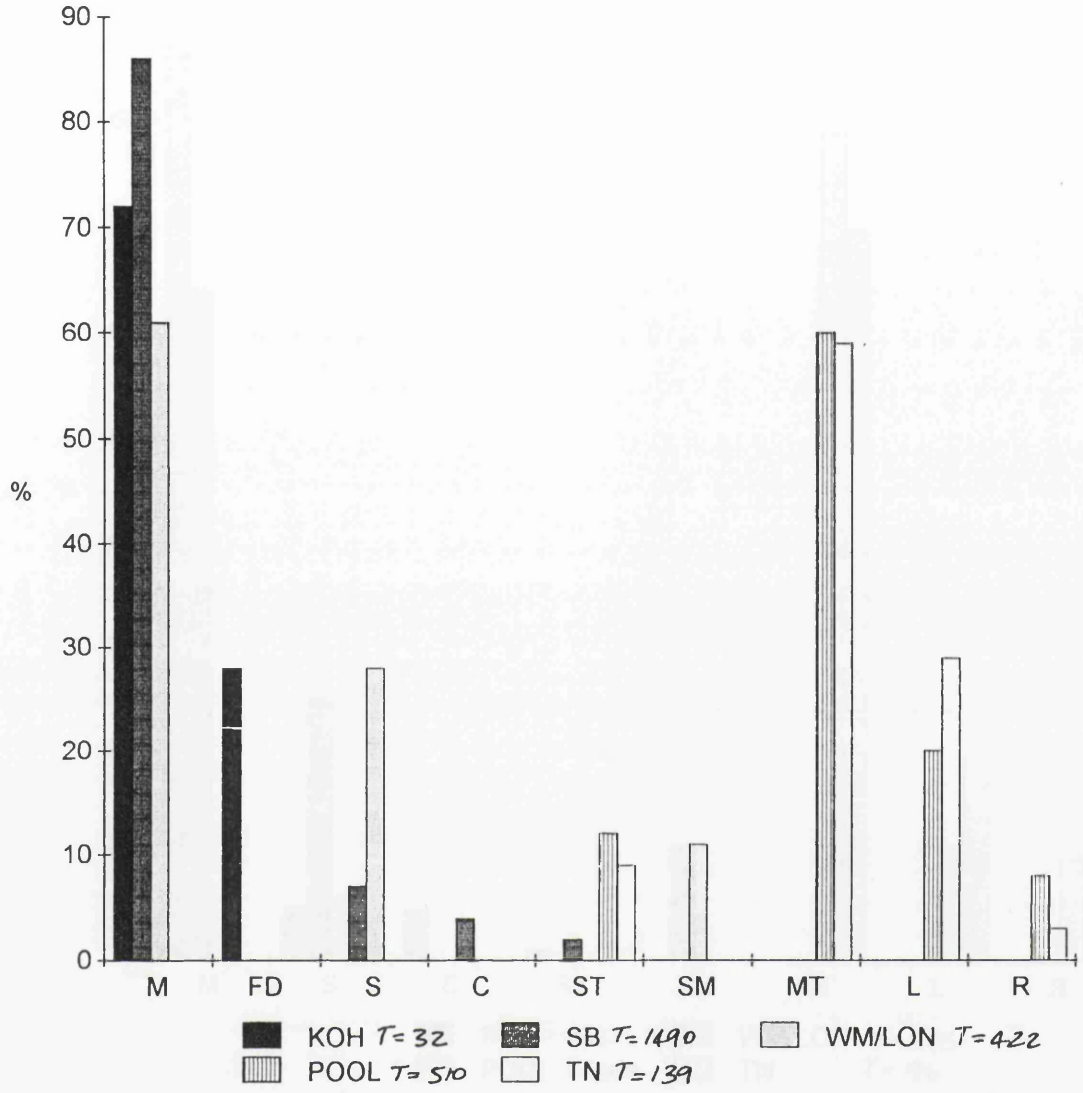

Figure 6.4 : Orkney neolithic: total assemblage, by context.

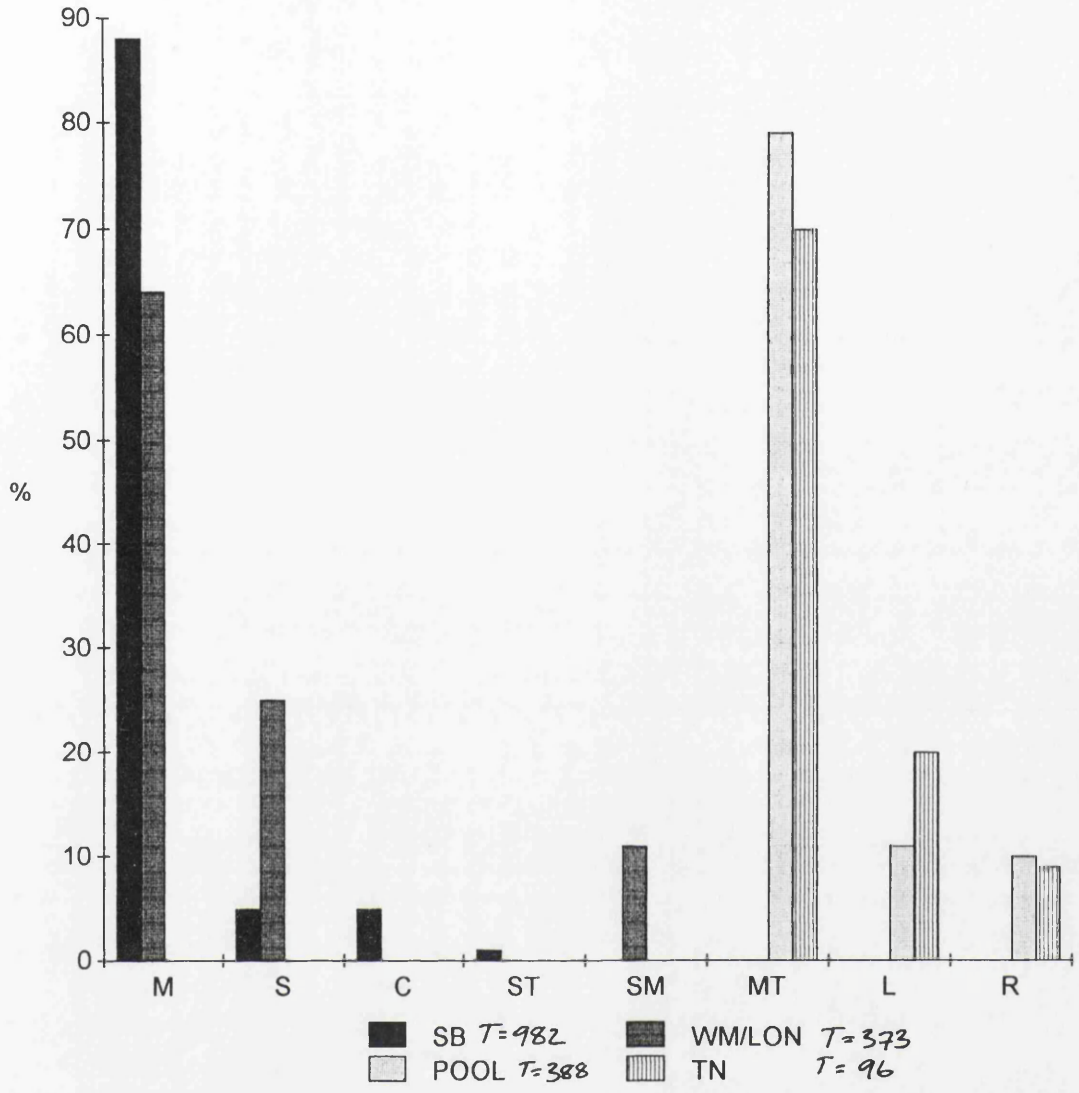

Figure 6.5 : Orkney neolithic: Skaill knives by context.

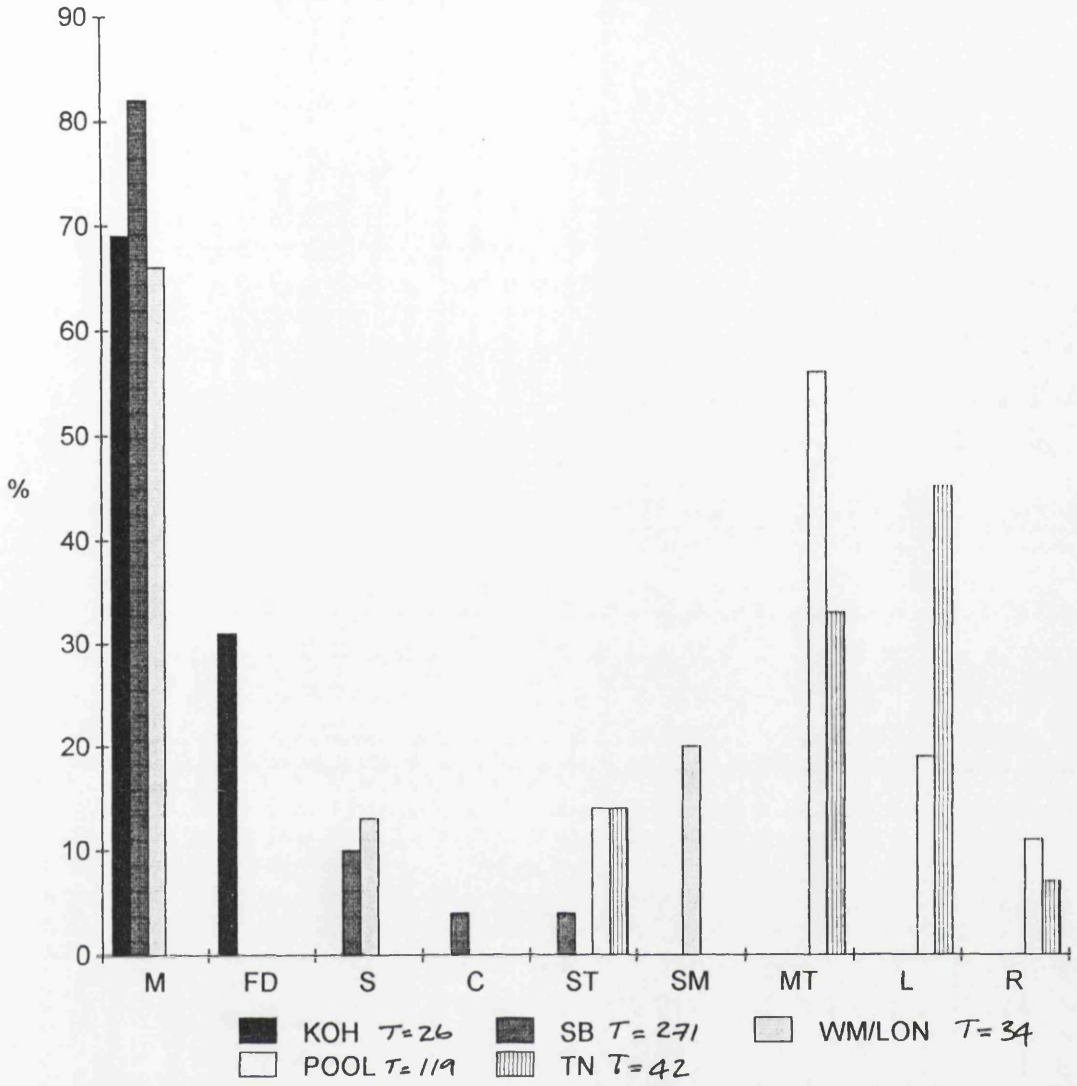

Figure 6.6 : Orkney neolithic: total artefacts, other than Skaill knives, by context.

