THE CHAMBERED CAIRNS OF ORKNEY:

LAND AND SOCIETY

IN THE THIRD AND SECOND MILLENNIA BC

VOLUME ONE

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to

the memory of

Neil McCallum

1957-1980

ORGANISATION OF THESIS

Volume One contains the main text. Volume Two contains the tables and figures illustrating the text, numbered according to the chapter to which they refer. Volume Two also contains photographic plates and a list of references. Volume Three contains six appendices, including Appendix A, a gazeteer of the chambered cairns of Orkney.

SUMMARY

The chambered cairns of Orkney: land and society in the third and second millennia bc

This thesis represents the results of extensive field-work in Orkney, supported by bibliographic research and the application of quantitative analyses. It is a contribution to our knowledge of the Neolithic period in Orkney and in particular to our knowledge of the relationships between the builders and users of chambered cairns and the land on which they lived.

Part One, "Evolutions", describes the various themes of previous research determining the form and subject matter of the thesis. Throughout, the philosophical stance adopted is positivist, using the standard model of scientific explanation, and relativist, accepting that the validity of explanations can vary over time and between places. The land of Orkney has undergone much change and is a palimpsest of past activity, but the climate, coastal configuration, and natural vegetation are largely similar today to that prevailing four millennia ago. Orkney and its Neolithic sites have attracted much archaeological attention, including explorations of 31 chambered cairns, and there has been much recent research on the location of chambered cairns in the landscape. Thus Orkney is an ideal place to pursue further research into the relationship of prehistoric peoples and the land.

Part Two, "The Buildings", is an exploration of the physical structures and artefacts left behind by the Neolithic Orcadians. A group of 76 chambered cairns is examined in detail, with the examination separating characteristics of the cairn and chamber. A cluster analysis of eight variables produces a four-part classification of the sites which, unlike previous classifications, incorporates information on the cairn itself, and on relative size of the monuments. Other monuments of the same age in Orkney include four settlement sites, two henges, and a number of standing stones. There are two different material cultures evident, of which the prime identifiers are the pottery styles of Unstan ware and Grooved Ware, but the distinction between the two is blurred, both spatially and chronologically. There is nothing to suggest that the material goods found in chambered cairns are of a grossly different nature from those found at other Neolithic sites.

Part Three, "The Land", begins with a listing of all the possible physical and organic resources which could have been available in the Neolithic. A pivotal chapter looks, with the aid of case studies in Eday, at the ways that the land of Orkney has changed since then, and the ways that prehistoric patterns can be distorted. A detailed locational analysis of the chambered cairns, culminating in a principal components analysis, reveals two distinct models of original location. The first, described by Childe in 1942, is particularly strong among small round cairns with simple chambers, and typically consists of a hillslope location on marginal agricultural land. The second typically consists of a location on glacial till with well-developed podzolic soils, and with extensive views of the land within five kilometres.

Part Four, "The People" concentrates on the builders and users of chambered cairns. The mortuary evidence, particularly from the sites of Quanterness and Isbister, suggests that people of all ages and both sexes were deposited in the monuments, but that life expectancy was short. The effort expended in building chambered cairns is measured by the surrogate method of estimating the volume of each cairn. This reveals that the largest cairns have a dispersed distribution. Some of the mechanisms of manipulation in Neolithic Orkney are examined by looking at symbols and their meaning. The orientation of the monuments suggests an interest in the sky and with points in the south-east and west. The demarcation of space within chambered cairns is varied: such complexity may mirror an equivalent complexity in their use. The animal bone reports from some excavated sites reveal a preponderance of the bones of a single species, suggesting a totemic association between the species and the users of the cairn. The last chapter of this part examines three alternative reconstructions of the social organisation of Neolithic Orkney.

The thesis concludes with a speculative attempt to synthesise all the available information. It is suggested that chambered cairns were meeting places for the community and were an ever-present and ordinary part of the landscape of everyday experience. Celebrations connected with important also suggested that farming communities survived by practising exogamy, but maintained their individual existence, and control of resources including land, by a totemic link with the place of birth and death in which the chambered cairn was a central feature.

VOLUME ONE

CONTENTS

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CONVENTIONS

1. Radiocarbon dates

As is now customary in archaeological writing, the following abbreviations are used to refer to absolute dates:

- bc : uncalibrated radiocarbon years before Christ
- bp : uncalibrated radiocarbon years before the present (= AD 1950)
- BC : calibrated radiocarbon years or calendar years before Christ
- BP : calibrated radiocarbon years or calendar years before the present.

Generally, arguments in the text are couched in terms of years bc or bp.

The graphical display of radiocarbon dates in Figures 9.15 to 9.20 is as recommended in Warner (1975).

2. Site numbering

The convention adopted for the referencing of British megalithic sites in Powell _et al_. (1969: xix-xxi) and Henshall (1972: 312-313) is used throughout. This consists of a three letter area code and a running number for every site: thus, Maes Howe (ORK 36). Certain sites have been given a temporary number: thus, Vestra Fiold (ORK T1). These temporary references are not intended to assume permanent currency.

PART ONE

EVOLUTIONS

CHAPTER ONE: INTRODUCTION

1.1. SCOPE AND OBJECTIVES

This thesis is concerned with furthering our knowledge of the early prehistory of Orkney. The present Island Area is politically and economically affiliated to Scotland, the United Kingdom, and the European Economic Community, and includes the island of Swona and the Pentland Skerries but excludes Stroma and Fair Isle: the modern boundaries are used hereafter to delimit the island-group. Physically, Orkney is separated from the Scottish mainland by the 10 km wide Pentland Firth, is 80 km south-west of the Shetland Mainland, 300 km south-east of Faroe, 480 km west of Norway, and is equidistant from Iceland and the north European plain (Figure 1.1).

Within Orkney, there are a number of buildings known as chambered cairns or chambered tombs, with the common characteristics of a stone cairn enclosing a relatively small, and formerly accessible, chamber. These cairns, mapped in Figure 1.2 and described in Appendix A, are conventionally attributed to the Neolithic period, and were built and used in the third and second millennia bc (uncalibrated radiocarbon years before Christ) by a people who had knowledge of farming but did not have extensive use of metal tools.

Figure 1.3 shows the distribution of chambered cairns in Scotland. At the present time there are somewhat less than a thousand known: the distribution is distinct and avoids the eastern lowlands south of the Moray Firth where

Neolithic monuments may take other forms. It is dense compared with the number of known settlement sites of the period. Chambered cairns are part of a human tradition that is represented in many parts of Europe. Under the generic term "megalithic tomb" they are found from Shetland to Cornwall and throughout Ireland; in southern Scandinavia and northern Germany; Holland; throughout France; around the Iberian coast; in parts of Italy; and in all the major islands of the western Meditarranean (Figure 1.4). The chambered cairns of Orkney which form the major source of data for this thesis, are thus representatives of a type of building which is widespread in Europe.

As with any archaeological study, this work is focussed on particular scales of analysis. Figure 1.5 shows some of the fields of enquiry covered by archaeology together with the spatial scale with which each field is primarily concerned. Thus some archaeologists have concentrated on single sites and have published excavation reports based on objects on the order of 10 to 10^3 m in greatest dimension. This does not mean that objects of smaller or greater magnitude do not feature in the report but rather that the greatest attention is paid to statements about the single site. Similarly, syntheses of archaeological information relating to a continent do not ignore objects of smaller size but do ask different questions, and suggest different answers, applying to the scale of a continent. This work is concerned with a small region - Orkney - and, as indicated by the hatched box in Figure 1.5, will concentrate on the description and explanation of the archaeological territories within Orkney and of the region as a whole. It is not primarily concerned with small artefacts, single sites, or continental patterns. These scales will be considered because no archaeological scale functions independently of all the others, but the major thrust of the thesis will be to ask questions and to suggest answers appropriate to the scale of Orkney as a whole.

Just as any archaeological study must concentrate primarily on certain spatial scales of analysis, so with temporal scales of analysis. Figure 1.6 shows some of the fields of archaeological enquiry and the time scales associated with them. Thus some archaeologists are concerned with the construction of artefacts, such as flint tools which may be made in a few minutes or hours. Others are concerned with the evolution of social systems, such as that of empires with a history of several hundred years. Again such individual studies must not ignore processes of shorter or longer duration but the primary focus of attention is directed at a particular magnitude of time, and will arrive at conclusions appropriate to that magnitude. As indicated by the hatched box in Figure 1.6, this thesis is concerned with processes operating over a greatest time of about 10^7 to 10^{11} seconds, or from less than a year to more than a thousand years. It is not specifically concerned with (although does not ignore) processes operating over very short time periods or over many millennia.

Thus the major objects of study in this thesis are chambered cairns: they will be considered as a group within the region of Orkney, and they will be considered over the millennium or more of their use by a Neolithic group of people. Within these broad boundaries of space and time, the thesis further focusses on two objects of archaeological interest: land and society.

Land is, self-evidently, one of the most fundamental of resources utilised by humans. It is the matrix of shelter and sustenance: without land humanity would not exist in its present form. As such, variations in land and its quality for different purposes are a great constraint on the patterns of human life. It is the objective here to describe and explain the nature of land in Neolithic Orkney and the patterns of life associated with that land. These patterns cannot be explored without reference to the people of Neolithic Orkney since the concept of land and its use does not exist to us outwith human perception. Thus the groupings of individuals and the transactions between groups - in short the social organisation - of the islands in Neolithic times may not be separated from the study of land. Accordingly, a second objective here is to explore the organisation of society and to suggest ways in which that society operated over time.

The thesis is arranged in five parts. Part One, entitled "Evolutions" contains introductory material and syntheses of previous archaeological studies. It explores the evolution of the natural and cultural landscapes of Orkney, presents a history of archaeologists who have worked in the islands, and reviews the new field of locational analysis of chambered cairns. The next three parts comprise the major body of work and consider "The Buildings", "The Land", and "The People" of Neolithic Orkney. Part Two describes and classifies the physical structure of the cairns and examines the other artefactual evidence from Neolithic Orkney. Part Three considers the potential resources of the islands, discusses the ways in which the land of Orkney has changed since the earliest settlers, and analyses the setting of the chambered cairns in the land. The people of the cairns are discussed in Part Four by means of their physical remains, the labour invested in their monuments, their symbols and beliefs, and by considering and criticising some alternative reconstructions of the organisation of their society. Finally, Part Five, entitled "Speculations", attempts to synthesise all the information and conclusions of the first four parts and present a coherent and reasonable statement connecting the chambered cairns to the land and society of Neolithic Orkney.

1.2. CREDO

Any communication between humans will be less effective if the philosophical language of either party is not recognised and understood by the other. Throughout every communication there are implicit references to the system of belief held by those taking part, but most transfers of information and ideas are made more effective by an explicit statement of the philosophical position of the communicants. What follows is necessarily compressed and incomplete but it may serve as a background to the way knowledge is treated in the following pages.

Central to the treatment of knowledge in this work is a doctrine which has received much attention from the philosophers of the last century - the doctrine of relativism. This would reject the notion that there is an absolute truth and would replace it with the notion that there are many relative truths, each subsisting in a different time and place. That is, any statement which is thought, uttered, or written is reasonable and satisfactory for only certain times and certain places, and may be unreasonable and unsatisfactory at other times and places. Such views are well expressed in the following quotations which briefly encapsulate this writer's present view of the nature of knowledge:

> "(Popper) saw that no theory could ever be relied on to be the final truth. The most we can ever say is that it is supported by every observation so far, and yields more, and more precise, predictions than any known alternative. It is still replaceable by a better theory."
>
> (Magee, 1973: 29)

> "...Man's mode of being is always 'there' or 'in a place' or 'in a situation' where the place is determined by man's 'concern'..... An individual is the center of all situations and each situation is defined by the individual according to his or her goals."
>
> (Entrikin, 1976: 622)

> "Because I know that time is always time
> And place is always and only place
> And what is actual is actual only for one time
> And only for one place
> I rejoice that things are as they are and
> I renounce the blessèd face
> And renounce the voice
> Because I cannot hope to turn again
> Consequently I rejoice, having to construct something
> Upon which to rejoice"
>
> (T.S. Eliot, Ash-Wednesday, 1930)

> "... the influential philosopher (or archaeologist) must 'be in the position to supply his generation with precisely the doctrine most congenial to them'. We can only hope no future historian of archaeology will go on to say, that any of us share, as Willey said of the men of the eighteenth-century Enlightenment, 'the sense of being at last in possession of the truth, which gladdened this enviable age'"
>
> (Piggott, 1981: 189)

The application of the doctrine of relativism to history is clear: any statement about events in the past is relative to, and holds true for, the time and place where it is made. We can never hope to reconstruct the past as it was - that truth has vanished with time - but we can hope to reconstruct the past in our image, a past which is true (in the sense of meaningful, satisfactory, and complete) for us in the here-and-now. Such reconstructions are necessarily subject to revision as the here-and-now changes its position, but their validity is undoubted for a group of people (one historian or every historian) and for a length of time (a few minutes or many decades). The aim of this thesis is to arrive at reconstructions of the patterns of life in Neolithic Orkney which will have validity for as many people as possible and for as long a time as possible. Nevertheless it is recognised that any statements made herein are subject to replacement by the truth of another time and place.

The second major philosophical thread in this thesis is the search for general laws of human behaviour. Two qualifications might be made to this statement. In the first place, the search is here for local laws of human behaviour; laws which are general to the scale of the events under consideration. In this case it is the objective to make general statements about the Neolithic period in Orkney. It is not the objective to make general statements about the Neolithic period in Europe, or about humanity as a whole. In the second place, the positivist notions of hypothesis testing and probabilistic statements will be employed as a convenient way of structuring arguments and provoking criticism. There are certainly other ways of doing this but the standard model of scientific explanation is widely understood and remains a powerful method of explication in all disciplines.

The following quotation draws together and illuminates this modified positivism in which the universe of universal statements is defined as having limits in time and boundaries in space:

> "In the natural sciences laws are supposed to be unrestricted and universal statements; clearly historical generalisations are not valid for all times and all places and they are not therefore universal and unrestricted statements... The generalisations which the historian refers to are therefore <u>mere</u> generalisations and cannot by the canons of scientific explanation be regarded as laws.... The two replies to this claim are worth noting. First, the generalisations used by historians might be regarded as first-stage empirical generalisations which might, at some later date, be subsumed under more sophisticated laws of universal validity. Second, the problem of localised generalisation is common to many other areas of natural and social science, and there are signs that the notions of universality often developed by philosophers of science are too rigorous for most purposes and therefore require some modification."
>
> (Harvey, 1969: 53)

Localised generalisations, or conditional statements; are a commonplace in historical writing. In the present context their application is clear: it is possible to generalise about the known chambered cairns of Orkney. By a detailed examination of the nature of our data, it may be possible to extend those generalisations to all the chambered cairns of Neolithic Orkney. Beyond this, such statements may also be applicable to other regions of Neolithic Europe - but such expanded generalisations are outwith the scope of this work.