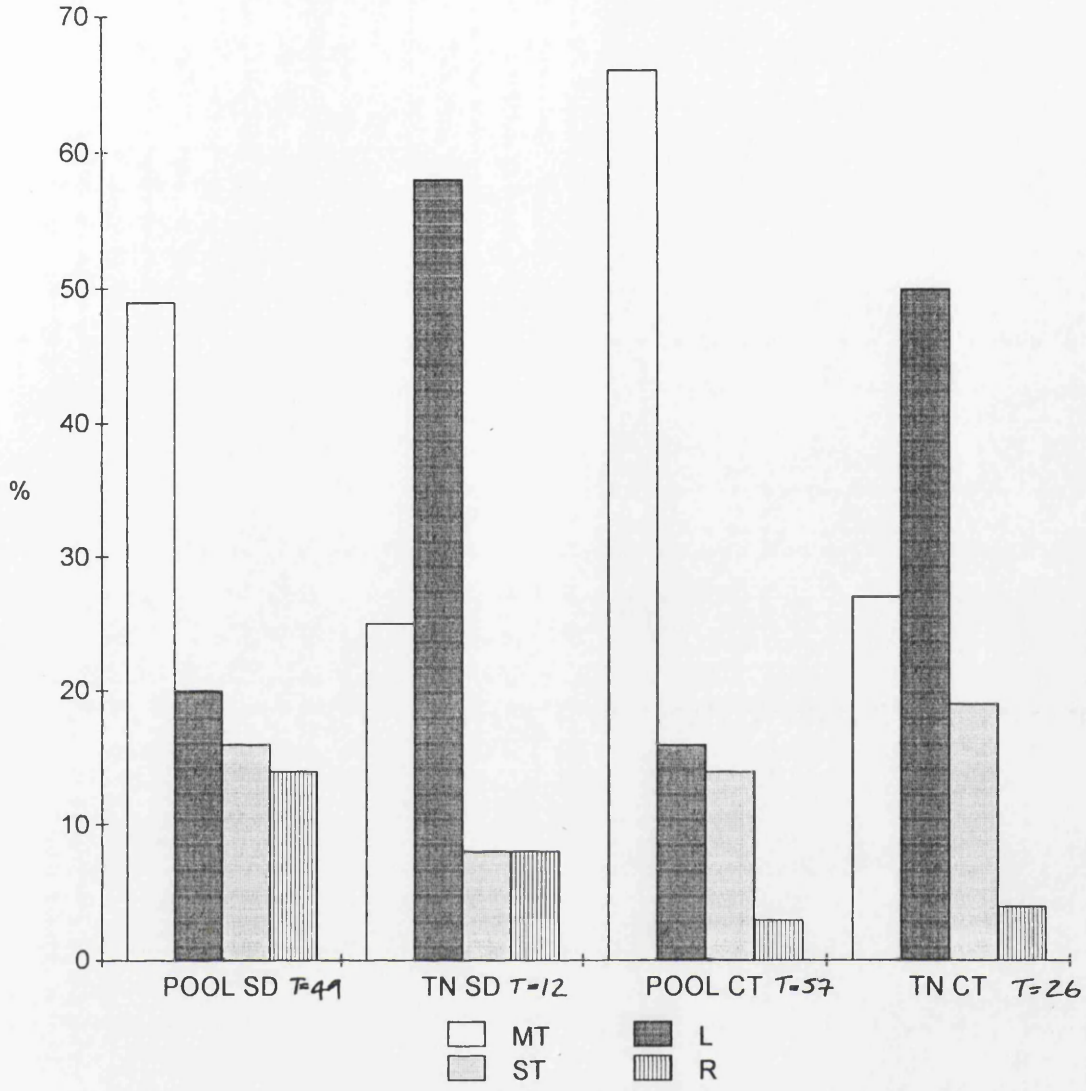

Figure 6.7 : Pool and Tofts Ness: contexts of cobble tools and stone discs.

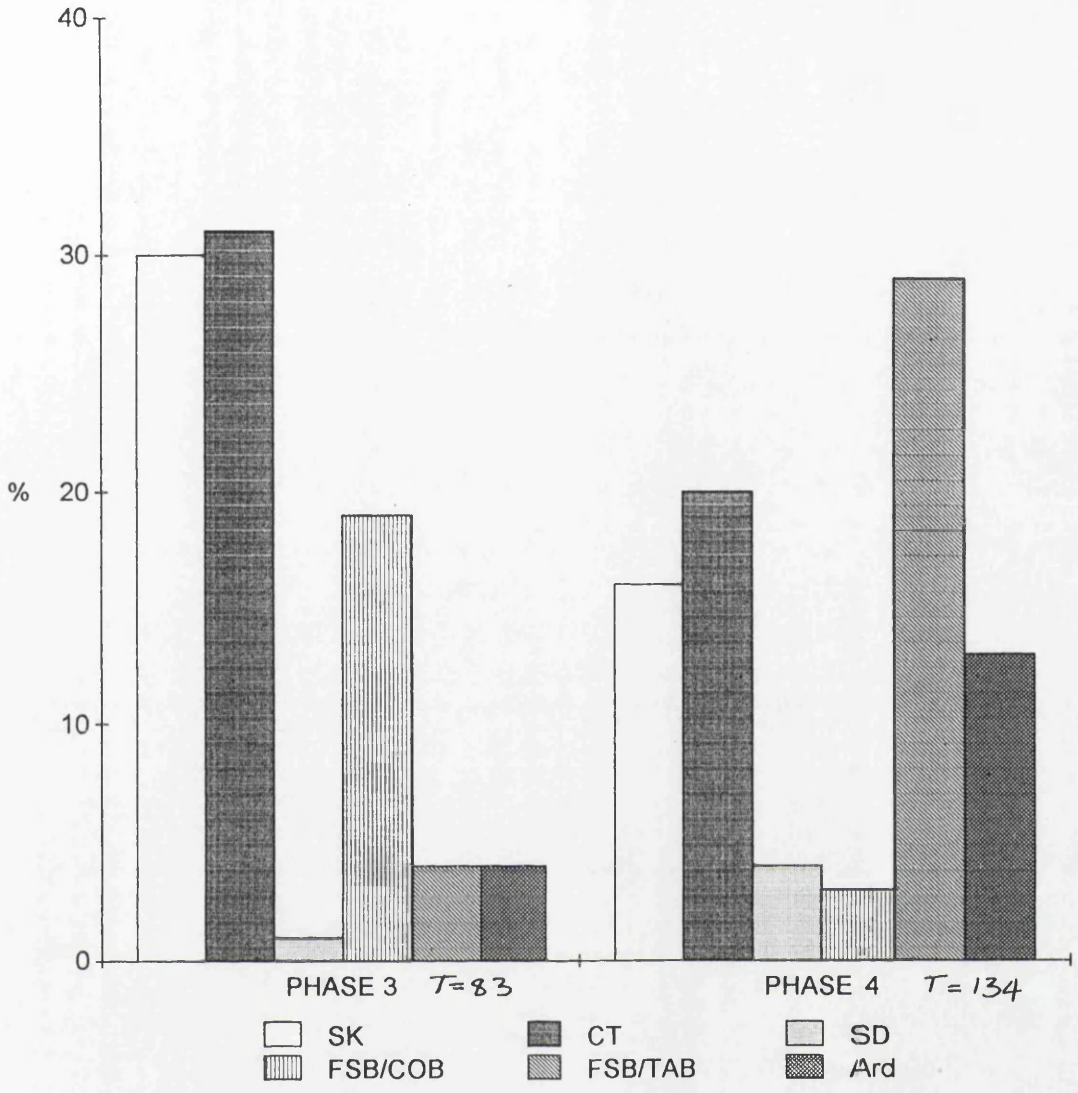

Figure 6.8 : Tofts Ness bronze age: frequency of artefact types.

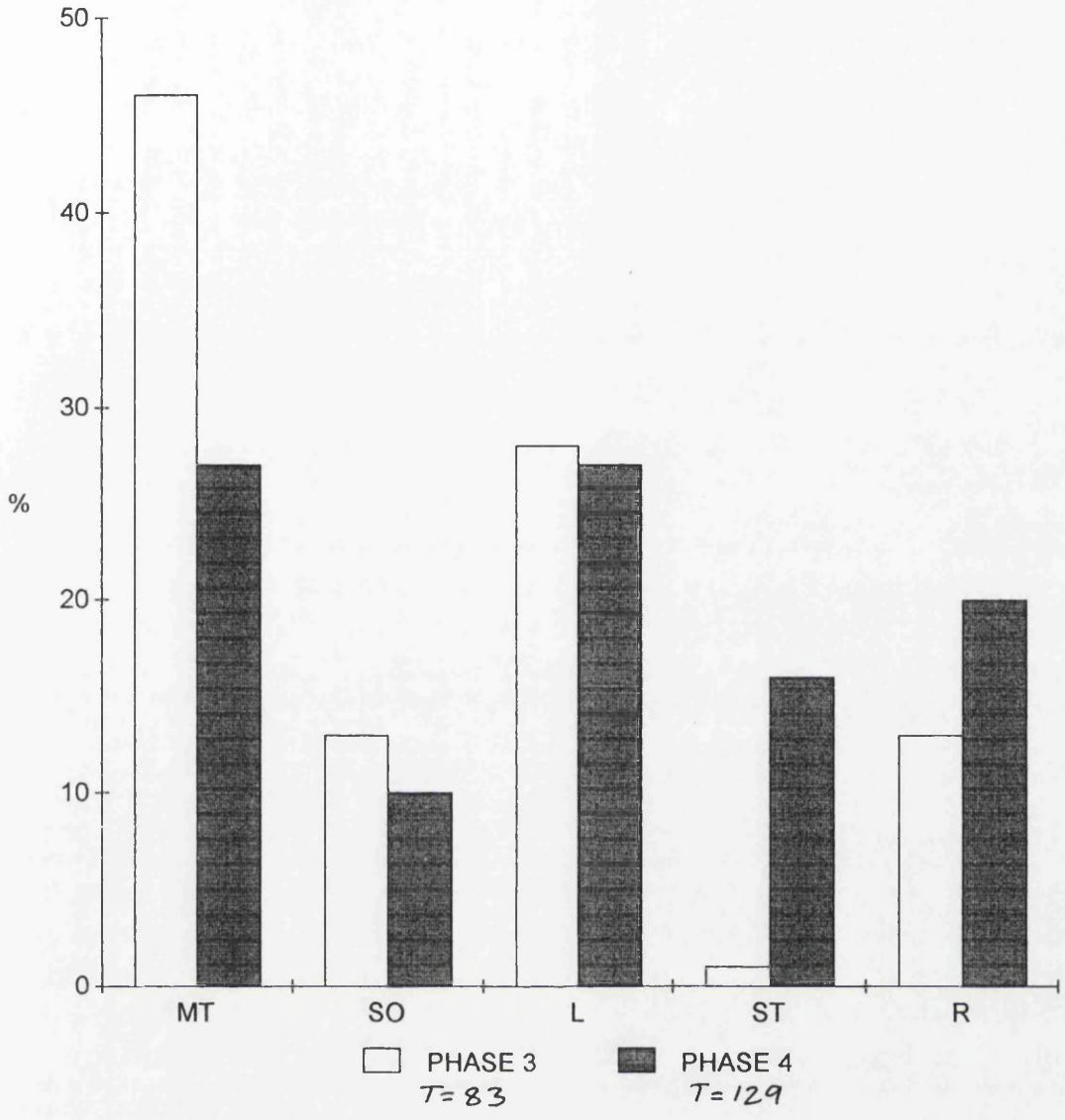

Figure 6.9 : Tofts Ness bronze age: total assemblage by context.