To summarise this highly compressed exposition, it is the objective in the following chapters to use the standard model of scientific explanation as developed in the last century by positivist philosophers to arrive at statements which have conditional validity within the stated limits of probability, and within the stated bounds of space and time.

CHAPTER TWO: THE NATURAL LANDSCAPE OF ORKNEY

2.1. THE EVOLUTION OF THE NATURAL LANDSCAPE

The landscape of Orkney is not a "natural" landscape, in the sense of it owing nothing to the hand of humanity, but there are elements of the landscape which owe more to geological, geomorphological, and climatic factors of formation than to any other. This chapter will discuss these elements and attempt to describe how they have evolved over time. Perhaps the best single source for the topic is "The Environment of Orkney" (Davidson and Jones, forthcoming).

The fundamental shaper of any land surface is the underlying geology. In comparison to Shetland, the geology of Orkney is not complex, consisting largely of Old Red Sandstone. The stratigraphical and structural outlines are shown in Figure 2.1 taken from Mykura _et al_. (1976: 10). The following summary is from the same source.

The oldest rocks in Orkney are found in the West Mainland, around Yesnaby and Stromness, and on the island of Graemsay. This basement complex consists of metamorphic rocks of Moinian type and some igneous granites of Caledonian type but are only exposed in small areas. The vast majority of the island-group consists of sedimentary rocks with an occasional volcanic intrusion. The sedimentary rocks belong exclusively to the Old Red Sandstone sequence and may be divided into three groups according to age: the Lower, Middle, and Upper Old Red Sandstone. Of these, the Lower and Upper groups are of limited areal extent. The Lower Old Red Sandstone is restricted to small areas around the exposures of basement complex. The Upper Old Red Sandstone is confined to the south isle of Hoy but is in places up to 1000 m thick. The Hoy Sandstones consist of red, pink, and yellow sandstones with intermediate bands of marl and are underlain with basalt lavas and tuffs.

The Middle Old Red Sandstone may be subdivided stratigraphically into several layers. The oldest layers are respectively the Stromness Flags (found throughout the West Mainland, in Graemsay and in north Hoy) and the Rousay Flags (widespread throughout the north isles, the central and eastern Mainland, and the southern-most south isles). These layers consist of finely bedded sequences of sandstones, siltstones and mudstones. Within the Stromness Flags is found the Sandwick Fish Bed, which has produced many examples of fossil fish. The youngest layers of Middle Old Red Sandstone, the Eday Beds (found in Eday, central and eastern Mainland and the northern south isles) may be divided into Lower, Middle, and Upper Eday Sandstones separated by the Eday Flags and Eday Marls.

The sedimentary stratigraphy of Orkney is summarised in Table 2.2.

In addition to the sedimentary rocks, there are a small number of volcanic intrusions spread throughout the islands. These include dykes and sills of camptonite, monochiquite, bostonite, and dolerite. There are also small volcanic vents, principally located in the south isles.

The structural geology of Orkney is dominated by two synclines, the Eday Syncline in the north isles and the Deerness Syncline in the East Mainland, and by an anticline, the West Mainland Anticline. In addition, there are two major systems of faults. The first of these includes the North Scapa Fault and faults in Shapinsay and South Ronaldsay which run in a north-east/south-west direction. The second includes the East Scapa Fault and other faults running north/south. These faults are indicated in Figure 2.1.

The evolution of the present day relief of Orkney began in the Tertiary era when drainage basins and river valleys drained to a base level considerably lower than today: the concordant floors of Scapa Flow, the Westray Firth and the Stronsay Firth may represent this former base level (Flett, 1920). The deep embayments of Stronsay and Sanday are characteristic of a submerged coastline, with the islands themselves being former interfluve areas almost eaten away by competing drainage networks (Godard, 1956). Subsequent glacial flows across Orkney were influenced by the remnants of these valleys.

Chronologically, the next major definer of surface topography was glaciation. A recent thesis by Rae (1976) has looked at the glaciation of Orkney in detail. Peach and Horne (1880) had first noted that the general trend of ice flow had been from south-east to north-west. Rae in common with Wilson et al. (1935) and Mykura et al. (1976), agrees with this general finding but, was also able to identify three separate flows. In sequence, ice flowed from between south and south-south-east, then from the south-east, and finally from between east-south-east and east. These three flows most likely occurred beneath a single ice sheet, with its origins on the west side of the North Sea. The dating of this ice was attempted by Rae using shell material from a glacial till on Stronsay. The shells were found to be very old and the only confident statement which can be made is that their true date is in excess of 44,300 bp (T-1152) (Rae 1976: 222). This implies that the last ice sheet crossed Orkney prior to the late Devensian glacial period. During that period there may have been a local ice mass on Hoy, with the last appearance of active ice being coincident with the brief Loch Lomond Readvance in Scotland in the mid eleventh millennium bp. At this time the rest of Orkney may have been covered with permanent snow, and periglacial processes would have operated over a long period.

There are two mechanisms of glaciation which may be revealed in the surface topography of a landscape: erosion and deposition. Glacial erosion is an effective smoother of the land, leaving rounded hills and undulating plains. Glacial deposition, in the form of debris dumped on the land at the margins of ice sheets and debris laid down under decaying bodies of ice, is manifested in the post-glacial landscape as rough, uneven, ground. Much of the land surface of Orkney consists of gentle convex and concave slopes with few irregularities - testimony to a long period of glacial erosion as the main ice sheet flowed over the islands. The legacy of glacial deposition is also apparent in places: landscape features caused by drift include moraines and kaimes. Of the various types of moraine, hummocky moraine is possibly of most interest to the archaeologist since natural mounds formed in this way may be confused with, or may conceal, mounds formed by human activity. Figure 2.3, derived by Rae (1976: 299) from aerial photographs, shows the distribution of drift composed topographic features for the south isles, Mainland and Rousay. This shows that hummocky features are widely distributed but have concentrations to the east of the Loch of Harray, on the coastal plain in Evie, in Orphir to the south of Ward Hill, to the north-east of Scapa Bay, in the parish of Holm, and to the west of Deer Sound. Perhaps significantly, it is observable that, with the single exception of the three recently noted cairns in the Redland district of Evie (ORK 56, ORK 57 and ORK T20), no chambered cairns have yet been discovered in these areas of concentration of hummocky glacial features.

Glaciation was the last major element in the formation of the macro-scale topography of Orkney. The general elements of the land surface and submarine surface were in existence ten thousand years ago and have remained unchanged since then.

The surface of the land in Orkney has been largely obscured by superficial deposits. The extent of these deposits (about 85% of the land surface) is shown in Figure 2.4 which is based on the Geological Survey's published maps of drift geology. As can be seen, much of the central West Mainland, the East Mainland, South Ronaldsay and parts of the north isles are covered with "boulder clay" or glacial till. Four types of till have been isolated (Macaulay Institute for Soil Science, 1978: 102). Peat of up to several metres in depth is found in the hills of the north-west Mainland, in Orphir, throughout Hoy and in the north isles of Rousay, Eday, and Stronsay. Wind-deposited sand is widespread in Sanday and is also found in North Ronaldsay, Westray, Eday and Stronsay. Two more areas of wind-blown sand are the Bay of Skaill in Sandwick and much of the island of Burray.

These superficial deposits are a major factor in the history of soil development in Orkney. The Soil Survey for Scotland has recently published their 1:50000 soil maps for Orkney together with a preliminary description of the soils by the field surveyor, Mr Frank Dry (Macaulay Institute for Soil Science, 1978). Ten soil associations have been recognised, differentiated by their parent materials. The most widespread sub-groups are podzols, peaty podzols, non-calcareous gleys and peaty gleys. Other soils found include brown calcareous soils, oroarctic podzols, calcareous gleys, saline gleys and peaty brown soils. In addition areas of peat, wind-blown sand, and alluvium have been identified. A full discussion of these soils must wait until the publication of the soil memoir, but immediately it can be seen that superficial deposits and the actions of climate and relief have been largely responsible for the patterns of soils observable today. An additional factor in the history of soil development is undoubtedly the action of humanity, so much so that the soil survey have identified a deep-topped phase of a soil derived from a peaty podzol by cultivation. This plaggen soil is restricted to parts of the West Mainland but indicates that other soils in Orkney may have been affected by the human occupation of the land.

Our knowledge of soils in the prehistoric past is limited but much can be inferred from a study of the vegetation of the past. The antiquarians of the nineteenth century were aware that the flora of Orkney had been radically different in the past: Traill (1868) had discovered traces of peat containing large trees below the high water mark in Sanday and Hoy. More recent studies based on pollen analysis have been summarised by Davidson and Jones (forthcoming) who have encapsulated the vegetational history of Orkney in a table, here reproduced as Table 2.5.

With the retreat of periglacial conditions, from about 11000 bp onwards Orkney was covered with an open grassland and heath vegetation, with grasses (Gramineae), sedges (Cyperaceae), and sorrel (Rumex) dominating (Moar, 1969). This heathland increased in density with an amelioration of climate throughout the early Flandrian, with juniper (Juniperus) and crowberry (Empetrum) increasing in proportion. It is unlikely that trees were even a minor constituent of this dense heathland, although pine (Pinus) may have had a presence in the islands. These conditions lasted for three millennia or so but by the mid Flandrian a colonisation by birch (Betula), hazel (Corylus) and willow (Salix) led to a transformation of the heathland into a scrubland containing these trees but also containing ferns and tall herbaceous plants. The limited molluscan evidence for Orkney (Spencer, 1975) also suggests a period of tree decline.

Keatinge and Dickson, in a recent (1979) study of the Mid Flandrian vegetation of Mainland Orkney, confirm the likely sequence of vegetation up to this period. In addition, they were able to add some absolute dating. They suggest that the low birch-hazel-willow woodland with an understorey of tall herbs and ferns lasted until about 5000 bp. At this time, which corresponds to the period of elm decline elsewhere in Scotland, the open woodland was replaced by a completely tree-less vegetation with high values for the grasses (Gramineae), ribwort plantain (Plantago lanceolata) and buttercups (Ranunculaceae) associated with decreasing values for birch (Betula), hazel (Corylus) and ferns (Filicales) Plantago lanceolata is commonly seen as an indicator of vegetation disturbance due to land being used for pasturing domestic animals. This, in conjunction with the overall pattern of change noted around this time appears to have been interpreted by pollen analysts as strong evidence for the introduction of agriculture by the (presumably newly-arrived)

Neolithic inhabitants of Orkney. As Davidson and Jones have written

"..when there is well-documented archaeological evidence, as is the case for the Orcadian Neolithic, it is reasonable to infer that high values of grass, ribwort, and a range of other herbaceous pollen toxa including cruciferae (Cauciferae) and mugwort (Artemisia) reflect agrarian practices, probably of a predominantly pastoral kind" (Davidson and Jones, forthcoming).

There is danger of a circular argument here. Archaeologists accept as a new insight a particular conclusion produced by pollen analysts which may be based partly on archaeological information. In this case, Neolithic occupation of Orkney has been shown by archaeologists, and so a change in vegetation patterns at approximately the beginning of that occupation (the earliest radiocarbon date from a human occupation being from Knap of Howar where a midden has produced dates of 4765 ± 70 bp (SRR-348)) is attributed to the effects of the proven Neolithic colonisation. Despite this caution, the evidence does seem to argue strongly for an introduction of pastoral agriculture into Orkney, and furthermore, to date that introduction to about 5000 bp. In the absence of any positive evidence for pre-agricultural settlement of the islands, it is reasonable to argue that the first human inhabitants of Orkney arrived about this time.

This tree-less landscape with many pastoral, herbaceous plants continued throughout the next millennium or so, as is confirmed by the analysis of pollen found at the archaeological sites of the Stones of Stenness, (Caseldine and Whittington, 1976) and Maes Howe (R.L. Jones, 1979). Such an environment may well have continued into the third millennium bp: the evidence for vegetation in the Bronze Age is as scanty as the reliable evidence for human settlement during the period. There do seem to be signs that growth of peat began about the end of the fourth millennium bp (Keatinge and Dickson, 1979), perhaps associated with a deterioration of the climate. This evidence for Bronze Age environments suggest an increasing use of the land for pastoral purposes resulting in the initiation of blanket peat formation on the hills. This peat growth continued well into the third millennium bp, but there is no indication of radical changes in agrarian practices with the grazing of animals and minimal signs of the cultivation of cereals continuing into the Iron Age. Peat growth was accelerated about 2500 bp due to the advent of colder, wetter conditions throughout the whole of the British Isles - the sub-Atlantic period. Vegetation became dominated by heathland with Calluna vulgaris typical of the species which became more widespread.

A source of bias in all of the palynological evidence for Orkney must be pointed out. All of the analyses which have been carried out have been on material from the Orcadian Mainland. Skara Brae, Skaill, Buckquoy, Birsay, Quanterness, Maes Howe, and Stenness are all situated on the major island and little, if any, pollen analysis has been performed to date on sites in the north and south isles. Due to the generalised nature of the conclusions which may be drawn from pollen analyses, it is not likely that a different story will emerge from the small isles, but the possibility that vegetation on the Mainland differed in some way from that of Westray or Stronsay must be borne in mind.

This review of the vegetational history of Orkney leads to the conclusion that climatic conditions in the fifth and fourth millenia bp may not have been altogether different from those which prevail today. The natural vegetation which would thrive at the present, were the islands only minimally affected by human disturbance, would not be dissimilar to that which thrived in the fifth millennium bp and, in the lack of any evidence to the contrary, it is tempting to assume that a description of the climate today will suffice for a description of the climate then. The essential characteristics of the Orcadian climate today rest on three features: pronounced oceanicity, high incidence of wind, and high latitude. The islands are surrounded by ocean currents, being at the nexus of the North Atlantic Ocean and the North Sea. This produces a marked evening-out of extremes of temperature (Figure 2.6). Wind is a dominant characteristic of every season of the year (Table 2.7). The high latitude of Orkney (Kirkwall is $58^{o}58'$ north of the equator) means that there is a great variance in the number of daylight hours between winter and summer (Figure 2.8). Rainfall, although not large in total is also inequitably distributed between the seasons (Figure 2.9).

One more aspect of the developing environment of Orkney since glacial times remains to be discussed. The changing configuration of land and sea has aroused much interest in archaeology recently, and three recent conferences have been devoted to the subject (Thompson, 1980; Brothwell and Dimbleby, 1981). In Orkney, prehistorians have always been aware of rapid morphological change: both Skara Brae and Links of Noltland were buried by wind-blown sand at some time in the past and are currently being exhumed. There are two elements of coastal change which are of interest here:

1. changes in the altitudinal relationship between land and sea
2. changes in the local areal configuration of land and sea.

The first of these topics, vertical movements of the coastline since the last retreat of ice, has occupied much of the geomorphological literature of Scotland during this century. A convenient summary of the still-continuing debate is provided in Chapter III of Steers (1973). The general consensus of opinion is that there was once an ice cap centred on Rannoch Moor. The removal of this weight of ice resulted in isostatic uplift of the land, with decreasing vertical movement away from the Moor. This rising of the land was accompanied by a eustatic rise in sea-level - a transgression - which in places on the periphery of Scotland may have resulted in a relative subsequence of the coastline. There have been two recent still-stands of the sea which have left the characteristic morphological signs of raised beaches and platforms: the late-glacial still-stand and the post-glacial still-stand, formerly known as the "100 ft" and the "25 ft" beaches. Within the last ten thousand years (encompassing the known human occupation) the overall movement on the mainland of Scotland has been regression: the retreat of the sea.

In contrast to the mass of information on vertical movement of the coast from certain areas of Scotland, there has been little work relating specifically to Orkney. As noted above, Traill (1868) observed several patches of submarine peat, implying a lower sea-level, and Steers (1973: 279) draws attention to a wave-cut platform along the north shore of Scapa Flow. The received opinion among geomorphologists is that Orkney lies on, or close to, the zero isobase of post-glacial sea-levels. That is, Orkney is located on the line of tilt between areas which have undergone a resultant emergence, and areas which have suffered submergence in the last ten thousand years. A corollary of this is that the total effect on land-sea relationships in Orkney is likely to have been minimal: any change in sea level is likely to have been on the order of only a few metres. This view seems coherent enough, but lacks published support based on field-work.

Several recent observations may act as a beginning to research aimed at describing these movements in detail. Dr Donald Davidson (personal communication) has observed small cliff-like notches about a metre above the present water level in some of the inland lochs of the Mainland. At the Loch of Tankerness in the East Mainland, Dr Raymond Lamb (personal communication) has found artificial structures exposed at the water's edge during a time of drought when the loch level was lower than normal. Close to the prehistoric settlement at Links of Noltland, Westray, Dr John S. Smith (personal communication) has noted a wave cut bench capped with a former beach, the assembly being associated with a sea level one or two metres higher than at present. This accords with the writer's observation that deflation of the machair system at Links of Noltland is conditioned by a base level which may be a former beach platform. None of these single observations are conclusive in themselves, but taken together suggest a time in Orkney's recent past when the sea-level was of the order of one metre higher than present. Such a transgression would not make a great difference to the area of utilisable land above mean sea level in the islands: the range of spring tides in Orkney is currently about 3.0 m (North Sea Pilot, 1934: 10). But a metre's difference in sea-level could conceivably have a significant effect on the second topic under discussion here - local changes in land-sea relationships.

Changes in the local areal configuration of land and sea are usually catastrophic events: they are geomorphological events operating over short time-scales and hence often attract attention. Gordon Childe (1931: 95), when describing the interment of Skara Brae recognised the relative speed with which the settlement was covered by sand. Again, there are many prehistoric sites in Orkney which are seriously threatened by coastal erosion: Links of Noltland in Westray is undergoing rescue excavation due to a rapid and unstoppable down-wasting and back-wasting of a machair system. These two settlement sites exemplify the two categories of geomorphological action which may result in changes of the shape of the coastline: deposition and erosion.

Depositional coastlines are rare in Orkney today. Where they do occur they are invariably the result of sand or shingle being blown onshore from submarine sources. One modern example is the build-up of sand around the four Churchill Barriers linking the Mainland, Burray and South Ronaldsay (Kerr, 1979), involving a considerable deposition of sand since the Barriers were built less than 40 years ago. This example is exceptional and is solely due to massive human intervention in the environment. Other, relict, examples of depositional landforms include "ayres" or shingle bars and machair systems. The latter have several representatives in Orkney including the Bay of Skaill area and the Birsay area of the Mainland, and the North Links and Mae Sand in Westray (Mather, Smith and Ritchie, 1974) (Figure 2.4). Unfortunately, no work has ever been attempted which would firmly date these depositional features and so the relationships of periods of coastal formation to the periods of prehistory are as yet obscure. An excellent opportunity has recently arisen to link the geomorphology and archaeology of the Links of Noltland (North Links) machair system. This work is being undertaken by Dr John S. Smith in conjunction with the writer but it is too early yet to build up a chronological and interpretational history of the Noltland area.

Erosional coastlines are much more common. To take just a single class of prehistoric monument, there are several cases of chambered cairn which are actively eroding into the sea. These cases are discussed in Appendix A, but the worst examples are undoubtedly Point of Cott (ORK 41) and Tresness (ORK 50). The extent of erosion at Point of Cott is vividly demonstrated in Plate A. The cairn of Tresness is located on a peninsula connected to the island of Sanday by a long line of sand dunes which is occasionally breached during winter storms (Lamb, personal communication). Once again, no work has ever been published in modern times which attempts to describe the serious and potentially catastrophic extent of coastal erosion. Archaeologists are well aware of the problem - it was thought necessary to build sea walls for protection from the sea at Skara Brae, Midhowe broch, Gurness broch, and the Brough of Birsay - but without a systematic geomorphological study, it is impossible to gauge the possible course of coastal erosion in the future or to extrapolate backwards in time. The only point which can be made with some degree of certainty is that the predominance of erosional coastlines over accretional coastlines in Orkney today is some indication that the island-group is in a state of overall submergence. Unfortunately, this limited conclusion may not be extended back to the Neolithic period without a concerted programme of study.

Is it possible to draw any useful conclusions from this brief look at the history of the natural environment of Orkney? It is certain that our knowledge of that history is very uneven: we know in some detail about the geology and glacial geomorphology of the island-group and we have some notion of its vegetational history due to pollen analysis. But there are large gaps in our knowledge of the geomorphologically recent landforms and our knowledge of past climates is even more skimpy, being based solely on the vegetational evidence.

Despite the uneven nature of our understanding, it should be possible to achieve a minimal description of Orkney for the fifth and fourth millennia bp. Inevitably, such a description will constantly use the present state of Orkney as a comparison, but this is a strength since the reference points of all modern archaeologists and palaeoenvironmentalists are in the present.

The basic layout of the islands of Orkney in the fifth and fourth millennia bp was much as it is today. Mean sea level was within the present tidal range and the islands which are separate land masses today were separate land masses then. (It has been suggested that Papa Westray may have been linked to Westray in the early Neolithic period: this proposition remains to be proven). There may have been minor differences in the configuration of the coastline and these minor differences may have had the effect of obscuring or destroying valuable archaeological evidence, but considering the island-group as a whole, any changes in coastal land forms have been minimal. As an obvious corollary, Orkney was separated from the Scottish Mainland, and a sea-crossing of the Pentland Firth was necessary to reach the island-group.

At the beginning of the fifth millennium a low birch-hazel scrub vegetation was replaced by a tree-less vegetation of grassland with common floral species including ribwort plantain and mugwort. Such vegetation today can be found on lowlying uncultivated ground. At the same time, some areas of machair vegetation may have been in existence. These vegetational changes are associated with the introduction of pastoral agriculture and help to date the first human occupation of Orkney. This pastoral landscape was relatively stable throughout the next two thousand years. The climate may have been slightly warmer and wetter than today but the prevailing oceanity of Orkney's position would have ameliorated extremes of climates.

Since the fifth millennium bp there has been only superficial change in the landforms of Orkney. Coastal change has already been mentioned and no other natural agent of landform change has had as much effect as those of the littoral fringe.

In essence, the natural environment of Orkney has undergone very little change since the Neolithic period. This is true in absolute terms but also in relative terms: compared with much of the mainland of Scotland and with Atlantic Europe in general, the northern archipelagos including Orkney have suffered a lesser degree of environmental change in post-

Glacial times. It is not an intention here to minimise the extent of changes which have occurred, but simply to state that if a study which requires knowledge of Neolithic environments is going to be attempted, and if a secure knowledge of those environments depends to some extent on analogy and interpolation of present-day environments, then Orkney is one of the places in Europe where that study will best succeed. Both of these stipulations apply to the present thesis.

CHAPTER THREE: THE CULTURAL LANDSCAPE OF ORKNEY

3.1. THE EVOLUTION OF THE CULTURAL LANDSCAPE

This study is concerned with the human occupation of an island-group for a period of time. Such a study is of interest in its own right but acquires more meaning when it can be related to the entire history of the island-group. Neolithic Orkney should not be seen in isolation: it is but one part of a continuous and continuing story. Accordingly, in order to place the subject of this thesis in perspective, the following pages consist of a brief review of the succession of occupation in Orkney from earliest times to the present, from the cairn-builder to the archaeologist.

There is no trace of human occupation before the arrival of the tomb-builders. According to Morrison (1980: 164) the furthest north that material of putatively Mesolithic date has been found in Scotland is at Freswick Sands in Caithness. Similar material has been found between Golspie and Dornoch in Sutherland and at the Culbin Sands in Moray. None of these finds can be securely attributed to the Mesolithic and so it seems likely that, if pre-Neolithic hunter-fisher people did penetrate into the extreme north of Scotland, then their presence there was ephemeral. This is not to say that evidence of a Mesolithic people might not be forthcoming from Orkney in the future: there is no *a priori* reason why they could not have reached the islands.

For the moment, it is assumed that a Neolithic people, with its cultural baggage of chambered cairns, pottery, stone tools, and agriculture, were the first to reach and live in Orkney. An occupation which began about 3000 bc (the earliest dated site is Knap of Howar - see Table 9.11), this earliest settlement showed itself in the Orcadian landscape by a change in the vegetation cover and by a scatter of chambered cairns across the plains and hills. In addition, there must have been settlements, built of stone and turf. Sadly, few of these survive to our knowledge.

At some indeterminate time later, the cairn-builders no longer lived in Orkney: instead, the dead were interred in tombs which were not intended to be reused. There are literally hundreds of cists, barrows, tumuli, and mounds in the islands. Not all of them need date from the Bronze Age but a sufficient number have been excavated to confirm that there were certainly Orcadians in the second and first millennia bc whose burial practices conform to those of the Beaker people and subsequent Bronze Age cultures of Scotland (M.E. Hedges, 1977). Until recently, the settlements of these people were undiscovered but excavations by J. Hedges (1975) have shown that a class of monuments hitherto undated in the prehistoric record should perhaps be regarded as the settlements of the Bronze Age in Orkney. Burnt mounds, of which there are over 200 in the islands are heaps composed of fire-cracked stone, carbon and ash. They have no regular shape and are frequently situated close to water. At the excavation of two of these mounds, at Liddle in South Ronaldsay and Beaquoy in the West Mainland, Hedges found evidence of stone-built structures underneath the mounds. These structures, or houses, contained flagged floors, hearths, and large lined troughs. The interpretation is that these troughs were filled with water and used for the cooking of meat by boiling, the water being heated by stones from the adjacent fire. Thus the material of the burnt mound itself is the debris from a method of food preparation. These people left behind stone and flint tools, and a few shards of bucket-shaped flat-rimmed pottery were found at Liddle. The dating of burnt mounds rests on physical methods of dating which would suggest they were in use around the turn of the first millennium bc. Further excavation might show the burnt mound builders to have occupied Orkney for centuries before and after this date.

The next change in the settlement record of Orkney is signalled by a change in the design of domestic structures, and by a corresponding change in the material culture. From the first half of the first millennium bc and into the next millennium, the islands were peopled by a group who built large, round, defensible, houses and who used some tools of metal. Conventionally, the period is known as the Iron Age and is characterised by the broch - a stone built circular tower of which there may be (depending on definition) around fifty to eighty extant examples in Orkney. The literature on this period of prehistory is voluminous and, for once, Orkney does not stand alone as an isolated, aberrant region of Scotland. Recent excavations of Iron Age round houses in Orkney include Renfrew's (1979) discovery of a roughly circular domestic structure overlying Quanterness chambered cairn. The artefacts, and particularly the pottery, from this site can be paralleled from post-Bronze Age contexts at Jarlshof and Clickhimin and the radiocarbon dates place the round house firmly in the mid first millennium bc. The debate continues as to the connection, or indeed distinction, between round houses and brochs (Hedges and Bell, 1980). The debate also continues as to the purpose and origin of the broch, a structure unique to the north and west of Scotland (Mackie, 1971 and Fojut, 1980). It seems likely that Iron Age settlement of this type continued into the first centuries of the first millennium AD. Excavations which are still in progress at Howe, near Stromness, have revealed continuous occupation including two periods of broch and a village of later date (B. Smith, pers. comm.). This village has been termed "Pictish" and contained artefactual material not dissimilar to that recovered from the Pictish phases of the multi-period farmstead at Buckquoy (A. Ritchie, 1977). That farmstead exhibited six phases of activity and demonstrated continuity of settlement from the Pictish seventh century to the Norse ninth century, with a later Norse burial. Thus in these two sites Ritchie and the officers of the North of Scotland Archaeological Services have demonstrated a sequence of settlement spanning over a thousand years, from the Iron Age into the historic era, which shows no signs of major social discontinuity.

Throughout the entire prehistoric period in Orkney, the economy of the islands was fundamentally undifferentiated.

Orcadians have always been a pastoral farming folk, supplementing the food of the land with food from the sea. Excavations of prehistoric sites dating from the Neolithic to the Iron Age have yielded evidence of domesticated animals, including cattle, sheep, goats, and occasionally pig. Non-domesticated animals such as deer were also eaten. Some grain was grown throughout Orkney's prehistory. Sea-food included many varieties of fish and shell fish, also large sea mammals. In short, the evidence shows that Orkney's prehistoric inhabitants have fully exploited the environmental resources of their islands from earliest times.

With the exception of passing references by classical authors, the historic period in Orkney began in the early centuries of the present millennium. The Orkneyinga Saga, or the History of the Earls of Orkney (Pálsson and Edwards, 1978) was written down in Iceland in the early thirteenth century but tells the story of the rulers of Orkney from the ninth to the twelfth centuries, that story being inextricably linked with the history of Scandinavia and the islands of the North Atlantic.