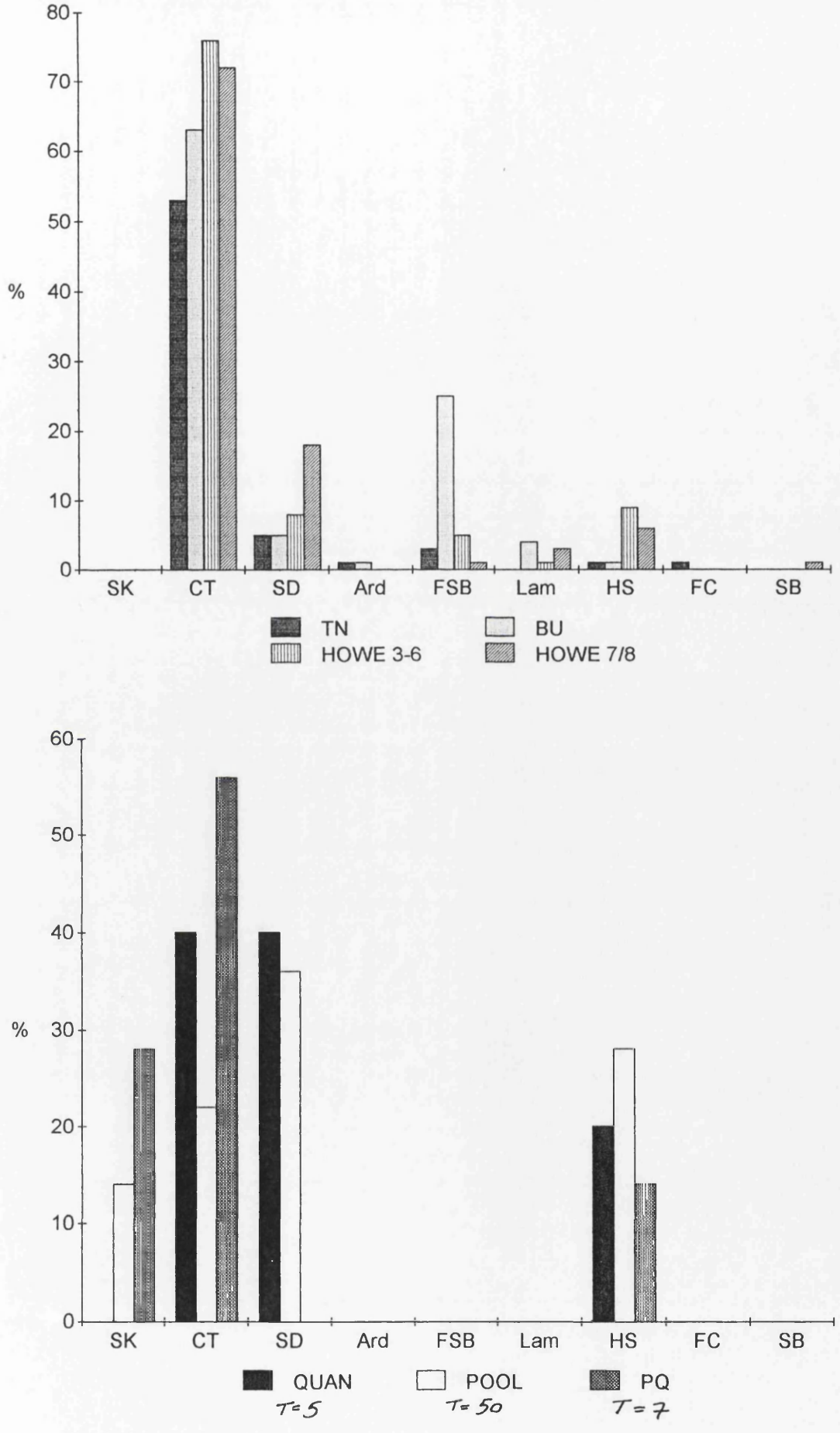

Figure 6.10 : Orkney iron age: frequency of artefact types.

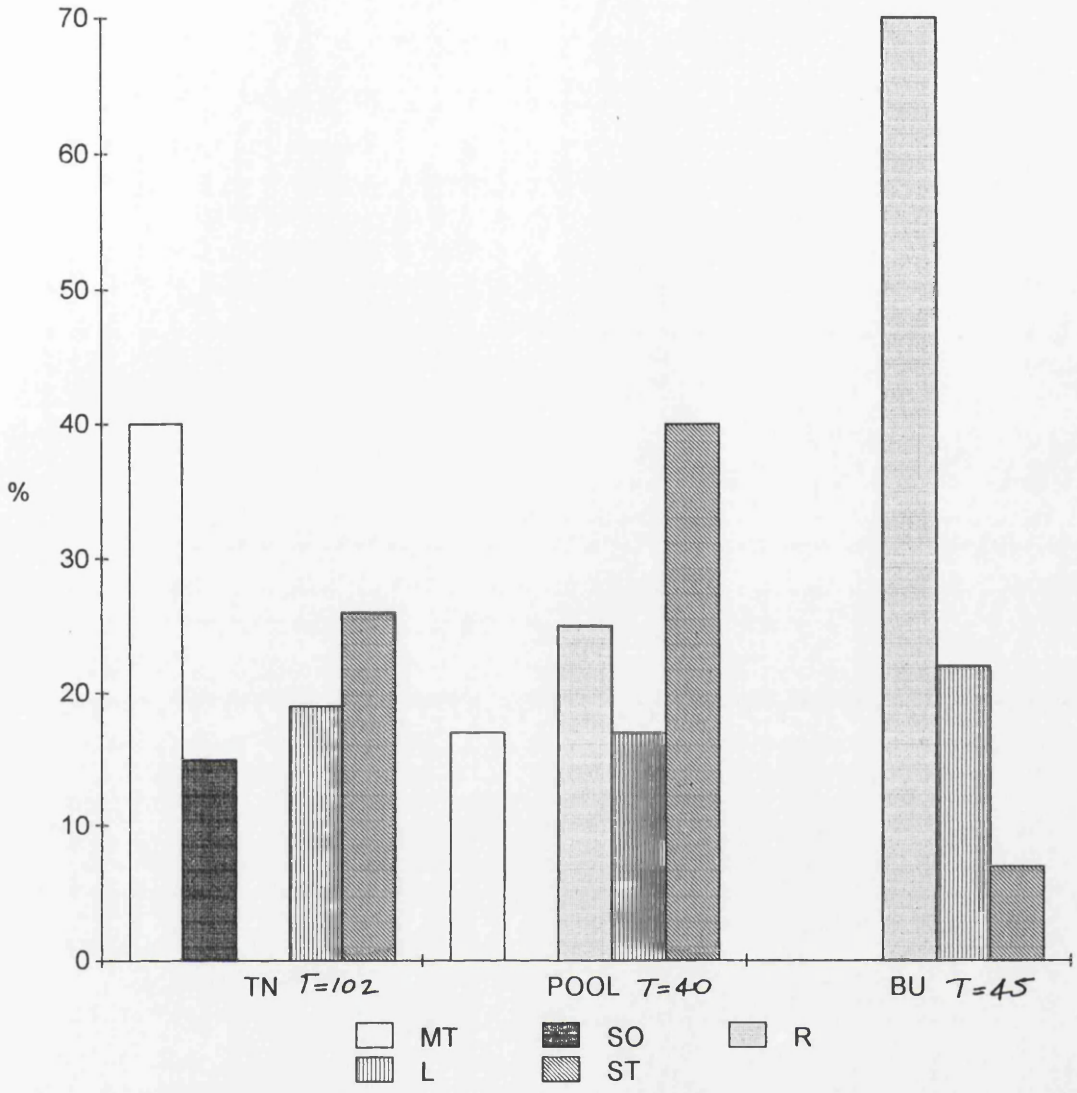

Figure 6.11 : Orkney iron age: total assemblage, by context.

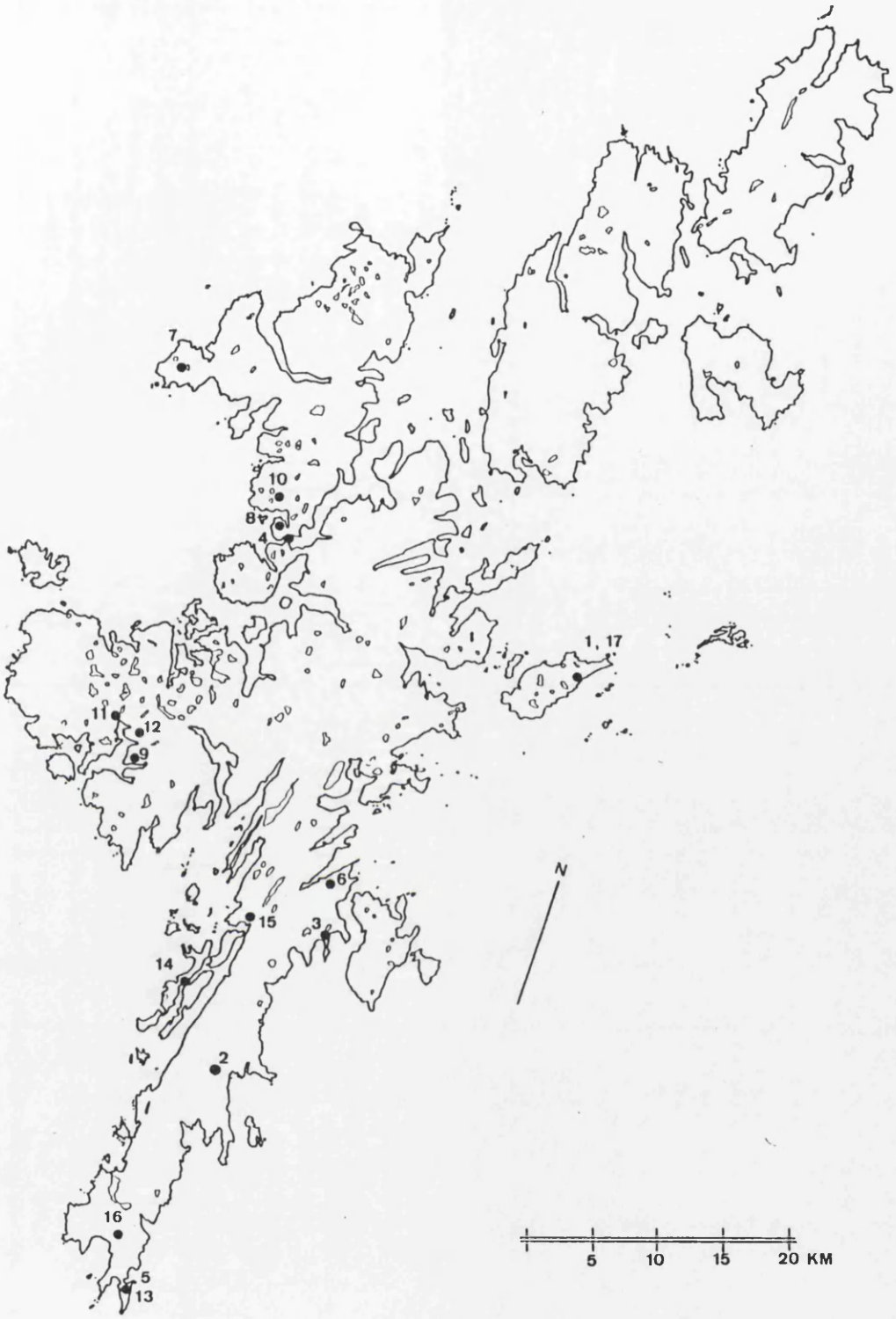

Figure 6.12 : Shetland: location of sites mentioned in the text. Key is on following page.