The saga is governed by certain literary and stylistic conventions but nevertheless it is a valuable historical source. It tells us that Orkney was gifted to a Norse earl, Sigurd Eysteinsson, in the ninth century. Little mention is made of the indigenous inhabitants, but very soon afterwards, the islands were Norse in custom and rule. The Earl of Orkney owed allegiance to a Norse king who controlled his dependancy by ensuring that the earldom was always under contention. Within the islands, an aristocratic hierarchical society prevailed with a rigid social stratification from the earl down to the slave. The archaeological record of the Viking period in Orkney is voluminous but unplumbed. The upstanding monuments of this period include the magnificent St. Magnus' Cathedral, the Earl's palace and the Bishop's palace in Kirkwall, Cubby Roo's Castle in Wyre, and the round church of Orphir. However, the only extensive archaeological investigations have been at the early Christian and Norse settlement of the Brough of Birsay. These have revealed a church and palace, but also a range of Norse domestic houses - long single rooms with a central hearth and side benches. Excavations by Morris and Hunter continue at Birsay and promise to add more to our knowledge of the transition between Pictish and Norse Orkney.

Orkney continued in the thralldom of the Scandinavian kings until 1468, when the islands came under the sway of Scotland. Throughout the Mediaeval period, Orkney was a peripheral part of Scotland and operated economically and politically in the same spheres as Scotland. Feudalism was the dominant social order with a superior class of land-owners exacting levies from a numerically large class of peasant farmers. This system persisted into the nineteenth century. From the end of the eighteenth century there is an abundance of historical writings and excavation as a method of examining past societies becomes less relevant. Descriptions and histories of the islands abound: the most useful include Low (1978), O.S.A. (1978) and Barry (1975), all of which are contemporary accounts of Orkney in the late eighteenth century, and Tudor (1883) and Firth (1974) which include descriptions of Orkney life in the mid-nineteenth century. The finest synthesis of all is Fenton's (1978) The Northern Isles, a study of folk life in the historical periods.

The cultural landscape of Orkney is a palimpsest on which successive societies have left their mark over a period of at least five thousand years. In recent centuries the landscape has suffered increasingly heavy disruption as our technological society built fields and roads and airports. But the earth endures, as do some elements of these earlier societies. It is the task of this study, as in most endeavours in prehistoric archaeology, to peel away the overlying layers, and expose something of the earliest cultural landscapes.

CHAPTER FOUR: THE ARCHAEOLOGY OF NEOLITHIC ORKNEY: A HISTORY

4.1. INTRODUCTION

Table 4.1 lists the known excavations of sites of the earliest prehistoric periods in Orkney. In all, there have been 54 such excavations, more than half of which were conducted this century. For such a restricted time period in such a small island-group, this represents a great concentration of effort, a concentration which would be hard to match elsewhere in the world of archaeology, and which is certainly unparalleled in Scottish prehistory. This presents the possibility of gaining an understanding of the Orcadian Neolithic in greater depth than is possible for other places and times of prehistory. Certainly it is true that recent works of synthesis in British prehistory such as MacKie (1977a) and Megaw and Simpson (1979) draw heavily upon Orcadian examples.

As a brief introduction to the history of archaeological investigation in Orkney, Figure 4.2 shows the dates of recorded excavations on chambered cairns, henges, and early prehistoric settlement sites in Orkney. In all 40 investigations have been made of 31 cairns, two henges have been explored, and twelve excavations have been conducted at four settlement sites. There have been three periods of activity: in the 1850s and 1860s when 13 investigations were carried out, mostly by Petrie, Hebden, and Farrer; between 1932 and 1941 when a further 17 investigations were made, mostly by Calder, Callander, and Grant; and in the

1970s when Orkney received the attentions of several archaeologists from Edinburgh and England. As is to be expected, the standard of these excavations varies considerably, both in excavation technique and in comprehensiveness of publication. Although variety of small finds may not be the best measure of archaeological value, a comparison of these excavations of chambered cairns which produced many finds (defined as having recorded finds belonging to three or more of the five categories: pottery, flint, stone, animal bone, and human bone) with those that produced few finds shows that the methods used by the antiquaries of the nineteenth century may have been less efficient than those of their modern counterparts. Four out of 17 excavations (24%) of the nineteenth century produced many finds while 17 out of 23 (74%) this century produced many finds. If it is taken into account that several investigations this century have not been primarily concerned with the recovery of artefactual material, these figures argue even more strongly for the effectiveness of modern excavation techniques (Fraser, 1980b:6).

It is plain that our picture of the earliest farmers in Britain would be different without such a depth of information from Orkney, but it is equally clear that that picture has not remained static over the last two hundred years. Ever since archaeology became a recognised discipline, its rationale and objectives have been in constant change. Archaeologists themselves have held differing attitudes to their work, and the societies around archaeologists have regarded them in different ways. Both of these relationships are crucial to the type of work which is done by archaeologists, and to the statement of that work in published form. Accordingly, it is the object of this chapter not only to discuss the archaeological investigations of the Neolithic period in Orkney during the last two centuries but also to note how those investigations have changed in character as modern society has changed in character.

4.2. 1792-1901: GENTLEMEN AND PIONEERS

The earliest recorded excavation of a Neolithic site in Orkney is noted in Sir John Sinclair's Statistical Account of Scotland (O S A , 1978: 326-7). There the rifling of the Earl's Knoll (ORK 14) on Papa Stronsay is described by the incumbent minister of Stronsay and Eday, John Anderson, among a description of the chapels and kirks of the islands. This indicates that, at the end of the eighteenth century A D chronological distinctions between ancient and modern were hazy and that general knowledge of times past was severely limited, a contention given support by the minister showing no surprise that the inhabitants of Papa Stronsay were formerly "of enormous size" (O S A , 1978: 327).

A second similar exploration of a chambered cairn took place at Quanterness (ORK 43) sometime before 1805. It is recorded by Barry (1975) in a meticulous way. The structure of the building - a circular cairn with a passage leading to a central chamber which has six side cells - was described in detail as were the floor deposits. Although Barry, in common with many writers of his time, was happy to repeat the comments of the classical authors on the early history of Britain, he was among the first to produce a classification of prehistoric monuments that owes nothing to Pliny or Tacitus. Barry recognised three types of monument: tumuli or barrows, for the disposal and memoralising of the eminent dead; standing stones, of unknown purpose; and Picts' houses, for use as watch towers and for other military purposes. This latter grouping included the chambered cairn of Quanterness as well as the whole spectrum of brochs and duns.

Anderson and Barry are separated in time by several decades from the next writers on the prehistory of Orkney. This is not to say that no explorations of prehistoric sites were attempted during the first half of the nineteenth century (the cairn at Eday Manse (ORK 16) was opened in the early decades of the century according to Hebden (1862)) but it is true that no records of any such explorations are easily accessible today. This is in itself a comment on the attitudes of inhabitants of, and visitors to, the island-group. Either nobody was curious enough to attempt excavation or, if excavations were carried out, then the results were not thought worthy of dissemination in print.

The latter is probably the case since Orkney was then experiencing a period of population growth from 23,654 in 1793 to a maximum of 32,225 in 1861 (Barclay, 1966: 45) accompanied by the breaking out of new land which must have resulted in the discovery of many sites that would later be regarded as being of antiquarian interest. We do not know how many prehistoric sites were casually explored in this period but it is improbable that no chambered cairn, burial mound, or broch, was entered. A parallel from Shetland has been noted by Fojut (1980: 108) who points out that in 1859 a considerable body of developed local antiquarian knowledge existed concerning the brochs of Shetland although little had appeared in print.

The latter half of the nineteenth century brought a revolution in attitudes towards prehistory which was part of a greater movement in the pursuit of knowledge throughout Victorian Britain. This revolution is exemplified by an increase in publications devoted to items of antiquarian interest and an increase in the opening of archaeological sites. In Orkney, the upsurge of interest in subjects antiquarian resided mainly in the hands of three gentlemen: James Farrer, George Petrie, and Robert Hebden. Farrer, a member of the Westminster Parliament, came from Yorkshire and spent several summers excavating in Orkney. Petrie and Hebden were both resident in the islands: Petrie being a Sheriff Substitute for Orkney, and an elder of the Free Presbyterian Church, while Hebden was proprietor of much of the island of Eday. Of these, Petrie was the most meticulous in observation and most conscientious in recording the details of his excavations - his notebooks survive today in the National Museum of Antiquities in Edinburgh.

Between them, these three excavated eleven chambered cairns between 1849 and 1867 (Table 4.1). At the same time, other prehistoric monuments in Orkney were excavated, including what we would now call brochs, cists, and souterrains. By the end of this period of activity, the class of monuments now called chambered cairns had not been reduced into a single class. Some, such as Wideford Hill (ORK 54) and Quoyness (ORK 44), were included with the brochs and termed Picts' houses. Others, such as the Calf of Eday tombs (ORK 9 and 10) were seen as subterranean houses. Only Bookan (ORK 4), Burray (ORK 7), Holm of Papa Westray North (ORK 21), and Quoyness (ORK 44) had produced definite finds of human bone while Maes Howe (ORK 36) and Withebeir (ORK 55) had been presumed to be of sepulcral nature.

Holm of Papa Westray South (ORK 22) had been excavated in 1849 by Lieutenant F.W.L. Thomas R.N., another peripatetic gentleman of independent means and wide-ranging interests very much in the mould of James Farrer, and had also failed to produce human remains. When it is considered that this site, and the mound of Maes Howe, are still without reasonable parallels in Scotland, it is not surprising that the prehistory of Orkney was a matter for uncertain conjecture. Indeed, it is no surprise that Petrie's Classes of Antiquities, described thus:

"I Ancient Dwellings
  i. Subterranean chambers
  ii. The so-called Picts-houses not probably subterranean
  iii. Brughs or Burgs
II Barrows or Grave Mounds, and Graves
III Miscellaneous Antiquities, such as Standing Stones, old dykes, &c."

(Petrie, 1856: 1)

did not differ greatly from the scheme proposed by Barry fifty years previously. Nevertheless, there is no doubt that these antiquarians were in the mainstream of academic research. As an example, Petrie was well aware of

> "the importance of antiquarian relics which at first sight may appear not worth the effort of lifting, but which, when all the circumstances connected with them are considered, may furnish proofs of valuable historic facts hitherto uncertain or wholly unknown".
>
> (Petrie, 1856: 1)

and cites a case from his own experience when a bone of Bos Longifrons was used to date the Picts' house on Wideford Hill to before the Roman invasion of Britain. Furthermore, when Joseph Anderson was delivering the Rhind lectures in 1881 and 1882, he referred to more than twenty-five Orcadian prehistoric sites (Anderson, 1883 and 1886).

We have seen that the Orcadian antiquarians of the late nineteenth century were generally, within the limitations of an embryo discipline, as determined as archaeologists today to describe and preserve ancient remains. But their opinion of the people who left those remains was very different. From a background of Victorian colonialism at the height of the British Empire it was easy to conceive of the Stone Age inhabitants of Orkney as being on the same level as the indigenous races which were subject to imperialist rule the world round. In the same way that General Custer was able to talk of the American Indian as a "savage .... whose cruel and ferocious nature far exceeds that of any wild beast of the desert" (quoted by Vogel (1974: 167)), then Petrie was able to talk of a passage "through which a naked savage might contrive to squeeze edgeways and coil himself in the interior" (Petrie, 1856) of his supposed dwelling house (actually the chambered cairn of Calf of Eday South-East (ORK 9)). This dual attitude of reverence for the physical remains and disdain for the uncivilised people who built them is encapsulated in an anonymous poem about the Ring of Brogar which appeared in Kirkwall in the 1850s:

"Those huge old stones so gray with age
Have they no place in History's page
No record of the past to tell
No bloody rites, or mystic spell
Of victims at the altar bound
On yonder stone-encircled ground.

We come, we wonder, and we gaze
On those remains of other days
But none can lift the close dark veil
Or read their old and wondrous tale
Perhaps within that stony ring
The Judges held the ancient 'Ting'
Where Justice swift and stern was given
Beneath the canopy of heaven
And near at hand the temple stood
Where priestly hands were dipped in blood
Ah! If those hoary blocks could speak
Their words might blanch the ruddiest cheek
And make the stoutest heart to quail
At many a dark and ghastly tale
Methinks I see the victim's face
Paled by the horrors of the place
Methinks I hear his fearful cry
Pierce upwards to the vaulted sky
No pity moves the circling throng
As through the midst he's dragged along
No friendly eye is dimmed with tears
No kindly voice allays his fears
But all around the savage cries
Too surely tell the victim dies
'Twere fitting that such scenes of blood
Should be where tongueless records stood

So close by yonder water's side
Should flow the fearful crimson tide -
That in the lake's oblivious wave
The victim's blood might find a grave;
And when in future ages man
Should seek these bygone rites to scan
And know the circle's history
Those huge old stones should silent be."

(The Orcadian 2/6/1855:2).

During this period, the first recorded excavation of a Neolithic settlement in Orkney took place at Skara Brae after it had been uncovered by a storm. The proprietor of Skaill, William Watt, collected many artefacts from the site in the 1850s (Petrie, 1868) and in the next decade explorations were made by both Farrer and Petrie. Farrer found little and concluded:

> I do not think anything is likely to result from further excavations at Skaill
>
> (Farrer, 1861)

(Later in the decade, Farrer's hurried approach to digging was again apparent at Quoyness (ORK 44) when

> ... being pushed for time, I was unable to remain until all the cists had been entirely cleared out, but this has subsequently been effected ...
>
> (Farrer, 1868:400))

Petrie, however, laid the foundations for future excavations at Skara Brae. He recognised the place as a series of dwelling houses, but was unwilling to commit himself to a date until more of the settlement and surrounding sites had been excavated. (Petrie, 1868).

Up to the beginning of the present century, three more chambered cairns were excavated, each being published according to the standards of the time - although Cuween Hill (ORK 12) had been entered in 1888, more than a decade before Charleson's full scale excavation. The first of these, Unstan (ORK 51), was entered in the conventional manner by digging down until a roof (in this case of the passage) was encountered. The excavator, Robert Stewart Clouston, was familiar with the work of others in the field, including the discoveries of Joseph Anderson in the Caithness tombs. Unstan is an important site because the mound gave its name to a class of pottery whose place in the spectrum of Neolithic pottery is still unresolved. Ten urns from Unstan were illustrated in Clouston's report to the Society of Antiquaries of Scotland, the first illustrations to appear in print of Orcadian Neolithic pottery (Clouston, 1885).

The excavators of Cuween (or Kewing) Hill chambered cairn (ORK 12) found a rectangular chamber with four cells constructed in masonry of a remarkably high standard. That Malcolm MacKenzie Charleson, a solicitor in Stromness, failed to comment on the excellence of the stone work coupled with his failure to draw comparison with the similar structure of Vinquoy Hill (ORK 53) in Eday, suggests that he was not perhaps as versed in contemporary archaeology as he might have been. Nevertheless, his account of Cuween (Charleson, 1902) includes a detailed report on the human bone encountered there. This account was contributed by Sir William Turner, Professor of Anatomy in the University of Edinburgh, who, shortly after, was to publish an account of an excavation of a chambered cairn in Rousay (Turner, 1903). Taversoe Tuick (ORK 49) had been uncovered by workmen erecting a summer seat for Lieutenant-General Traill Burroughs - the "Little General of Rousay" - and had been partially explored by him. It appears that Turner himself never visited the site but Burroughs and Lady Burroughs provided enough documentation (copies of some now being in the National Monuments Record in Edinburgh) to enable Turner to publish a description of Taversoe Tuick that does not compare unfavourably with other reports of the time.

Several conclusions of a general nature may be made from this brief look at nineteenth century antiquaries and their activities among the Neolithic sites of Orkney. In the first place the excavations which were taking place in Orkney were not conducted in an academic vacuum. Petrie, Hebden, Farrer, Thomas and Clouston were all connected with the Society of Antiquaries of Scotland, whether as Fellows, Honorary Members, or Corresponding Members, and the Society was among the most learned in Europe. Orkney was, even then, recognised as an area rich in antiquarian interest and was cited in works of national, and international import.

Secondly, more effort was concentrated on the artefacts, both structures and portable objects, of Stone Age people than on the people themselves. Little thought was given to the economic life of Neolithic Orkney and still less to its social life. Where life beyond the material was considered, the ancient inhabitants were dismissed as savages or barbarians, both terms having special derogatory connotations. The only actual studies of men and women, as opposed to their artefacts, concentrated on their physical remains of bone and teeth.

The third general point concerns the synthesis of information gathered from the twenty-one excavations so far discussed. Among the chambered cairns excavated there were seven Picts' houses or, to anticipate Henshall's terminology, Maes Howe type cairns. Of these Maes Howe (ORK 36) and Holm of Papa Westray South (ORK 22) were clearly anomalous. In addition two sites on the Calf of Eday (ORK 9 and 10) and Bookan (ORK 4) formed another class of structure. There was no firm dating evidence to separate chambered cairns, cists, and brochs. Apart from being classified as Stone Age on the absence of any metal implements, the material culture of the cairn-builders was sparse and devoid of interpretation. It was by no means certain that a primary function of the cairns was the disposal of the dead: there had been no human bone discovered at eight of the cairns. Only one settlement site, Skara Brae, had been excavated and there was no firm evidence to link that settlement with the cairns. All in all, a great deal of structural information existed on a few sites of very dissimilar nature. With the honourable exceptions of Wilson (1851) and Anderson (1886) no writer had attempted a synthesis which would have placed Neolithic Orkney in its

Scottish or European context.

The archaeologists working in nineteenth century Orkney were, for the most part, gentlemen: men of means and social standing who excavated with the aid of hired workmen and labourers, curiosity their primary motivation. In some ways, their interest in things antiquarian was a dilettantish interest: a few excavations of which we know were never recorded, and there may have been further undocumented cases of howe-breaking. But these gentlemen were also pioneers: they followed no previous path. Many of them, and in particular George Petrie, established procedures of excavation and recording which accorded well with contemporary practices elsewhere. Some of them were perceptive observers and have left records which are still of great use a hundred years later. The antiquarians working in Orkney in the nineteenth century laid the foundations for our understanding of Neolithic society.

4.3. 1913-1955: PROFESSIONALS AND AMATEURS

In the first decades of this century, Skara Brae was prominent in the eyes of Scottish archaeologists, a prominence that has continued up to the present day. The village was explored by a group of antiquarian gentlemen who were members of a house party at Skaill in 1913 (Stewart, 1914). Their report adds little to that of Petrie and it was not until the late 1920s that the village was comprehensively excavated. Under the charge of V. Gordon Childe, the first Abercromby Professor of Archaeology in the University of

Edinburgh, H.M. Office of Works exhumed and conserved many of the structures revealed by an eroding m chair area (Childe, 1931). This excavation was radically different in several respects from those we have examined before and was to set different standards in the publication of prehistoric sites in Orkney. The difference is accentuated by the hiatus in the 1910s and 1920s when no Orcadian early prehistoric sites were excavated, but should be seen as part of a general trend in European archaeology towards increased objectivity and scientific methodology.

The explorations at Skara Brae were conducted in three seasons of work, from 1927 to 1930, although Childe was not present in the first season. This unprecedented length of time is the first clue that the excavations were conducted more methodically than those of the gentlemen and pioneers. The taking of photographs, the drawing of work in progress, and the riddling of floor deposits were all standard procedures. Further clues come in the presence of seven section drawings across the village and the identification of stratification within the midden deposits. These enabled Childe to identify at least four periods of occupation at Skara Brae. The book (Childe, 1931a), and the three papers (Childe and Paterson, 1929; Childe, 1930a; and Childe, 1931b) contain comprehensive specialist reports, the conclusions of which were integrated into the body of the text. It is true, as Clarke (1976: 6) has pointed out, that Childe was constrained in the pursuit of archaeological objectives by the primary objective of presenting the site as a display monument, but there is no doubt that these reports were a considerable advance on previous Orcadian excavation reports. The main strength of Childe's Skara Brae is undoubtedly his integration of all the information gathered and his attempt to place the village in its European context, both in time and space.

Childe considered several possibilities: that Skara Brae was built by the broch builders; that it was similar to the earth-houses of the Iron Age; that it was lived in by the chambered cairn builders; and that the inhabitants belonged to a Late Bronze Age culture. He came to the tentative conclusion that the latter possibility was the most likely, largely on a comparison of the material culture, and finally stated that the foundation of Skara Brae should be dated to
a some time before 500 BC (Childe 1931: 179).

The 1930s, 40s and 50s saw a veritable flurry of activity in the island group with the excavation of no less than seventeen chambered cairns and two early prehistoric settlement sites (Table 4.1). There are four notable personalities who were greatly responsible for this activity. Childe continued his interest in Orkney and excavated another
ny settlement site, Rimjo, in addition to two chambered cairns, the latter once more under the auspices of H.M. Ministry of Works. J. Graham Callander, the Director of the National Museum of Antiquities, participated in four excavations and contributed several specialist reports, as well as always being prominent in academic discussions of the Scottish

Neolithic. Charles S.T. Calder, an architect with the Royal Commission on the Ancient Monuments of Scotland, excavated four tombs on the islands of Eday and Calf of Eday. Finally there was Walter G. Grant, proprietor of much of the island of Rousay. This gentleman, judging by the number of excavations with which he was involved, must have been an enthusiastic lover of prehistory. He participated in the exploration of n/ ten chambered cairns and the settlement of Ri~~m~~yo. In addition, as the Inventory makes plain (RCAMS, 1946), he explored prehistoric sites of all kinds on his island, including the massive broch of Midhowe. Unfortunately, his last four sites, Knowe of Rowiegar (ORK 31), Bigland Round (ORK 2), Kierfea Hill (ORK 26) and Knowe of Craie (ORK 27) remain unpublished in full form. If we include the excavations of Wideford Hill (ORK 54) (a M.O.W. consolidation by Howard E. Kilbride-Jones) and the first excavations at Knap of Howar settlement (by William Traill and William Kirkness), there are fifteen excavation reports from this period. Inevitably, they vary in quality (to which a contributory factor must surely have been the Second World War) but taken as a whole they represent a unique body of information which it would be hard to parallel elsewhere.

Of the cairns excavated during this period, five fall into one distinct grouping: the stalled cairns of Rousay. The similarity of this grouping to the chambered cairns of Caithness was already suspected (Callander and Grant, 1934: 341) but the excavations at Midhowe (ORK 37), Knowe of Yarso

(ORK 32), Knowe of Ramsay (ORK 30), Blackhammer (ORK 3), and Knowe of Rowiegar (ORK 31) confirmed their basic affinity with the cairns on the Scottish mainland while, at the same time, pointing out the essential structural differences. The excavation of the Rousay stalled cairns, and two other cairns in the island, led to a rare situation in which the majority of the known Neolithic monuments in a small area had been explored: Childe himself took advantage of the high level of information from the island (Childe, 1942) and Rousay has appeared in many archaeological arguments since then. But Rousay has never been seen simply in isolation: Knowe of Lairo (ORK 28) was revealed to consist of a tripartite chamber beneath a long horned cairn, a configuration well known from Caithness. Again, the re-excavation of Taversoe Tuick (ORK 49) revealed two chambers, one on top of the other, a pattern which was being uncovered in the same year by Calder at a site on the Orcadian island of Eday. (The proprietor who aided Calder in Eday, Major Harry H. Hebden, was a grandson of Robert J. Hebden). This site, Huntersquoy (ORK 23) was one of the four chambered cairns explored by Calder in 1936 and 1937, four cairns, which, although located within six kilometres of each other, are remarkable for their structural diversity linked to an underlying homogeneity. Huntersquoy is a round cairn with a tripartite chamber on top of a sub-divided rectangular chamber. Calf of Eday South-East (ORK 10) contains the latter element of this arrangement in a small round cairn. Sandyhill

Smithy (ORK 47) contains the former element - the tripartite chamber - in one of the smallest of Orcadian cairns. Calf of Eday Long (ORK 8) also contains two chambers, one of which is sub-divided and rectangular, whilst the other has its closest parallels in the Rousay stalled cairns. Thus Calder's excavations show several different strands of structural design coming together and demonstrated the connection of the Orcadian chambered cairns with similar structures further south. This impression was certainly not disproved by the material culture associated with the Rousay and Eday tombs. Callander was able to parallel pottery from Midhowe with pottery from the west of Scotland and from the south of England (Callander and Grant, 1934: 335), as was Edwards with pottery from Sandyhill Smithy (Calder, 1938: 215), and Calder could parallel stone axes from Eday with similar examples from Caithness and Arran (Calder, 1937: 128).

The last grouping of cairns excavated during this period were the "Picts' houses" of Wideford Hill (ORK 54), Quoyness (ORK 44), and Maes Howe (ORK 36). These were all undergoing consolidation for display, having been originally explored by Petrie and Farrer, and so might not have been expected to produce much new information on structural design. In fact, the presence of internal concentric walls, which Anderson (1886: 284-5) had suspected would occur in this class of cairn, was confirmed at all three sites. In addition, examination was made of the rare features of a ditch encircling the cairn at Maes Howe, and a platform around the cairn at Quoyness. Artefactual remains from the three cairns were almost non-existent, which meant that the cultural relationship between the Maes Howe type cairns and other chambered cairns was as much a matter for conjecture as ever.

In addition to the chambered cairns, the excavations of two prehistoric domestic settlements are of interest here. A short report by William Traill (the proprietor of Holland in Papa Westray) and William Kirkness (1937) describes the uncovering of a pair of superbly-built drystone houses at Howar (or Knap of Howar) in Papa Westray. Like Skara Brae, this was a rescue excavation since the sand-covered site was eroding into the sea. The buildings had no exact parallels in Scottish archaeology, and although a date contemporary to Skara Brae was considered, the excavations eventually suggested that Knap of Howar was used by the same people as built brochs. This suggestion was prompted by similarities between broch architecture and that of Howar, and a compatibility between the artefactual remains associated with brochs and those found at Howar. At the time Knap of Howar did not enter into any discussion of the Neolithic period: its importance was not to emerge for another forty years.

The second prehistoric settlement is the crucial site of Rinyo in Rousay. Another discovery due to Walter Grant, two excavations by Childe and Grant took place there, separated by eight years due to the intervening war. It emerged that Rinyo was a stone-built village, with some architectural similarity to Skara Brae and an artefact assemblage which has parallels there and in the south of England. Childe was confident in assigning a pre-Bronze Age date to some phases of Rinyo on this basis alone and his interpretation of the economic regime of the settlement supported a Neolithic date. Although the term "Stone Age" appears in the title of the Rinyo reports, Childe was at first reluctant to say anything about the relationship, chronological or otherwise, of Skara Brae and Rinyo to the chambered cairns (Childe and Grant, 1939: 31). By 1946, however, more finds of pottery enabled the statement to be made that "the traditions inspiring the makers of the funerary pottery deposited in the classical chambered cairns of Orkney were alive in the Rinyo area" when much of the floor deposits were laid down (Childe and Grant, 1947: 37-8). It was obvious that Rinyo was to be a key site in the elucidation of the Orcadian Neolithic.

By 1955, then, there was a mass of information about the Neolithic period in Orkney. Chambered cairns of four distinct types had been excavated and published. The Royal Commission had published a partial classification of Orcadian cairns (RCAMS, 1946: I, 15-19) and it was recognised that, in addition to being buildings for the disposal of the dead, chambered cairns may have had other functions (Childe, 1942). From less than twenty at the turn of the century, the number of known chambered cairns had increased to over forty. But this multiplicity of non-domestic sites inevitably emphasised the relative lack of settlements of the Neolithic period. The dating of Skara Brae was uncertain: Childe undecided between an Iron Age survival of a Bronze Age tradition (Childe, 1930a) and a Late Bronze Age date (Childe, 1931a), with Callander (1931) arguing strongly for an Iron Age culture contemporary with the broch-builders. Rinyo was responsible for shifting the date of Skara Brae backwards and it became generally accepted that the two sites were broadly of the Neolithic period. Nevertheless, as yet there was no satisfactory established relationship between chambered cairns and settlement sites. In addition, the late Stone Age in northern Scotland was largely seen as a single static era: Piggott's (1954) typological classification of chambered cairns had not yet been assimilated or widely discussed in the literature. These difficulties in dating the prehistoric eras of Orkney may be largely attributed to two factors: the continuity of architectural traditions within domestic sites, and the relative paucity of the material cultures of the time. Both factors are still with us, but in the 1930s and 1940s they seriously hampered progress towards understanding the Orcadian Neolithic.

The period 1928 to 1955 was an exciting time for students of prehistoric Orkney. The methods and techniques used were one step removed from those which had served the antiquarians. Careful digging and detailed recording were the ideal to aim for, and, even if every excavation failed to reach these high standards, the general advance in archaeological method and the increasing professionalism of the discipline had set objectives by which to measure every excavation. An increasing amount of post-excavation research was being attempted: specialist reports from this period include discussions on animal bone, human bone, pottery, pollen, plant remains, minerals, and flints. The individuals concerned in the work, both professionals and amateurs, were generally experienced and competent and this includes the workmen who did the physical labour of excavation - James K. Yorston Sr. who was present at most of the Rousay excavations, was a Corresponding Member of the Society of Antiquaries of Scotland. Most of all, Orkney was favoured by the attentions of Childe, whose grasp of European prehistory in its entirety was unparalleled. During this period, the island-group acquired an international reputation for being dense with prehistoric monuments - a self-fulfilling reputation as more and more effort is concentrated on a small area. Finally, the role of archaeology in a wider context cannot be ignored. Largely due to the activities of H.M. Ministry of Works in preserving guardianship sites for display to the public, Orkney has, ever since, attracted many visitors with an interest in history and prehistory.