KEY FOR FIGURE 6.12

x domestic contexts
*funereal contexts

1. x Benie Hoose, Whalsay
2. x Catpund, Cunningsburgh
3. x Clickhimin, Lerwick
4. x Mavis Grind, Northmaven
5. x Jarlshof, Dunrossness
6. x Kebister, Tingwall
7. * March Cairn (Zet27), Northmaven
8. * Isleburgh (Zet21), Northmaven
9. x Ness of Gruting, Walls
10. *x Punds Water (Zet33), Northmaven
11. x Scord of Brouster, Walls
12. x Stanydale, Walls
13. x Sumburgh, Dunrossness
14. x Tougs, Burra Isle
15. x Upper Scalloway, Scalloway
16. x Wiltrow, Dunrossness
17. x Yoxie, Whalsay

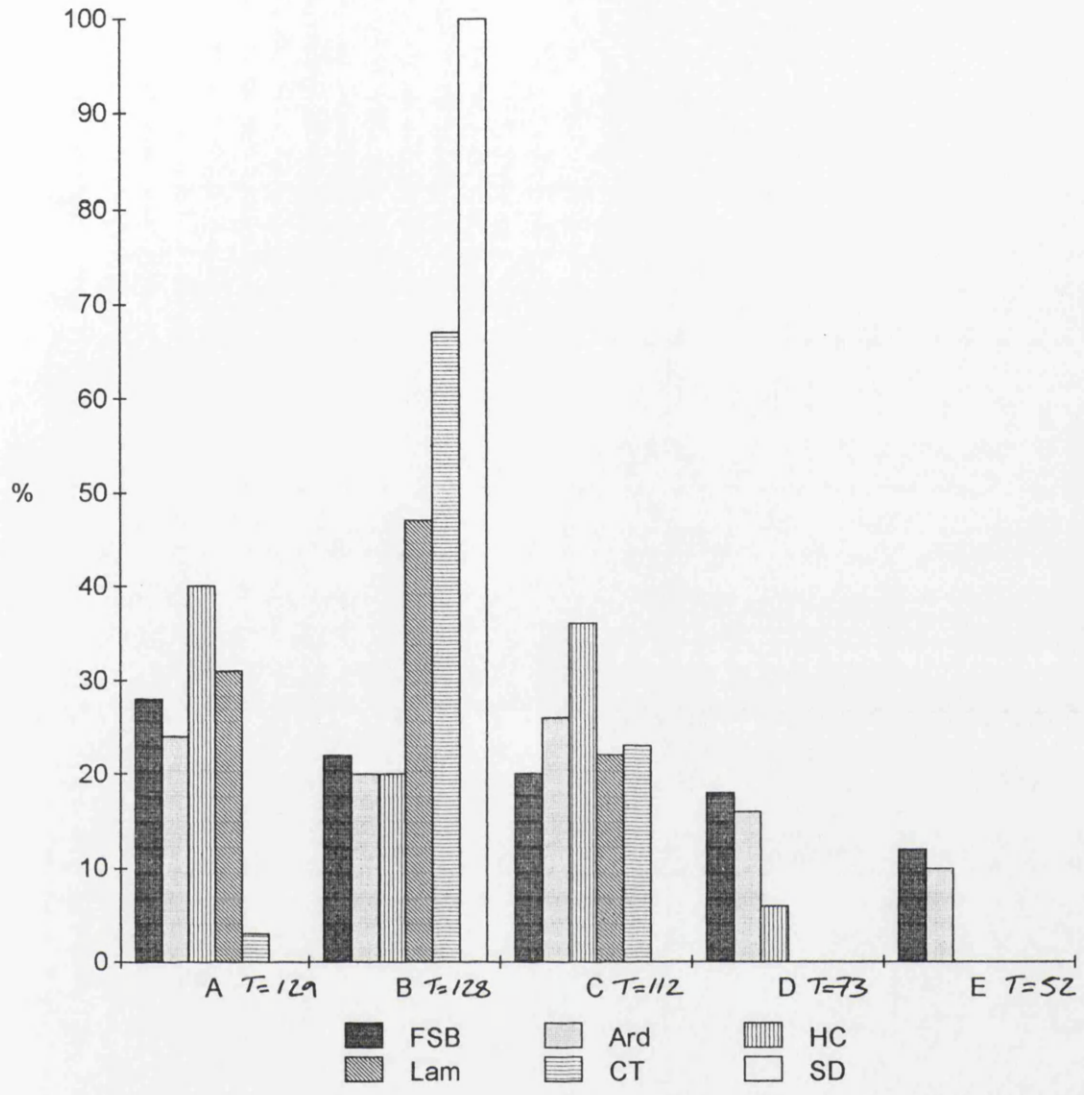

Figure 6.13 : Scord of Brouster: percentage of each artefact type, by context.

A: stone accumulations around H1 and H3, B: internal. C: H1/H2 decay, D: cairns/ field system, E: construction.

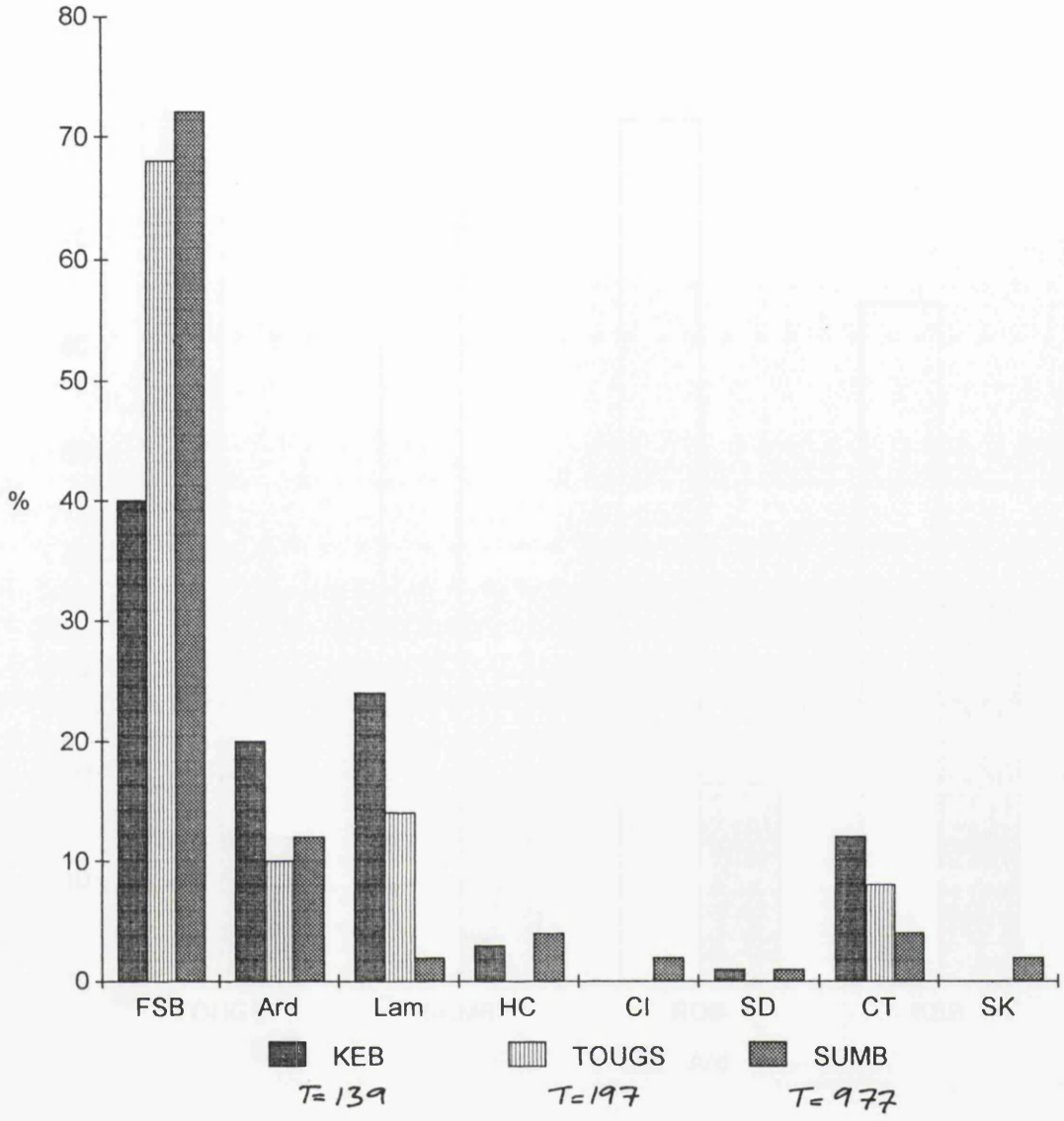

Figure 6.14 : Shetland bronze age: frequency of artefact types.