4.4. 1958-1981: RECENT EXPLORATIONS

The next significant advances in the study of the Orcadian Neolithic were the publication of three volumes:

Piggott's (1954) study of the Neolithic Cultures of the British Isles, and Henshall's two volume study (1963 and 1972) of the Chambered Tombs of Scotland. Stuart Piggott, Childe's successor as Abercromby Professor of Prehistoric Archaeology in the University of Edinburgh, had excavated long barrows and chambered cairns in the south of Britain and is a prolific writer on all aspects of the British Neolithic. Like Childe, he was a synthesiser of information and, as part of his broad scheme, he felt able to define a northern grouping of chambered cairns, the Orkney-Cromarty group, and to suggest a chronological sequence for their development (Piggott, 1954: chap. 8). Audrey S. Henshall refined Piggott's classification on the basis of many years of field-work and research (Henshall 1963: chaps. 3 and 4) and, in the process, was able to publish details of 57 chambered cairns in Orkney. These two works are discussed in depth in Chapter 9, but their influence was undoubtedly felt by the excavators whose work is examined below.

Demonstrating the continuing involvement of the amateur in archaeology, the next two excavations of Neolithic sites in Orkney were by Simison (Isbister (ORK 25) chambered cairn in 1958 and again in 1976-78) and by Watson (Nev Hill (ORK T15) about 1970). Ronald Simison, a farmer in South Ronaldsay, has fully communicated his discoveries to the profession and the excavations at Isbister have been partly published (P.R. Ritchie, 1959) with more in preparation (Hedges forthcoming). In addition, a valuable museum exhibition entitled "The Tomb of the Eagles" was displayed in Tankerness House Museum, Kirkwall, throughout the summer of 1981. Sadly, with the exception of a plan of the excavated remains (Appendix A) no information is available on the interesting site of Nev Hill.

Isbister is a tomb whose structural configuration bears some resemblance to that of Quanterness (ORK 43), the chamber of which was re-excavated by Professor Colin Renfrew in the early 1970s. In a programme of excavation and allied research (Renfrew, 1979), which included small explorations at the Ring of Brogar and Maes Howe, but was largely based on the discoveries at Quanterness, he set forward a model of the social organisation of Neolithic Orkney which is an important statement about the structure of the society of a small area in prehistoric times.

At the same time as Renfrew was exploring the ditch at the Ring of Brogar, Dr J.N. Graham Ritchie, an investigator with the Royal Commission on the Ancient and Historic Monuments of Scotland, was excavating less than two kilometres away, at the Stones of Stenness. It has recently come to be realised that henge monuments may well be contemporary with some of the Neolithic burial and habitation sites and Ritchie's findings, on the whole, support this impression for Orkney (J.N.G. Ritchie, 1976) implying that archaeological research into the Neolithic period of the island group will henceforth have to take into account two of the most impressive prehistoric monuments, Brogar and Stenness, to be found in the islands, and perhaps also the profusion of single standing stones in Orkney.

In the last decade, equal attention has been paid to the early prehistoric settlement sites of Orkney. Dr David V. Clarke, Deputy Keeper of the National Museum of Antiquities of Scotland, has been excavating at Skara Brae and at Links of Noltland on the island of Westray. Using techniques of excavation (such as wet-sieving and three-dimensional recording of midden material) which enable the recovery of more information than previously, a wealth of data has been gathered on the economic structure of some of the first Orcadians. Meanwhile, at Knap of Howar, re-excavated by Dr Anna Ritchie in 1973 and 1975, it has been demonstrated that the two houses there date from the Neolithic period and are, indeed, even earlier in date than Skara Brae and Rinyo. For the first time, the balance of excavation has swung towards the every-day settlement sites, and away from the ritual and burial sites. In the near future, when Knap of Howar, Skara Brae, and Links of Noltland are fully published, our knowledge of the early prehistoric inhabitants of Orkney will be much enhanced.

When Piggott published his Neolithic Cultures in 1954, dating of archaeological sites relied largely on a mixture of typology and stratigraphy. With the advent of radio-carbon dating and its subsequent dendrochronological recalibration, a new dimension was added to the interpretation of prehistoric chronology. Dates for specific sites are discussed elsewhere, but it is relevant to note that in Orkney the date of the chambered cairns was changed from a few centuries in the second quarter of the second millennium BC (Piggott, 1954: 381) to almost all of the fourth and third millennia BC (Renfrew, 1979: 209). That such a radical change could be accepted without disturbing many of the other established notions about prehistoric Orkney is some indication that the framework of our understanding of the period is not yet rigid and remains open to new interpretations.

The years since 1958 have seen changes in archaeology, quite apart from the use of radiocarbon, which are reflected in the progress of excavation in Orkney. Excavation has become a more complex affair: early in the century Childe and Calder were using five or six local labourers to dig a site in a few weeks, with the majority of excavations not extending into a second season. In contrast, during the third season at Quanterness, Renfrew used a team of over twenty, with several specialists on site, while Clarke's fourth season at Links of Noltland saw an establishment of over forty, none of whom were from Orkney. More money and effort is being expended on excavation and other aspects of archaeology than before: the result has been an explosion of knowledge. Much of this extra knowledge has not yet been published or assimilated and it is a challenge for the future to see what such a magnitude of information can teach us about prehistoric society.

CHAPTER FIVE: THE LOCATION OF CHAMBERED CAIRNS

5.1. A REVIEW OF RECENT WORK

The relationship of prehistoric monuments to their surroundings has been a recurring theme in the literature of archaeology. Crawford was describing the distribution of Early Bronze Age settlements as early as 1912, and was making further links between geography and prehistory ten years later (Crawford, 1912 and 1922). The first total synthesis of British prehistory was published by Fox in 1932 (4th ed. 1959), against a background of geographical environmental determinism. In his Personality of Britain, Fox saw the lives of "inhabitants and invaders" as being largely conditioned by the distributions and relationships of structure, climate, flora, and fauna. This general connection has been maintained up to the present, with archaeology adopting the methodological advances of geography decade by decade. The 1960s saw the transfer of geographical positivism (Clarke 1968); the 1970s saw the publication of a textbook on spatial analysis for archaeologists (Hodder and Orton, 1976); and the 1980s may see the ideology of the geographer Gregory (1978) becoming accepted in archaeology. This is not the place for a complete review of the links between geography and archaeology because the field has been explored elsewhere (Goudie, 1976; Fraser, 1979). Most recently, Martlew's (1981) essay contains an excellent introduction to the progress of geographical awareness in archaeology.

Chambered cairns have figured prominently in the discussion of prehistoric location patterns. In a way, this is strange because chambered cairns do not have a clear and obvious function: their meaning to a past society is more difficult to interpret than that of, say, a domestic settlement. Nevertheless, for the past forty years, it has been accepted that the location of chambered cairns is one legitimate field of study which may be incorporated with information on the structures and their contents. By thus considering the cairn in its landscape, a wider view of the social and economic conditions prevalent at the time of its use may be considered.

The earliest references to the location of chambered cairns in Scotland are from the writings of Childe. His 1934 paper notes the correlation between the sites of the Clyde cairns and the occurrence of gravel soils. Another seminal paper is a short note in the Antiquaries' Journal (Childe, 1942). He compared the distribution of chambered cairns on the Orcadian island of Rousay with the distribution of natural and cultural features. Two observations were made: each cairn is associated with a historic unit of settlement (based on townships and churches) and each cairn is situated at the margins of good arable land. Immediately, some inferences can be made: Neolithic population levels are in some way related to modern population levels, and agriculture may have been practised. If Childe's previous observation (1935: 26), that certain early chambered cairns are located close to the shore, is added, we see that certain factors of location were already becoming apparent to prehistorians.

More factors of location were considered by Daniel in his study of the chamber tombs of England and Wales. Altitude was one such factor, and Daniel (1950: 29-33) refers to several previous authors who considered that tombs were purposedly built at high altitudes. He rejected this as a generalisation, and suggested instead that a prominent position - a site commanding a good view - was of more importance. Daniel also summarised a series of arguments on the location factors of nearness to water, nearness to building stone, and nearness to minerals. (In the process he uncovered an article dating from as early as 1915 entitled "The relationship between the geographical distribution of megalithic monuments and ancient mines" (1950: 31)). While rejecting many arguments which had been advanced with reference to particular localities, he felt able to draw certain conclusions about the tomb-builders, conclusions which are worth citing in full because they are intended to apply to Britain as a whole:

> "It is clear from the distribution map alone that the megalithic cultures of Britain are seaborne and that the coastal concentrations represent in part the primary areas in the colonization of England and Wales by the builders of chamber tombs. The needs of these early colonists would be those of any simple food-producing community - a place to live, where crops could be grown and animals tended, and assured supplies of water and stone and clay. These needs they fulfilled partly in the coastal lowlands and islands which were their first landfalls, and in part by spreading up into the hinterland of their country, penetrating up the river valleys, at times being content to settle on the bottom or the slopes of the valleys, at times moving on to the tops of the hills."
>
> (Daniel, 1950: 33)

Two points can be made here. The first is that Daniel shows his awareness that chambered cairns were not necessarily in use at the same time, and the second is that these conclusions apply strictly to a certain scale of analysis, the national or regional, and not to other scales. An appreciation of these two factors, contemporaneity of use and scale of analysis, is crucial to the understanding of any problem in prehistoric locational analysis. These points will recur below.

Henshall's (1963 and 1972) discussion of the Scottish chambered tombs was divided into studies of eight groups of tombs. For each group she looked at factors of location, and found great variability between groups. The Clava cairns are notable for their clustered distribution at the head of the Great Glen and for their location upon the invasive gravels of the Beauly, Endrick, Nairn and Spey (1963: 15-21). The long cairns are found in the north-east and in the very south of Scotland, and there is no regularity in their local situations (1963: 40-41; 1972: 158-159). The Orkney-Cromarty group is found on the mainland north of the Beauly Firth and in Orkney. On the Scottish mainland they sometimes occur in clusters, and are frequently found on land between the two extremes of the rich, forested, coastal plains and the heavily glaciated, sparsely vegetated upland. "<u>In Orkney the distribution is markedly uneven and rather puzzling</u>". (1963: 49, emphasis added). The ten cairns of Henshall's Maes Howe group are restricted to the Mainland and north isles of Orkney (1963: 122). Similarly her Zetland group is restricted to the Shetland islands, with an emphasis on the west and north of the Mainland. Frequently these cairns are in prominent visual positions and they are frequently situated near to the more fertile land (1963: 137-139). The small group of Bargrennan cairns is concentrated in south-west Scotland. These cairns, in contrast to the Zetland group, are never situated in prominent positions and frequently avoid the more fertile soils of the river valleys (1972: 3-6). The Clyde cairns, found throughout the south half of Scotland's western seaboard, are generally situated on well drained hillsides of land which is marginal with respect to modern agriculture (1972: 19-32). Henshall's final group, the Hebridean group, is found mainly in the Western Isles and Skye. Their siting is unremarkable, and they may have been placed close to the settlements they served (1972: 113-124).

An extensive survey of the megalithic tombs of Ireland is still in progress, and three volumes have been published by de Valera and Ó Nualláin (1961, 1964 and 1972). They too did not ignore the distribution and siting of the monuments. In County Clare they argue that the wedge-tombs, being commonly sited on areas of open pasture, can give a fair impression of the original distribution of settlement. (1961: 107-112). A similar conclusion is reached about the court-tombs of County Mayo (1964: 113-117). Court-tombs in Counties Leitrim and Cavan are found in limestone landscapes while portal-tombs in the west of Ireland seem to be found along river valleys (1972: 158-160). All in all, there seems to be much variability in the siting of the Irish tombs, and more detailed study of their location is required before any conclusions can be drawn (1972: 159).

The work of Henshall, and of de Valera and Ó Nualláin, has been aimed at discussing the megaliths of a very large area - entire countries - and hence their studies of distribution have inevitably concentrated on the description of distributions of a national or regional scale. The importance of scale in locational studies has long been recognised in geography and Davidson (1981) makes a forceful plea for its recognition in archaeology. Locational decisions by the cairn-builders were made at a variety of scales:

1. the national scale (for example, northern Scotland)
2. the regional scale (Orkney)
3. the local scale (Rousay)
4. the sub-local scale (the Suso valley)
5. the micro scale (the site of Knowe of Craie).

At each of these scales, different locational factors would have been brought into play. Thus conclusions arrived at by the study of a particular scale are good only for that particular scale and may be irrelevant, or even misleading, at any other scale. This may be one reason why the results outlined so far in this chapter often appear to be confusing or inconsistent.

During the last decade, there has been a renascence of interest in chambered tomb location, almost certainly promulgated and certainly sustained by Professor Colin Renfrew. Without exception, these studies have eschewed analysis at the national scale and, using the high level of information now available on the monuments of Scotland and

Ireland, have concentrated on analysis at the regional and local scales.

Renfrew, in his search for the social context of the tomb-builders of Atlantic Europe, looked at the spatial arrangement of chambered cairns in the Scottish islands of Arran and Rousay. (1973a: 146-151). He charted the areas of modern agricultural land and calculated maximum limits on population by using modern ethnographic parallels. The land surface for each island was dissected into zones using the technique of polygonal division based on accessibility. For Arran, the result was an island divided into eighteen territories, each supporting a "single farming family of up to about ten persons". For Rousay, Renfrew postulated thirteen territories each supporting a population of 25 to 30: Each territory would thus include its own tomb, belonging to the single group of people and, as a permanent mark on the landscape, acting as a territorial marker, confirming and legitimising the claim of that group to use the land within the purview of the tomb. Thus:

> "... for each community, the monument was not just the ancestral tomb but an enduring symbol of the continuity of its occupation of the land"
>
> (Renfrew 1973a: 148)

Renfrew's published maps of Arran and Rousay are reproduced here as Figures 5.1 and 5.2. They show that each chambered cairn is associated with a patch of arable land, and, with certain exceptions, each cairn territory is of roughly equal size. (Note that Renfrew's published map of Rousay contains cartographical errors in the positioning of the cairns. These are corrected in Figure 5.2).