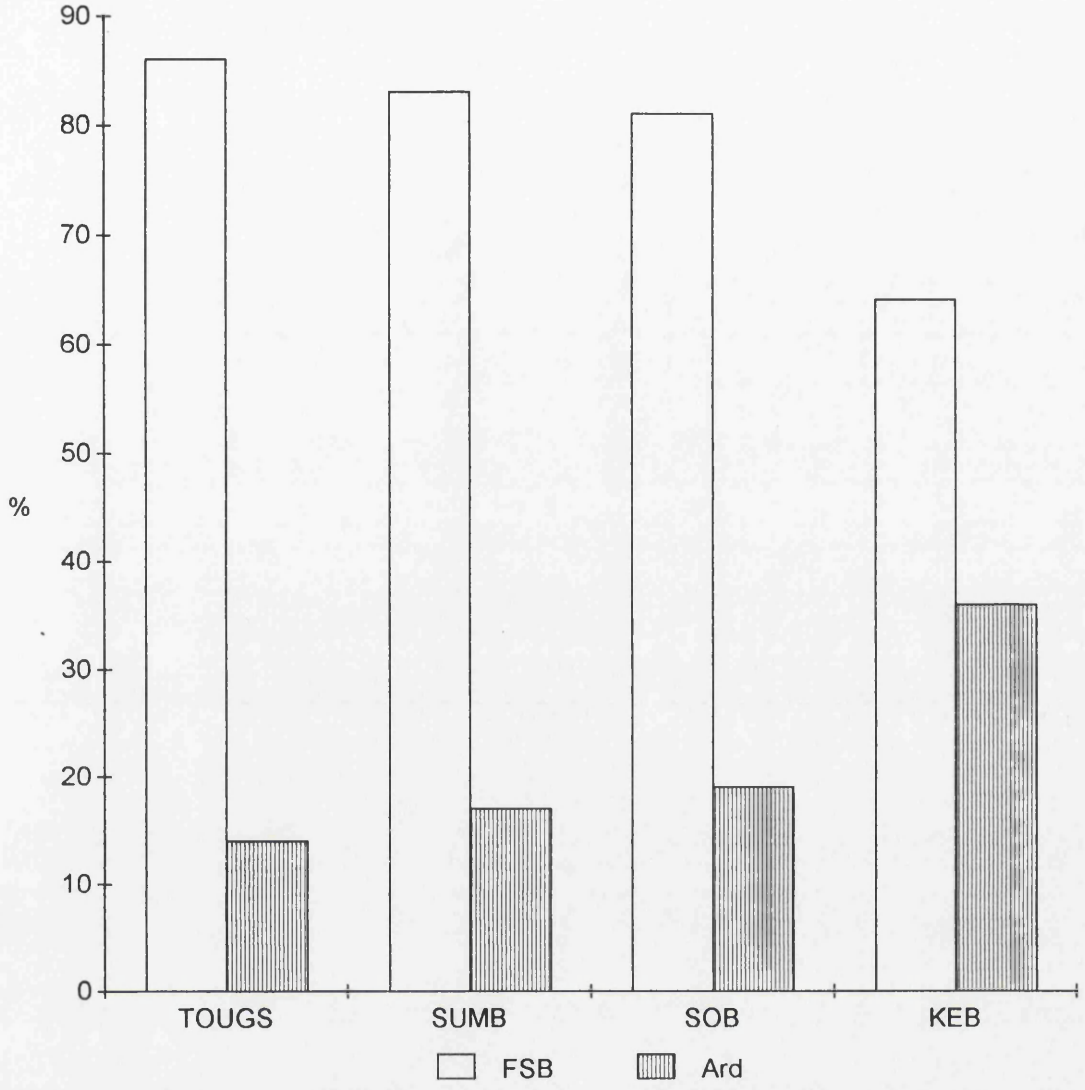

Figure 6.15 : Shetland bronze age: ratio of flaked stone bars to ard points, by site.

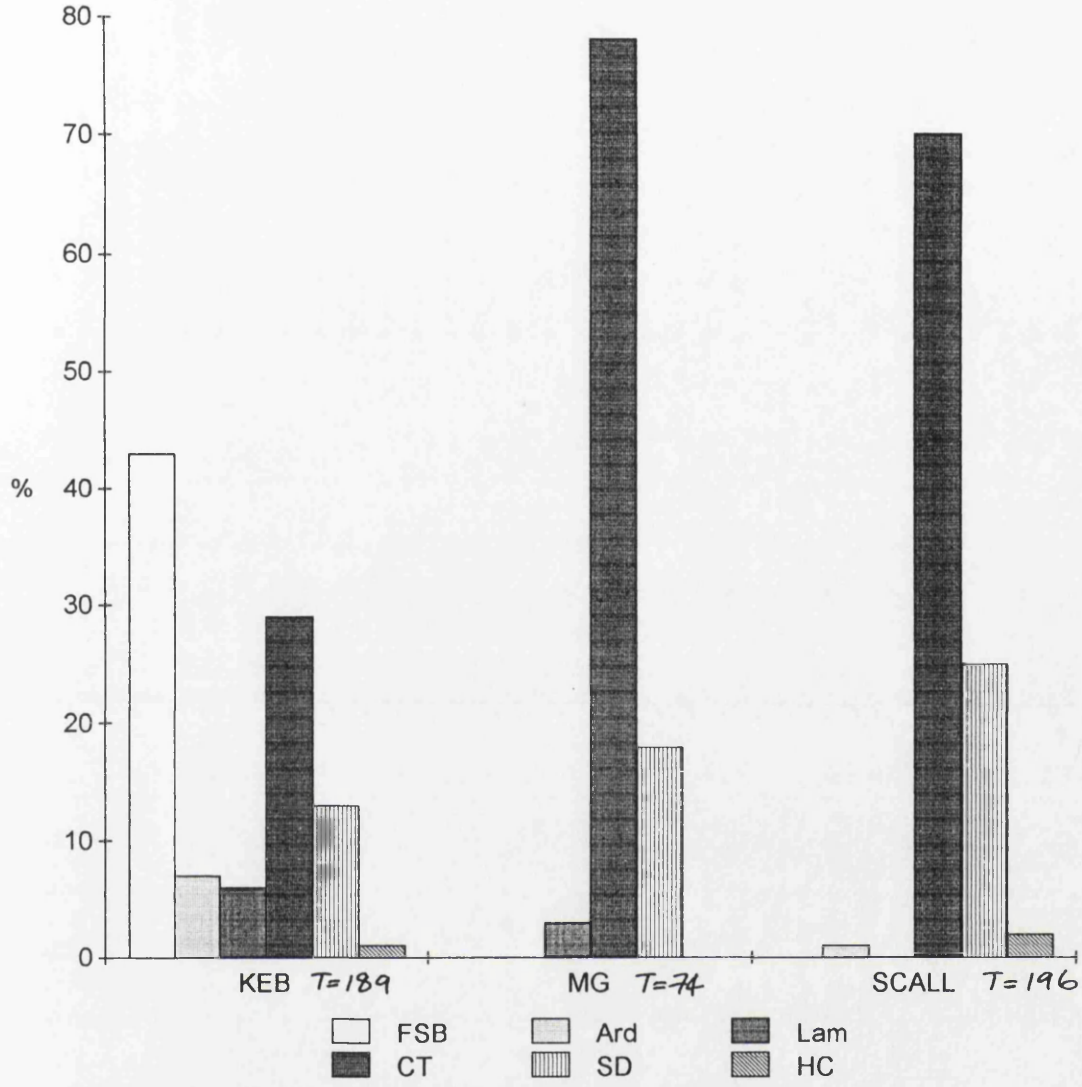

Figure 6.16 : Shetland iron age: frequency of artefact types.

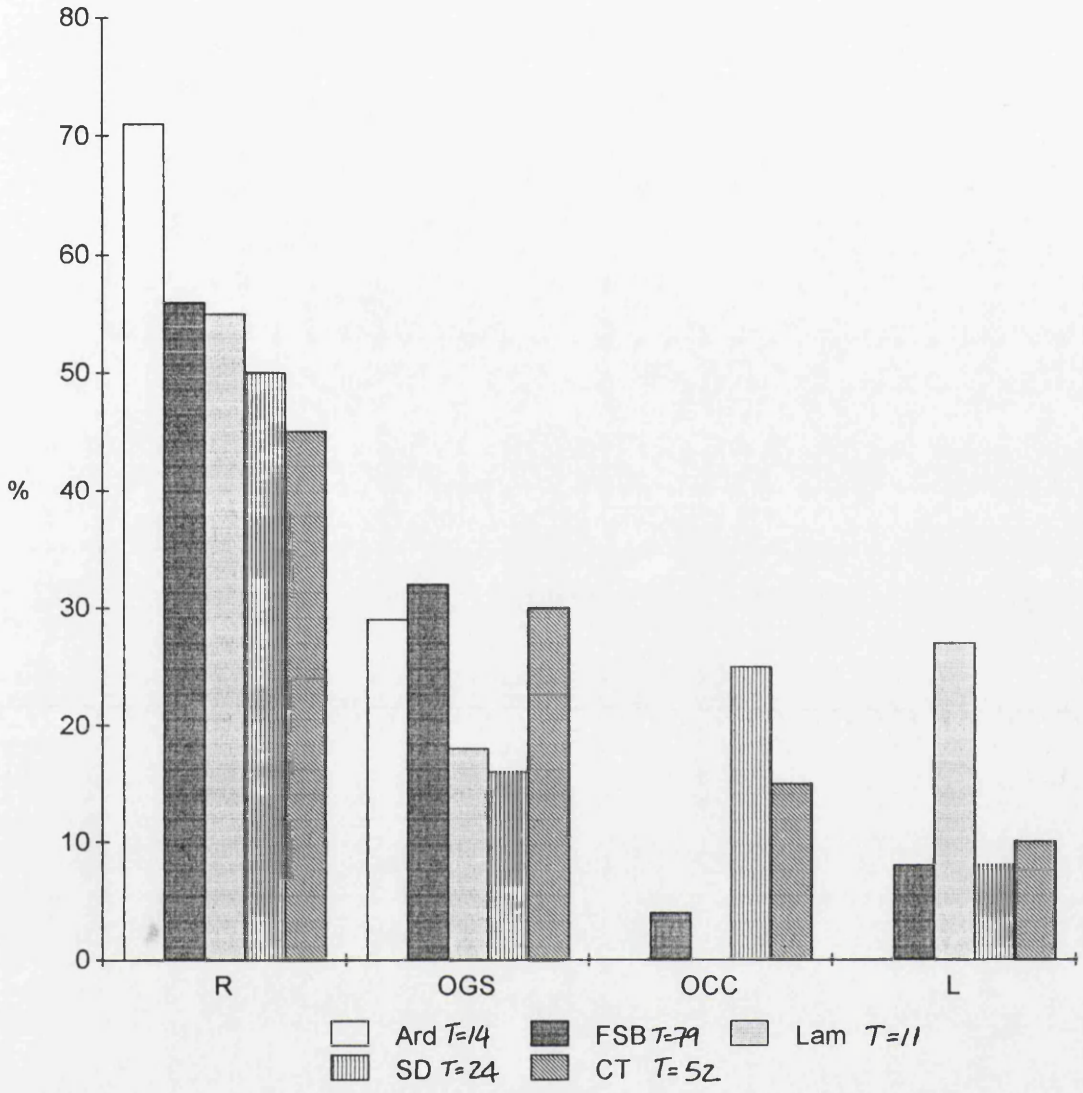

Figure 6.17 : Kebister iron age: percentage of each artefact type by context.

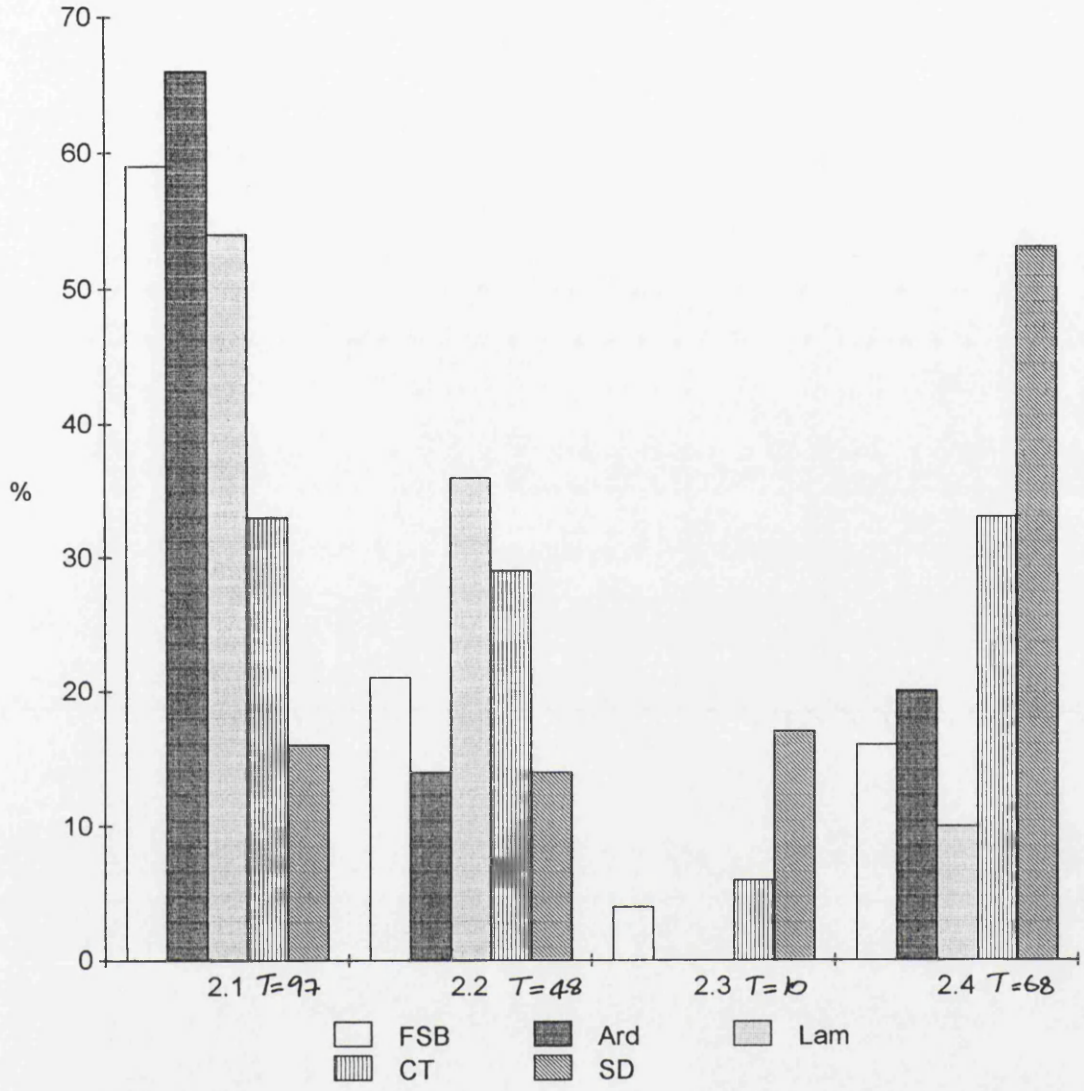

Figure 6.18 : Kebister iron age: percentage of each artefact type, by phase.

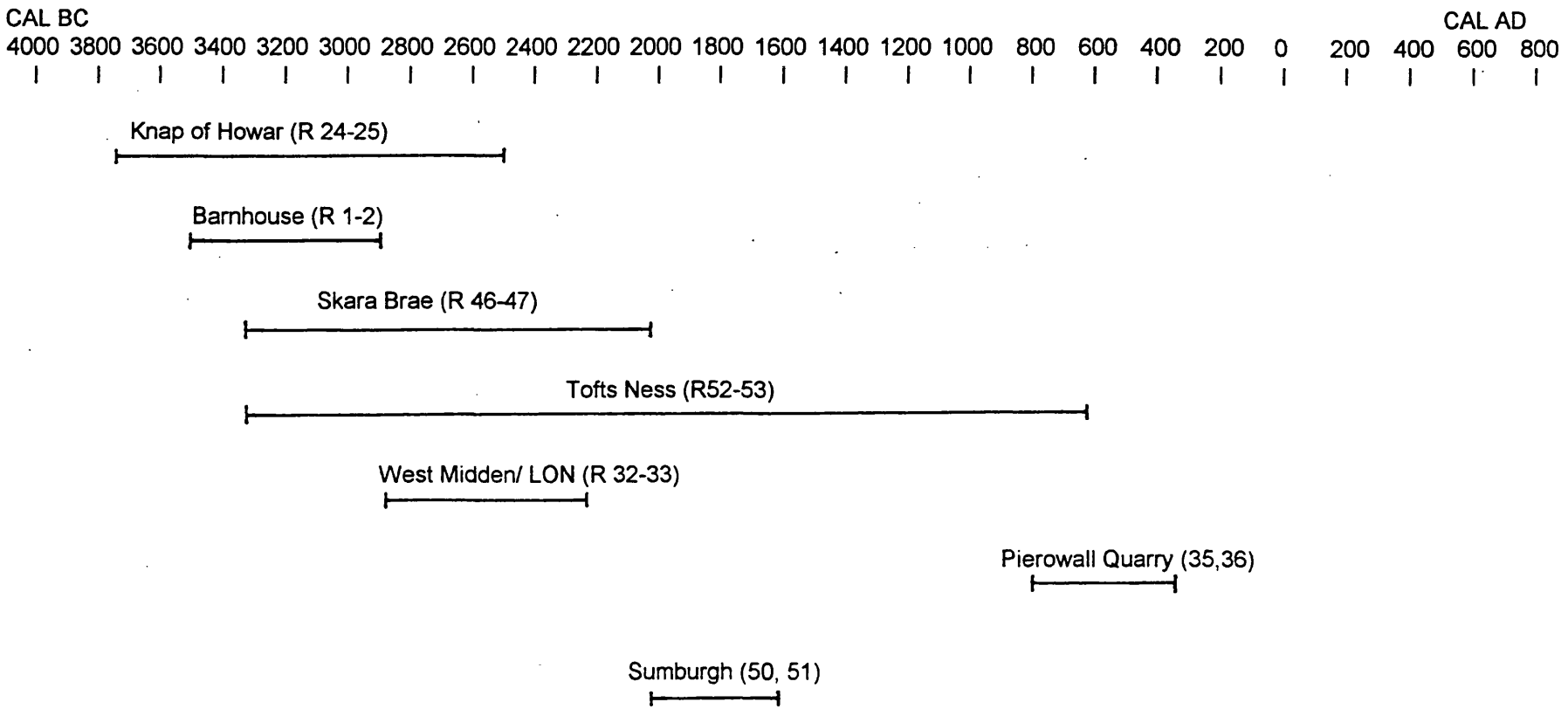

Figure 8.1 : Chronology of Skaill knives, by site.

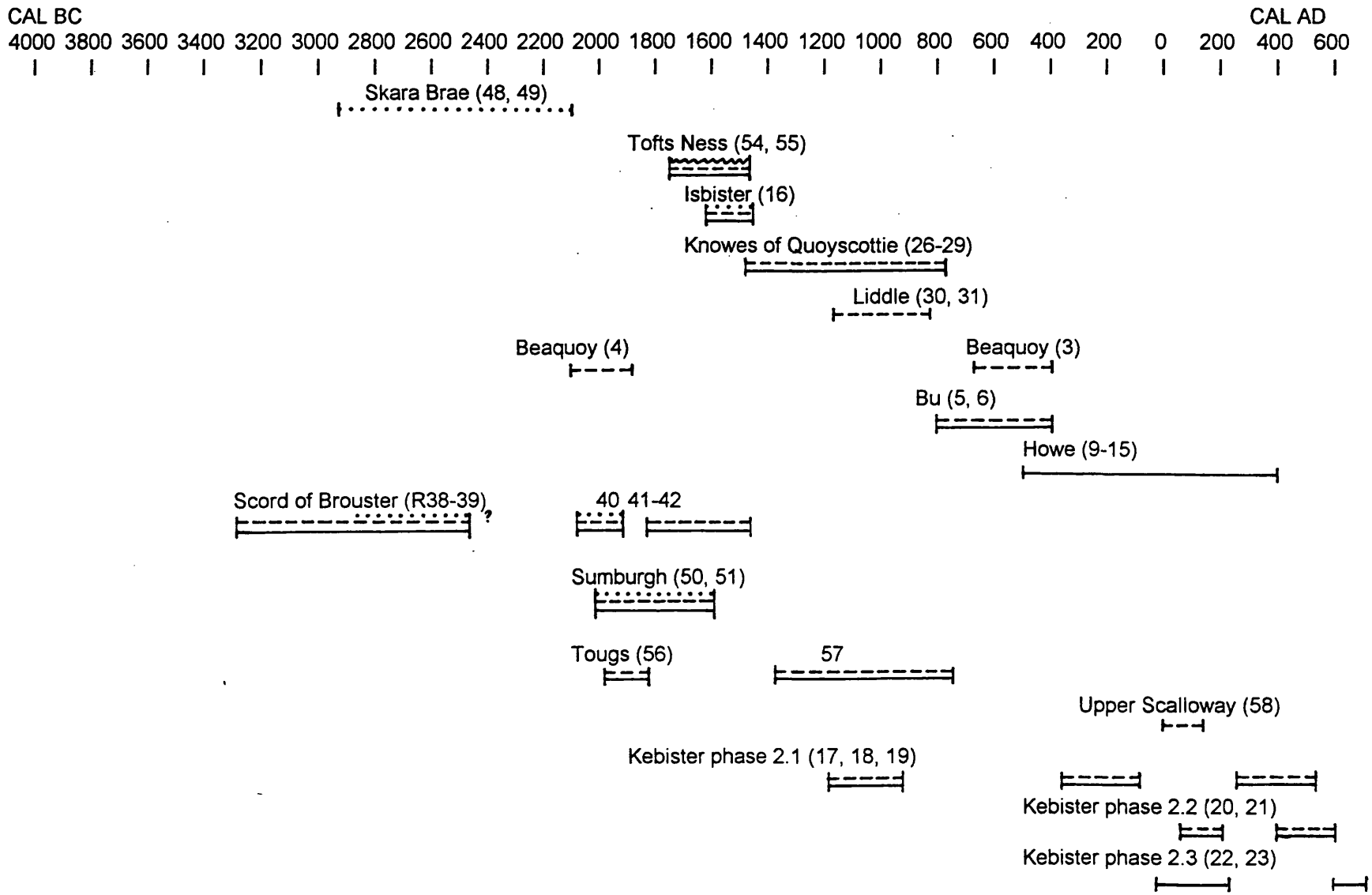

Figure 8.2 : Chronology of flaked stone bars (solid line), ard points (dashed line), handled clubs (dotted line), and flaked cobbles (wavy line), by site.

Figure 8.3 : Chronology of ground stone discs, by site.