This approach was certainly revolutionary in the early 1970s. For the first time the question of Neolithic society was being approached directly. Renfrew was interested in how the society of Rousay functioned, how it was organised, and, most fundamentally what was the meaning of that organisatio This meant that attention was drawn away from the material artefacts of the society, including the cairns themselves, and directed towards the landscape in which people lived - the locus of the society. Renfrew considered only two aspects of that landscape, the relative location of the cairns and the distribution of good land. The next step would be to consider the landscape in greater detail.

At this stage, we must also consider the problem of contemporaneity of use. There are certain techniques of locational analysis, and the drawing of equal-access polygons is one of them, which have as a basic assumption the premise that every site was in use, for whatever function, at the same time. In many cases in prehistory there is no archaeological evidence to support this assumption. In none of the studies cited above (or, indeed, below) is there any positive evidence to substantiate the claim that all the chambered cairns of a particular area were built, or used, during the same years. To take an extreme example, there is simply not enough dating evidence available to disprove the hypothesis that the thirteen or so tombs of Rousay were used sequentially, with no overlap of years between any pair. This does not mean that the drawing of polygons, or nearest neighbour analysis, or intervisibility studies, are meaningless, but it does imply that any results from such analyses must be interpreted with care. In any case the current thrust of the research topic of chambered cairn location, as outlined in four recent projects below, is moving away from such techniques. In particular it is moving towards the analysis of environmental factors of location - factors which subsist in the land itself. Thus the location of each cairn is being compared with a landscape which is always present and which changes slowly over time, instead of being compared with the pattern of other cairns which may be dynamic and is certainly part of a complex social structure. The nature of a society cannot be divorced from its physical environment but an understanding of the latter is a necessary prerequisite for an understanding of the former.

In the mid 1970s Renfrew was excavating the chambered cairn of Quanterness (ORK 43). As part of a unified research inquiry into the Neolithic of Orkney, Donald Davidson reconsidered the distribution of cairns on Rousay. The results are published in Davidson, Jones and Renfrew (1976) and in Chapter II (by Davidson) of Renfrew (1979): they are reviewed in Fraser (1980b). Briefly, Davidson's work on Rousay is directed into two unequal parts. The first part considers just one factor of location and attempts to define areas of influence for each cairn by charting the extent of land visible from thirteen cairns on the island. This exercise produced the map shown here as Figure 5.3, which identifies three contrasting, and distinct, areas corresponding to the modern-day settlement areas of the south coast, the Suso valley and the Wasbister basin. (A repeat of the exercise by the present writer did not produce exactly the same map because it is difficult to judge the maximum extent of vision in an undulating landscape. Thus such a visibility map has limited value for comparison with other localities).

The main thrust of Davidson's research on Rousay was a simulation study of the location of chambered cairns with respect to eight environmental factors. These factors, together with their sub-classes, are displayed in Table 5.4. Data were compiled for each of these factors at each of 166 points on Rousay using aerial photographs and a terrain map (Figure 5.5). A simulation program (Davidson, Richer and Rogers, 1976) was used to construct a large number of hypothetical distributions of chambered cairns according to different weightings of the eight factors. The simulated distributions were then compared with the actual distribution. The weighted factors producing those simulated distributions closest to the actual distribution are deemed to be the ones which are of importance to the cairn-builders. (Davidson (1972) shows that he is well aware of the problems involved in inferring causal relationships from spatial correlations). The results of this analysis suggest that in Rousay the important factors are access to a beach coast-line and the presence of deep land. In essence, the cairns of Rousay were built in commanding positions with easy access to the sea.

Meanwhile, in Ireland, Cooney (1979) published a locational study of chambered cairns which, like Davidson's, considered a number of different environmental variables. Following on the field work of de Valera and Ó Nualláin (1972), Cooney looked at the 49 megalithic tombs (including 21 court-tombs, 9 wedge-tombs, 8 portal-tombs and 7 passage-tombs) of County Leitrim. Analysis of the location of these tombs was purely descriptive and there was no attempt to correlate environmental variables. A large number of tombs were situated between the altitudes of 61 and 91 m and a large number were found on the topographical unit of "rockland hummock-ridges", perhaps a reflection of their well drained shallow soils. The presence of rock outcrops or the desire for a commanding situation did not appear to be of importance. Looking at soils in more detail, Cooney found a preference for tombs to be located on Brown Podzolic, Grey Brown Podzolic and Rendzina soils, all of these soils commonly being found only in small patches in Leitrim. These soils are perhaps representative of Brown Earth soils of prehistoric periods, and suggest that the tomb-builders of Leitrim may have used light well-drained soils of uniform profile. The relationship between tombs and settlements in the county is still unclear but de Valera and Ó Nualláins' suggestion that tombs were located close to settlements is perhaps shown to have some validity. (Cooney, 1979).

While Cooney was working in the west of Ireland, a very similar study was taking place independently on the east coast of Scotland. Initially, the location of 16 chambered cairns was considered (Fraser, 1978) and later the survey area was enlarged to embrace 26 cairns, all in eastern Caithness (Fraser and Ralston, 1978). The cairns all belong to Henshall's Orkney-Cromarty class, but there is much structural variation among them. As in Cooney's study certain environmental variables were considered, but no account was taken of interaction between variables. As in Davidson's simulation study, a certain amount of significance testing was undertaken. Results for the 26 cairns may be tabulated:

1. Soil: there is a very high probability (greater than 0.999) that cairns are preferentially located on land that is freely drained. In addition, peaty podzols are the most favoured soil.
2. Land Potential: there is a suggestion (probability greater than 0.9) that cairns were preferentially located on land that is now regarded as not generally suitable for agriculture.
3. Nearness to sea: at the scale of study, distance to the coast was not a significant locational factor.
4. Nearness to building stone: no location in east Caithness gives relative advantage over any other location.
5. Nearness to fresh water: distance to water was not a locational factor of great importance.
6. Altitude: cairns are located randomly with respect to absolute altitude.

7. Orientation: the cairns are preferentially orientated towards the south and east
8. Clustering: there is a high degree of clustering among the cairns, indicating that there is a very high degree of probability (greater than 0.999) that the cairns are not distributed randomly across the landscape.
9. Intervisibility: the desire to see other cairns was not a significant locational factor.

One further on-going study must be mentioned. Following the realisation that conclusions about the same distribution pattern may vary according to the scale of study, Perry (1981) is examining the pattern of chambered cairns on Arran at three different scales: the island as a whole; the areas around each cairn; and the characteristics of each individual site. Part of her work involves the use of a simulation model based on Davidson's model. This project considers many environmental factors, considers them in interaction with each other, and subjects conclusions to statistical significance testing.

Can any conclusions be drawn from this brief review of the history of chambered cairn location studies? Certain factors of location have been noted in several discussions of the subject and it might be useful here to list some of the more common criteria which have been postulated as being of interest to the megalith-builders:

1. soils, and in particular light, free-draining soils
2. visually commanding positions
3. steep slopes
4. access to landing beaches
5. orientation of the monuments
6. closeness to contemporary settlements
7. positions of ritual or social significance.

These criteria are obviously not independent of each other, which leads to the first of three comments on the general methodology behind chambered cairn location studies:

1. a multivariate approach, considering the interaction between variables, would seem to be most valuable.
2. conclusions must always be regarded as scale-dependent.
3. little significance has yet been taken of structural differences between cairns; all monuments have been treated equally.

PART TWO

THE BUILDINGS

CHAPTER SIX: THE CHAMBERED CAIRNS

6.1. PROBLEMS OF DEFINITION

There are many definitions of "chambered cairn". Even restricting the search to writers of the second half of the twentieth century, there is no agreement on, or standardised description of, a typical chambered cairn. Indeed, the same buildings have been called by more than one label: the most common terms in use are "megalithic tomb" (de Valera and Ó Nualláin, 1961, 1964 and 1972) and "chamber tomb" or "chambered tomb" (Daniel, 1950, and Henshall, 1963 and 1972). These five publications represent recent catalogues and discussions of chambered cairns in Ireland, England, Wales, and Scotland, and yet nowhere is there a single, formal, definition of the class of building which is under study. This must be intentional on the part of the authors involved, who prefer not to or cannot define the structures too closely. Nevertheless, the impression to a novice in the subject is one of confusion: the authors are evidently agreed that there is an identifiable type of structure but rarely are the unifying or identifying features of that structure outlined on paper. This state of affairs is potentially unsound because it allows the possibility of conflicting theories to be suggested which, being based on different premises, are incapable of resolution. In short, some kind of definition, however minimal, would be desirable as a prerequisite for discussion.

The present state of affairs has arisen because of the enormous diversity of buildings which have been called chambered cairns. Within Orkney there are circular cairns, rectangular cairns, and irregular cairns. Figure 6.1 illustrates the extremes of ground area of cairn from 50 sq m to 964 sq m, showing a twenty-fold variation in size. Similarly, Figure 6.2 illustrates some of the variety of chamber plan found in Orkney. If the survey is extended to Scotland, many more varieties of cairn plan, varying both in size and shape, have been noted (Figure 6.3), and the variety of chamber plan (Figure 6.4) is equally large. Extending the survey still further, even more types could be added from England, Wales, and Ireland, and a recent survey of European megalithic monuments (Evans, Cunliffe, and Renfrew, 1981, part 2) demonstrates a plethora of varieties. All of these structures, however disparate they appear, share something in common that has allowed their appearance in a gazeteer of similar archaeological sites. The common elements among them do not depend upon their containing burials of any kind. So what is the common link? Is it indeed possible to arrive at a minimal definition?

The problem of definition is inextricably linked to the problem of classification. The arrangement of units into order may be approached from two opposing philosophical viewpoints, the idiographic and the nomothetic. The first of these sees all units as being essentially different and requiring to be forced into order: this is a very common view-point in archaeology and results in many units not being explicitly included in any final definition emerging from the classification. On the other hand, the nomothetic view-point sees all units as having an essential underlying conformity or order which may be forced into displaying variety: such a classification does not exclude any unit under consideration from the final ordering. A classification produced in this latter way thus admits of the possibility of a minimal definition.

In practice, most classifications are produced by a mixture of both approaches, even if they are formally expressed as a product of one. The procedure adopted here is to present a minimal definition of the chambered cairns of Orkney which has evolved over two years of research. The evidence leading to this definition will be examined in detail in the present chapter, concluding with a classification - a cluster analysis - based on the features of cairns and chambers which have appeared most distinctive. Chapters 7 and 8 will examine the conventional archaeological evidence for contemporary Neolithic activity in the islands which has been incorporated in the numerous typologies and seriations of the Orcadian chambered cairns by previous writers discussed in Chapter 9. Finally, at the conclusion of Chapter 9, the cluster analysis will be combined with the ruling archaeological hypotheses to produce the classification of the chambered cairns of Orkney used in the following two parts of this work. Again it should be stressed that, without further research, such a classification is not applicable outwith the Orcadian Neolithic.

6.2. COMPILATION OF GAZETEER AND DATA

Two sources were most valuable in compiling a list of probable and possible chambered cairns in Orkney:

1. the card index of the Archaeology Division of the Ordnance Survey formerly housed in Rose Street, Edinburgh.
2. the sites and monuments record of the Orkney Heritage Society in Junction Road, Kirkwall (approximately one third complete in 1981).

In addition, a few sites were gathered from the following sources:

3. the National Monuments Record, housed in the Offices of the Royal Commission on Ancient and Historic Monuments of Scotland, in Melville Street, Edinburgh.
4. word of mouth from the inhabitants of Orkney.
5. personal fieldwork.

In total 115 sites were considered seriously for inclusion. In two seasons of fieldwork in the summers of 1980 and 1981 these sites, with one exception, were visited, many on more than one occasion.

There have been two complete surveys of the chambered cairns of Orkney. At the present time two more are in progress. Leaving aside the latter two surveys (by Lamb of the Orkney Heritage Society and a re-survey by Henshall and Davidson in preparation for a supplement to The Chambered Tombs of Scotland) the former two reveal an increase in numbers of recognised sites over time. In 1946, the Royal Commission on the Ancient Monuments of Scotland published their inventory of Orkney (RCAMS, 1946, Vol. II) based on fieldwork in the 1920s and 1930s. No firm distinction was drawn between cairns and cairns with chambers: the two classes, including sites of cairns, numbered 71 for the whole of Orkney. Of these, 40 or 41 were included in Henshall's gazeteer which in both volumes (Henshall, 1963 and 1972) listed 57 chambered cairns in Orkney. Since then, more fieldwork, mostly by the surveyors of the Ordnance Survey, has revealed more sites which may belong to the same class of structure.

For the purposes of this thesis, it was found that a simple division into sites that are chambered cairns and sites that are not chambered cairns was not possible. It was shown above that it is not easy to give a single definition of the type. Furthermore, there are many sites that are either unexcavated or in too advanced a state of dilapidation to be able to say very much with certainty about their structure and hence difficult to say whether they fit into any given definition.

With this in mind five different categories of site were established as a working guide to aid field-work and subsequent analysis. Note that these categories are not a classification of chambered cairns: they represent a spectrum of certainty from sites that are (by customary usage) definitely chambered cairns, through sites that, given more information, may or may not be chambered cairns, to sites which can (again by customary usage) be defined as a member of some other class of ancient monument. The five categories are:

TEXT CUT OFF IN ORIGINAL

Category Alpha: Sites which consist of (or once consisted of) an enclosed space within a cairn of stones with a connection between the enclosed space and the outside. The enclosed space is less than a third of the volume of the cairn. These sites have all been excavated and commonly, but not invariably, have produced finds of human bone and artefacts of the Neolithic period.

Category Beta: Sites which, in all probability, consisted of an enclosed space within a cairn of stones with a connection between the enclosed space and the outside. The enclosed space was, in all probability, less than one third of the volume of the cairn. None of these sites have been excavated or produced finds, but are recognised either by the observable pattern, or the historical report of a structur which resembles the structure of a site in Category Alpha.

Category Gamma: Sites which possibly consisted of an enclosed space within a cairn of stones with a connectio between the enclosed space and the outside. The enclosed space may have been less than one third of the volume of the cairn. Few of these sites have been excavated or produced finds. They are placed in this category because they show (or at some time did show) some, but not all, of the criteria for inclusion in category Beta.

Category Delta: Sites at which no features can be observed (or have ever been observed) which would allow the site to be included in category Gamma. Commonly, these sites show insufficient evidence to be admitted as any known type o archaeological site.

Category Epsilon: Sites which, by reason of observed features, can definitely be assigned to another class of prehistoric monument.

These categories are dependent upon descriptions of the morphology of a site. At this stage, no attention is directed towards the function or the meaning of a site. This is a deliberate attempt to remove an interpretational bias: the function attributed to an archaeological site is more liable to change as the ideas of our society change than is its physical morphology. This same principle is the reason behind the term "chambered cairn" being preferred to the term "chambered tomb" throughout this thesis.