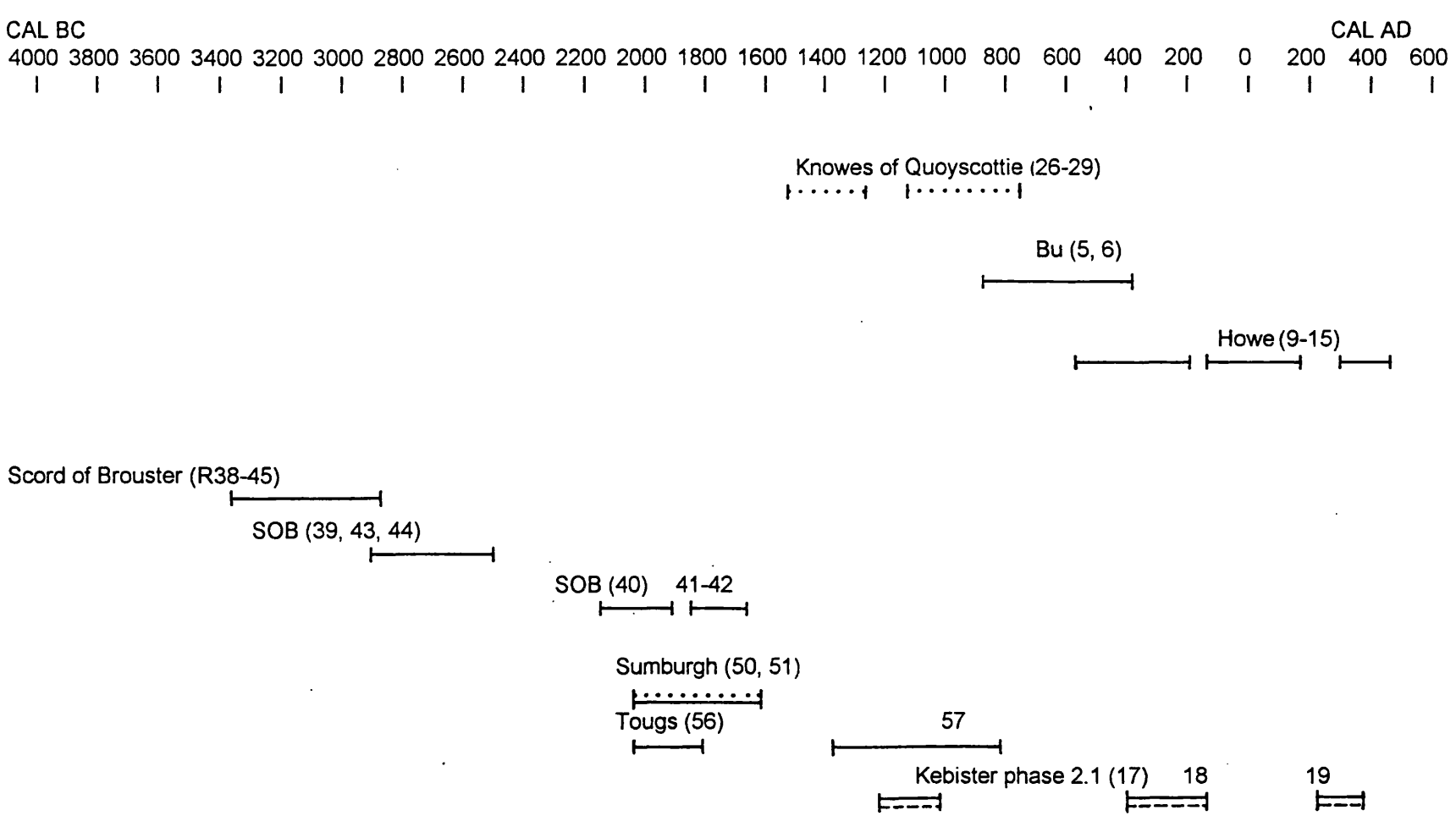

Figure 8.4 : Chronology of rectangles (solid line), points (dashed line) and shaped pieces (dotted line), by site.

Figure 8.5 : Chronology and assemblage composition.
D dominant (>50%), S secondary (20-50%), x present (<20%). Stone discs presented as percentage of total assemblage.

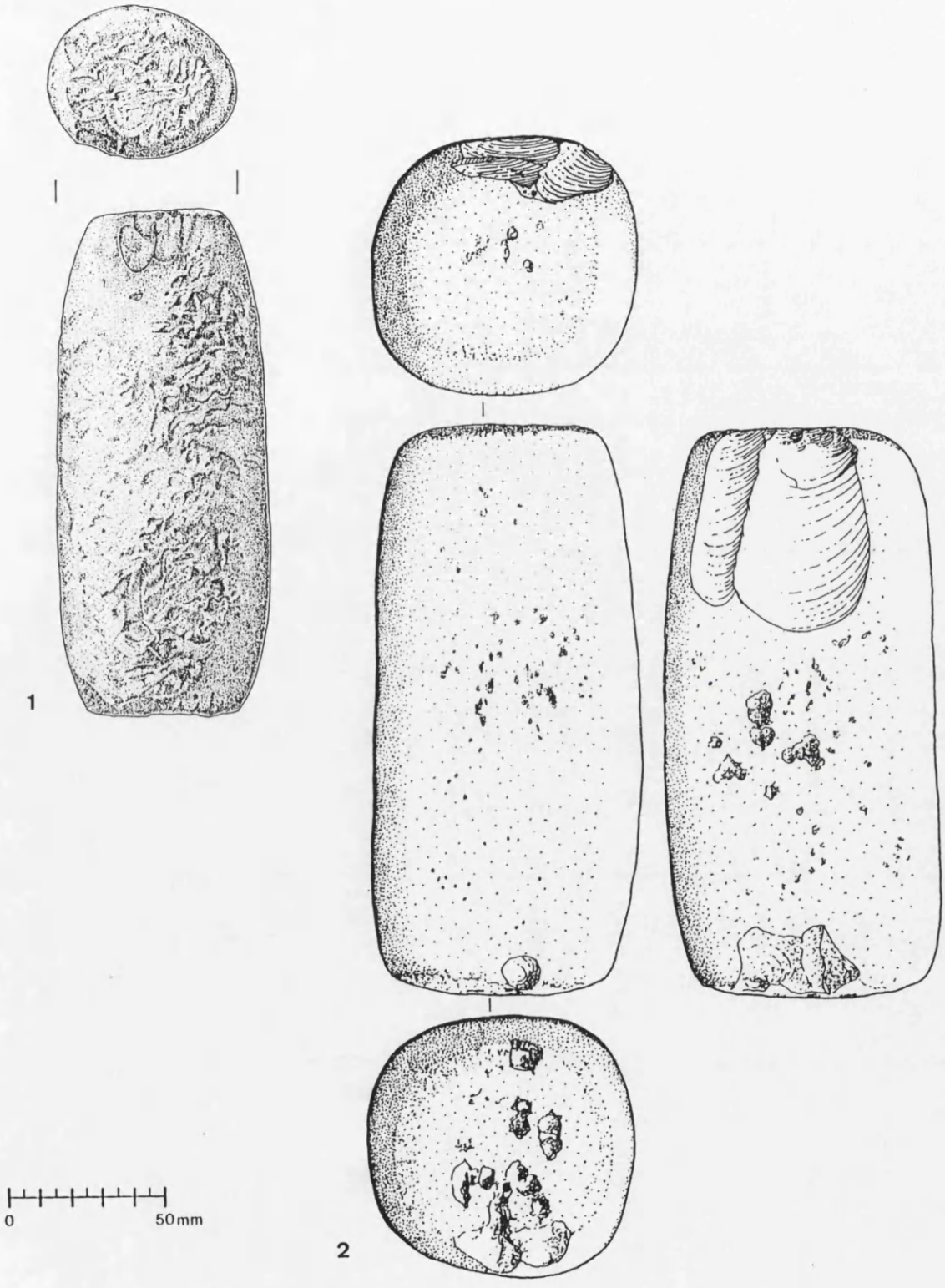

Figure 8.6 : Cylindrical stone objects. 1 Tofts Ness, 2 Upper Scalloway.

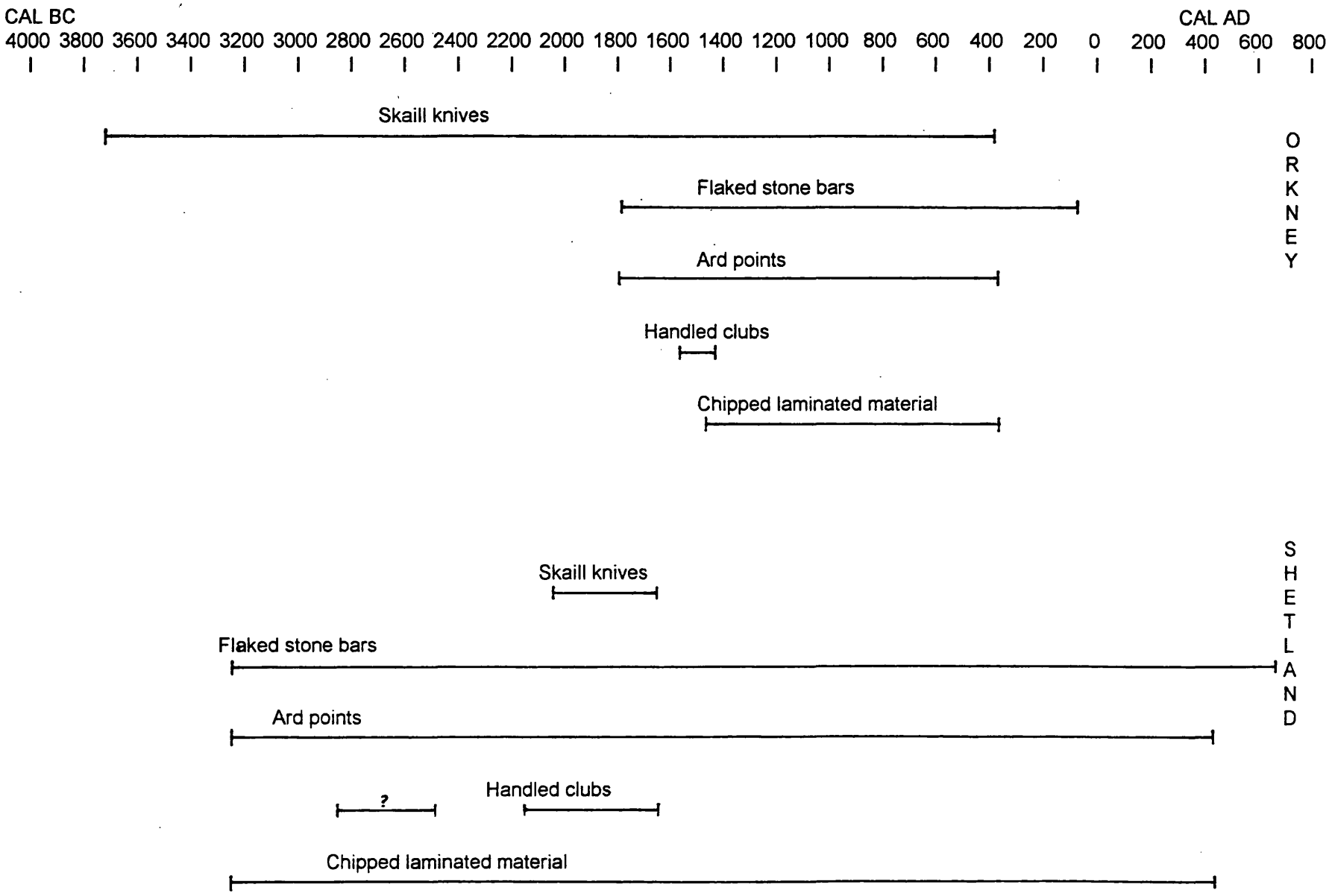

Figure 8.7 : Chronological summary.

TYPE	SUB-TYPE
Flakes	Skaill knives
	Manufacturing debitage
	Use debitage
Flaked Blanks	Ard points
	Flaked stone bars
	Flaked cobbles
Chipped Laminated Material	Stone discs
	Rectangles
	Points
	'Heart-shaped' pieces
	'Cleavers'
	'Knives'
	'Handled' discs
	Lobate objects
Cobble Tools	Pounder/grinders
	Faceted cobbles
	Facially pecked cobbles
	Faceted and facially pecked cobbles
	Group A cobbles
	Other cobbles with polish/ gloss residue
	Ground cobbles
	Plain cobble tools

Table 4.1 : Artefact types discussed in Chapter 4.

ML:MW	Pool	Tofts Ness	WM/ LON
0-0.4	1	3	2
0.5-0.9	63	71	63
1-1.4	26	21	25
>1.5	10	5	10
Total	343	183	248

Table 4.2 : Percentage of flakes in shape categories, by site. Flake shape expressed as ML:MW (maximum length:maximum width).

	Pool	Tofts Ness	Skara Brae	Wm/LON
Retouched	6	7	2	7
Edge damage	23	23	10	54
Total assemblage	421	189	1434	461

Table 4.3 : Percentage of retouched and edge damaged Skaill knives, by site.

Knap of Howar grinders
Knap of Howar borers
Ground-end tools
Multi-hollowed cobbles
Pestles
Handled clubs
Single-hollowed stones
Stone balls and other sculpted objects

Table 5.1 : Artefact types discussed in Chapter 5.

	SK	CT	SD
Knap of Howar	3	8	
phase 1	3	7	1
phase 2			
Skara Brae (1972/73)	194	8	17
trench 1 Early	788	6	173
trench 1 Later	251	9	33
trench 2			
West Midden / LON			
phase 1	5	2	
phase 2	220	5	2
phase 3	153	8	7
phase 4	12	1	
Pool			
phase 1	1	8	
phase 2	60	20	4
phase 3	338	33	31
Tofts Ness			
phase 1	35	18	1
phase 2	61	12	
Barnhouse	9	67	
Pierowall Quarry	3		

Table 6.1 : Orkney neolithic: artefact types, by site.

	KHB	KHG	GT	HS	FB	M	MH	GS	Misc
Knap of Howar									
phase 1	4		1						
phase 2	2	3		1					
Skara Brae (1972/73)									
trench 1 Early				1	1				2
trench 2									3
West Midden/ LON									
phase 2					3				
phase 3					6				
Pool									
phase 2		1				1			
phase 3	1		2		3		1	1	5
Tofts Ness									
phase 2		1		1	3				
Barnhouse			16		3	2	7	22	10
Pierowall Quarry									1

Miscellaneous:
Barnhouse: 2 shaped stone; 2 grooved stone; small shale ? disc.
5 stone balls or frags
Skara Brae: T1 early; bifacially ground flake, decorated Skaill knife, T2 sculpted object, radially incised stone, ?handled club
Pool: 5 sculpted objects.
Pierowall Quarry: cobble with four ground facets placed at cardinal points.

Table 6.2 : Orkney neolithic: artefact types, by site.

	SK	CT	SD	Ard	FSB	FC
Tofts Ness						
phase 3	25	26	1	3	19	9
phase 4	22	27	6	17	41	21
Liddle		12	1	1		?1
Beaquoy		3	1	1		

Table 6.3 : Orkney bronze age: artefact types, by site.

	SK	SD	Ard	FSB	MD	FC	HC	Lam	HS	SB
Quanterness									1	
Pool	7	18							14	
Pierowall Quarry	2								1	
Tofts Ness	37	5	3	2		1			1	
Bu										
(phase 1a pre-IA)			3	9	8		1			
phase 2a		2	1	10	130			1		
phase 2b		1		2					1	
phase 3				2				1		
Howe										
phase 3/4		2							2	
phase 5/6		3		3				1	4	
phase 7		50		1				14	15	2
phase 8		32							7	

Table 6.4 : Orkney iron age: artefact types, by site.

	SK	CT	SD	Ard	FSB	HC	Cl	Lam	SB
Scord of Brouster		18	3	74	358	20		19	15
Kebister									
phase 1.1		5	1	9	20	1		4	
phase 1.2		11		21	36	3		28	
(drain complex A)		2		2	5				
(drain complex B)		2		7	2	3		15	
(rubble)		2		9	2			10	
Tougs									
phase 1		3		1	10			4	
post-phase 1		4		1	5			2	
pre-phase 2		2		10	71			13	
phase 2		3		2	11			1	
field-system		3		6	37			8	
Sumburgh	23	40	13	119	704	38	21	19	

Table 6.5 : Shetland neolithic and bronze age: artefact types, by site.

	CT	SD	Ard	FSB	Lam	MD	HC	SB
Kebister								
phase 2.1	18	4	10	49	6	20		
phase 2.2	16	3	2	18	4	5		
phase 2.3	3	4		3				
phase 2.4	18	13	3	13	1	20		
Mavis Grind								
pre-building	1				1			
phase 1	11	2			1			
phase 1/2	2	1						
phase 2	9	4						
phase 2/3	4	1						
phase 3	31	5						
Upper Scalloway								
phase 2	27	14	1				1	1
phase 3	110	35					2	3

Table 6.6 : Shetland iron age: artefact types, by site.

	A	B	C	D	E	F	G
Cuween Hill	X						*
Maes Howe	X						
Quoyness	X						*
Taversoe Tuick	X						*
Quanterness	X			X			*
Midhowe	X	X		X			*
Holm of Papa Westray N		X					*
Isbister		X					*
Knowe of Ramsay		X					
Bigland			X				
Burray			X				
Knowe of Craie			X				
Knowe of Lairo			X				
Calf of Eday Long				X			
Pierowall Quarry				X			
Howe				X		X	
Sandhill Smithy				X			*
Huntersquoy					X		*
Knowe of Yarso					X		
Blackhammer					X		
Knowe of Rowiegar						X	*

Table 7.1 : Orkney: excavated chambered cairns with secondary activity.

A: inserted cist/ burial, B: external walling, C: external misc., D: later occupation, E: later presence internal, F: souterrain, G: sites with stone finds.

CUWEEN HILL Ork 12, Maes Howe type
'A round sandstone ball, roughly chipped and smoothed on one side'.
From a high level in S part of W cell.

HOLM OF PAPA WESTRAY N Ork 21, Orkney-Cromarty
Stone disc and a cobble tool from topsoil. Two Skaill knives from Grooved Ware context outside tomb.

HUNTERSQUOY Ork 23, Orkney-Cromarty
Flaked stone bar from floor of lower passage. Two stone discs from surface near edge of cairn.

ISBISTER Ork 25, Orkney-Cromarty
Ard point, handled club, flat-handled tool, two flaked stone bars, nine cobble tools. All from W bank of secondary wall (Hedges 1983, 24)

KNOWE OF ROWIEGAR Ork 31, Orkney-Cromarty
Eight pounder/ grinders, one cobble tool, four whetstones, three stone discs, handled object. All from chamber SE of souterrain and later occupation on NE side of cairn.

CORQUOY HILL Ork 34, Orkney-Cromarty
A 'ball' of quartz found with skeletons.

MIDHOWE Ork 37, Orkney-Cromarty
Two ard points, six cobble tools, stone club-like implement. All from later filling of chamber (Callander and Grant 1934, 339).

QUANTERNESS Ork 43, Maes Howe type
Stone disc, two flakes (S1), quern rubber N cell (S2), facially pecked cobble (S3), ground-edge tool (S5a), plain hammerstone (S5b). Numbers in brackets refer to the strata of the chamber (Renfrew 1979).

QUOYNESS Ork 44, Maes Howe type
Two sculpted objects and one ground stone disc from chamber and/or the cells. Two Skaill knives, two flaked stone bars, two stone discs from platform. Two stone discs from outside platform.

SANDHILL SMITHY Ork 47, Orkney-Cromarty
One pounder/ grinder, two flaked stone bars, one cobble tool and two stone discs from infill above later floor level of chamber (Calder 1938, 208)

TAVERSOE TUICK Ork 49, Orkney-Cromarty
Lobate object from foot of wall revetting the cairn. Two whetstones, hollowed stone and a possible stone disc from foot of wall revetting the cairn, E side outside wall. Flat cobble with smoothed faces from entrance to upper chamber.

UNSTAN Ork 51, Orkney-Cromarty
?Quern rubber and possible smoothed stone from under skeletons in cell. Grooved stone and smooth pebble no location (Clouston 1885, 343).

Table 7.2 : Orkney: artefacts from chambered cairns. Primary reference for all sites, Henshall 1963.

ISLEBURGH Zet 21, heel-shaped
Two flaked stone bars. Deposited one in front of each end of the facade (Calder 1963, 47).

MARCH CAIRN Zet 27, square
Two small stone discs, the edges of both have been ground to form a bevelled edge and a splayed edge. Both from 60cm above the disturbed chamber floor (Henshall 1963, 149).

PUNDS WATER Zet 33, heel-shaped
Fragment of worked slate, cylindrical object with flat ends, two fragments of handled clubs, four flaked stone bars, two ard points. All found at various levels in the debris in and around the cairn- a sample only collected (Calder 1963, 45).

Table 7.3 : Shetland: artefacts from chambered cairns.

	With kerb	Ard	FSB	SD	CT	Misc
QUOYSCOTTIE (Hedges 1977)						
knowe 1	Y	1	1			
knowe 2	Y	1				1
knowe 3	Y	1				
knowe 4	Y		1			
CUEAN (Hedges 1977)	Y	1				
QUANDALE (Grant 1937)						
mound 7	N	1				
cist in mound 2	N				2	
WHITEHALL (Petrie 1868b)	?	1				
BOOKAN (Petrie 1868b)	?		1			
ST ANDREWS (Petrie 1868b)	?	1				
HOLLAND (Neil 1981)	Y	1			1	1
GYRON HILL (Watt 1885)	?	1				
BACKAKELDY (Marwick 1929)	N					?2
QUEENAFJOLD (Ritchie 1974)	Y			1		
CASTLE (Kirkness 1925)	?				1	

Table 7.4 : Orkney: artefacts from burial mounds.

	SK	CT	SD	KHB	KHG	GT	HS	FB	M	MH	GS	Sc
Round-based pottery:												
Pool 1	x	x										
Knap of Howar	x	D	x	x	x	x	x					
Rinyo 5a and below	x											
Incised wares:												
Pool 2	D	S	x		x							
Knap of Howar	x	D	x	x	x	x	x					
Barnhouse	x	D				x		x	x	x	x	x
Rinyo 1	x								x			
Skara Brae 1 and 2- cannot differentiate												
Plastic and grooved:												
Pool 3	D	S	x	x		x		x		x	x	x
Grobust/ LON	D	x	x									
Rinyo area G	D	x	x									x
Skara Brae 1, 2 and 3	D	x	x					x	x			x
Tofts Ness	D	x	x		x		x	x				

Table 8.1 : Orkney neolithic: ceramic sequence (after MacSween 1992) and artefact type, by site. NB information for Skara Brae and Rinyo is incomplete. Sc: includes stone balls from Rinyo and Barnhouse.

	FSB	Ard	SD	CT	SB	HC	ChL	ShL	SK
Stanydale Temple	x	x	x	x	x				
Ness of Gruting	x	x	x	x	x				
Scord of Brouster	x	x	x	x	x	x	x		
Benie Hoose	x	x	x	x	x	x	x	x	
Kebister	x	x	x	x		x	x	x	
Sumburgh	x	x	x	x		x	x	x	x
Catpund	x	x		x		x	x	x	
Punds Water	x	x				x		x	
Jarlshof	x	x	x	x		x		x	x
Clickhimin	x			x			x	x	
Tougs	x	x		x			x		
Wiltrow house	x	x	x	x					
Yoxie	x	x		x					
Wiltrow smithy	x	x							

Table 8.2 : Shetland: artefact types present at house sites.