Of the 57 sites listed by Henshall and the 58 additional sites considered during the course of field-work, Table 6.5 shows the numbers falling into each category. In broad terms, sites in categories Alpha, Beta and Gamma are accepted as chambered cairns and are hereafter subjected to detailed analysis. Sites in categories Delta and Epsilon are rejected as chambered cairns and are not further considered.

Appendix A of this thesis consists of a full gazeteer of sites in categories Alpha, Beta, and Gamma. Appendix B consists of a short description of sites in categories Delta and Epsilon, together with reasons why they were rejected, to aid future field-workers. It is expected that in the future more sites, and perhaps many more sites, will be accepted into the first three categories, including some which may be transferred from category Delta.

The remainder of the chapter consists of an examination of the morphological characteristics of the cairns in categories Alpha, Beta, and Gamma. This examination is broken down into two major divisions: analysis of cairns and analysis of chambers. At this stage no interpretation of function is attempted: this chapter is devoted to description of the buildings only.

Certain attributes of cairn and chamber are amenable to numerical analysis and display. Where such analysis has been carried out, it has been performed separately for cairns in categories Alpha, Beta, and Gamma before the three categories have been amalgamated. Significance testing has been carried out to determine if the results for each category are consistent with each other. Where this is not the case, priority has been given to the result from category Alpha and then to the result from category Beta. This procedure has been followed, without the significance testing, for analyses which are not expressed numerically. Thus, in any argument, more weight is given to evidence from sites which have been excavated or which have more visible remains. However, where results from all three categories are consistent, arguments are rendered more powerful and potentially more universally applicable.

6.3. THE CAIRNS

6.3.1. CONSTRUCTION

The "cairn" of a chambered cairn is that part of the building which covers and conceals the enclosed space in the interior. The word is Scots and originally comes from the Gaelic carn meaning "pile of stones". The chambered cairns of Orkney are, with only one exception to our knowledge, built of stone. That exception is Maes Howe (ORK 36) which according to Childe (1956: 162) has a mound of "clay and stones" which "can only be worked with a pick and stands quite firm in a vertical face of 16' (4.9m)". Every other cairn which has been examined, both superficially and during excavation, has been composed of angular and subangular slabs. Little mention has been made of the size of stones involved, but Renfrew implies that at the top surface of his west section of Quanterness, the maximum dimensions of stones were not much more than 0.30 m (Renfrew, 1979: 46). No chambered cairn in Orkney has been completely excavated - that is, the stones of the cairn removed to expose the original ground surface - so there is little to say about the deposition of the stones. We can only speculate whether the mound material itself was deposited carefully with a consistent tilt, such as has been observed at Camster Long (CAT 12)

(Masters, pers. comm.), or if it was deposited in a haphazard fashion. The former is suggested by Childe (1952:128) but complete excavation would be necessary to confirm this for any particular site.

Due to this lack of excavation evidence, inference about the internal construction of the cairns must be based on the structures visible on the top surface of the mounds or, in a few cases, on evidence from narrow sections through the mounds.

At Wideford Hill chambered cairn (ORK 54) the chamber was found to be encased in a "construction", shown as a roughly circular wall in the Office of Works plan (RCANS, 1946: 2,157). This in turn is encircled by two "ring-walls". The distance between the central construction and the inner ring-wall is about 1.4 m and the distance between the inner ring-wall and the outer ring-wall is 1.2 m.

At Quoyness (ORK 44) Childe (1952) confirmed that there are three concentric walls, within the cairn, around the chamber. These walls, designated A', A, and B (there is the suspicion of a fourth concentric wall B') are not truely circular: in fact wall B "lies between circles of diameter 56' (17.2 m) and 67' (20.6 m) and actually runs quite straight in some section (<u>sic</u>), for instance for 12' (3.7 m) on the north-east" (1952:129). Walls A' and A rise from the ground surface: wall B begins several feet above the surface.

The cairn of Unstan (ORK 51) (RCAMS, 1946: 2, 316) shows evidence of two internal circular walls at about 1.1 m and a further 1.1 m inside the outermost revetment.

At Maes Howe (ORK 36) (Childe, 1956), a central stepped construction is surrounded by two walls, B and A, at distances of 4.6 m and a further 3.4 m from the construction. Neither of these walls is founded on the ground surface but begin within the body of the cairn. A further 4.6 m outside wall A is a turf bank which marked the outer limit of the mound.

During the excavation of the west section of Quanterness (ORK 43), Renfrew (1979) found two internal walls; wall U at about 7.7 m from the centre of the cairn and wall V about 2.3 m outside wall U, but did not confirm (despite his reconstruction drawing (1979: facing 66)) that these continue down to the ground surface. On the east side two more walls X and Y were found, but it is not clear whether these correspond to walls U and V. The remains of three similar concentric walls were found in 1981 during the excavation of a prehistoric site at Pierowall, Westray (Sharples, pers. comm.).

Walls within the core of the cairn have also been suspected at some of the Rousay tombs. At Blackhammer (ORK 3), there was an inner wall at a distance of between 0.9 m and 2.2 m behind the outer revetment. (Callander and Grant, 1937: 298). At the Knowe of Lairo (ORK 28) remains of two wall faces were traced with the inner one 0.9 m to 1.2 m behind the outer wall. (RCAMS, 1946: 2, 217). An inner wall, which may have stood 1.5 m high, was noted between 0.7 m and 1.2 m behind the outer revetment at the Knowe of Yarso (ORK 32) (Callander and Grant, 1935: 328). Similarly, at Midhowe (ORK 37) an inner wall follows the line of the outer wall at an average distance of 1.7 m (Callander and Grant, 1934: 321). Suggestions of a single internal wall are apparent in the reports on Bigland Round (ORK 2) (RCAMS 1946, 2: 204) and Kierfea Hill (ORK 26) (Henshall 1963: 207).

Three more cairns have the feature of internal walling. The plans and sections of Sandyhill Smithy (ORK 47) (Calder 1938: 205) show an internal wall within the line of the outer revetment at a distance of about 1.1 m. Both chambers at Calf of Eday Long (ORK 8) are surrounded by a revetment wall which follows the shape of the chamber rather than the outer wall (Calder, 1937: 117). Finally, at the excavation of Bookan (ORK 4) Petrie (1863: 35) found a "circular wall or facing" about 3.4 m in from the edge of the cairn.

Table 6.6 is a list of those cairns in Orkney which have been shown to have internal walls. This table is very much a minimal list and it is not unlikely that some excavated cairns contain such walls and that the presence of such walling was missed in a few of the earlier excavations.

The building techniques used in the construction of the walls is generally unremarkable. Apart from the common feature of a stepped foundation (an example from Isbister (ORK 25) is shown in plate B), the flat slabs were laid horizontally in a dry-stone construction rising vertically from the ground. The pattern of stone work appears to depend largely on the size and variety of stone available. But again there are exceptions, as demonstrated by three cairns on the island of Rousay excavated by Callander and Grant. The outside walls at Blackhammer (ORK 3), Knowe of Yarso (ORK 32), and Midhowe (ORK 37) show deliberately designed patterns of diagonal stone work (Figure 6.7) with the most complex being at Midhowe where a middle string course of stone separates two layers of stones tilted diagonally in opposite directions. There are indications that the outer wall at Knowe of Lairo was also constructed with obliquely laid stones. These decorative patterns lend credence to the notion (dismissed by Childe, 1952: 137) that some of the outer revetment walls were intended to be seen when the building was in use, an opinion strengthened by the fact that the inner, unseen, wall at Midhowe appears to have been constructed in ordinary, horizontal, stone coursing (Callander and Grant, 1934: 323).

This discussion has concentrated largely on chambered cairns in plan - the third dimension has not been prominent. The decision not to examine here the heights of cairns (and of chambers and passages) was taken because the information available is at a different lévél of accuracy than that available for other variables. There are two reasons for this: the height of a cairn is very liable to change over time as chambers collapse and stone is removed for building purposes, and heights are more difficult to measure in the field resulting in loss of comparability between sites. An example of the first point is the contrast between Linkertaing

(ORK 35) with no cairn material, and Maes Howe (ORK 36) which may have most of its mound intact. An example of the second point is Quanterness (ORK 43), a cairn for which three heights are quoted in the same publication (Renfrew, 1979). The question of cairn height will be further discussed in Chapter 14.

6.3.2. <u>SIZE AND SHAPE</u>

One characteristic of chambered cairns which is obvious to any field worker is their great variability in size and shape. This section examines five parameters which together explore the degree of this variability. The parameters are:

1. cairn length: the maximum measurable distance in a straight line across the cairn in plan view
2. cairn width: the maximum measurable distance in a straight line at right angles to the line used to measure cairn length
3. cairn ratio: the ratio of cairn width to cairn length
4. cairn area: the plan area covered by the cairn and the enclosed spaces within it.
5. cairn shape: a description of the plan shape of the cairn.

The individual values of each of these variables for each cairn, where measurable, are to be found in Appendix A. An explanation of the conventions used in the measurement of length and area, and in the graphic display of measurements, is given in Appendix C.

To consider cairn length first, it was found possible to measure this variable for 69 cairns (29 in category Alpha, 22 in category Beta, and 18 in category Gamma). The results are displayed in histograms in Figures 6.8 and 6.9. The minimum value was 8.0 m for Calf of Eday North-West (ORK 9) and the maximum value was 77.6 m for the Earl's Knoll (ORK 14). There is no significant difference between the distribution of cairn length against frequency between categories Alpha, Beta, and Gamma. The combined distribution is positively skewed with a median (value for the 34th item) of 18.0 m and a mean of 20.8 m. In descriptive terms there is a large number of cairns with lengths between 10 m and 25 m and a decreasing number of longer cairns.

Cairn width could be measured for the same 69 cairns, and the distribution of this variable was very similar. By definition, cairn width is less than or equal to cairn length and so the absolute range of width is less. The relevant histograms are displayed in Figures 6.10 and 6.11. The minimum value was 6.6 m for Knowe of Rowiegar (ORK 31) and the maximum width was 35.1 m in the case of Maes Howe (ORK 36). Again, there is no significant difference between categories Alpha, Beta, and Gamma. The combined distribution is positively skewed with a median of 13.7 m and a mean of 14.2 m. In descriptive terms there are a large number of cairns with widths between 10 m and 20 m and far fewer narrower cairns.

Cairn length and cairn width were combined to give cairn ratio, a number which must be greater than zero and less than or equal to one. For the same 69 cairns, the results are displayed in Figures 6.12 and 6.13. The minimum values were 0.23 and 0.24 for Knowe of Ramsay (ORK 30) and Knowe of Rowiegar (ORK 32); two cairns which are more than four times as long as they are wide. On the other hand, thirteen sites had cairn ratios of 0.99 or 1.00 (a difference which could be attributed to measurement error) indicating that their lengths and widths are equal. In most cases, these cairns are circular. The most interesting observation about the histogram of cairn ratio (Figure 6.12) is that it is bimodal, with peaks close to unity and between 0.4 and 0.5. This observation, which is gratifyingly echoed in the results for each of categories Alpha, Beta, and Gamma, shows that there is a distinct preference for two cairn ratios: for cairns which have almost the same length as width, and for cairns which are almost twice as long as they are wide. Conversely there is a distinct lack of cairns with ratios between 0.61 and 0.70. Indeed, the only cairn which falls into this ratio is Swona (ORK T14) and an examination of the raw data for this site strongly suggests that cairn length has been underestimated due to coastal erosion. (As an aside, a rectangle with sides in the golden ratio, so favoured by artists and mathematicians, would fall into this missing class).

Cairn area is partly a function of cairn length and cairn width. Measurements for 65 cairns (28 in category Alpha, 21 in category Beta, and 16 in category Gamma) are displayed in Figures 6.14 and 6.15. Values for this variable range from 50 sq m in the case of Calf of Eday North-West (ORK 9) up to 964 sq m for Maes Howe (ORK 36) and 1048 sq m for the Earl's Knoll on Papa Stronsay (ORK 14). This is a great difference in size with the largest cairns having twenty times the cairn area of the smallest. Again there is no significant difference between the distributions for each of the three categories. The combined distribution (Figure 6.15) is positively skewed with a median of 195 sq m and a mean of 250 sq m. In other words, there are many small cairns with ground areas between 50 and 250 sq m and fewer larger cairns.

Unlike the previous four variables, cairn shape was measured categorically. The plan of each cairn was examined and each cairn was allocated to one of four groups:

1. round cairns: those with circular or nearly circular plans
2. rectangular cairns: those with rectangular or sub-rectangular plans
3. oval cairns : those with elliptical or ellipsoidal plans
4. complex cairns: those with no simple shape, commonly having projections from a central mass.

In total 66 cairns (28 in category Alpha, 22 in category Beta, and 16 in category Gamma) could be assigned to these groups. An example of each type is shown in Figure 6.16 and results are displayed in Figures 6.17 and 6.18. Although there is not complete agreement between categories Alpha, Beta and Gamma, the main characteristics of the distribution are clear: nearly two-thirds of the cairns are round, less than a fifth are rectangular, and oval and complex cairns are equally uncommon, accounting for about a tenth of the cairns each. As might be expected, there is a high correlation between cairn ratio and cairn shape (Figure 6.19). The 40 round cairns all have cairn ratios between 0.82 and 1.00, the distribution having a small standard deviation of 0.05. The cairn ratios of the 12 rectangular cairns range between 0.23 and 0.61, this distribution having a standard deviation of 0.13. The range of ratios for oval cairns overlap these two ranges, all falling between 0.43 and 0.85, the distribution being similar in spread to that for rectangular cairns with a standard deviation of 0.14. Complex cairns form another group entirely, with a range of cairn ratios across the whole spectrum, from 0.30 to 0.97, and a distribution that is similar to that of cairn ratios as a whole, having the same large standard deviation, 0.24, as that distribution. Thus the division into round, rectangular, oval and complex seems to be a meaningful one, with round and rectangular cairns forming opposite ends of a spectrum that has oval cairns as a transitional group, while complex cairns stand outwith the spectrum.

No such high correlation exists between cairn shape and cairn area. Within each shape, there is a wide range of cairn areas (Figure 6.20). Round cairns range between 50 sq m and 964 sq m. Rectangular cairns range between 109 sq m and 1048 sq m. Oval and complex cairns have similar large ranges. The only tendencies which might be pointed out are that of round cairns to be small (with a mean area of 207 sq m) and for complex cairns to be large (with a mean area of 367 sq m). Despite these observations, there seems to be little relationship between cairn shape and cairn area.

More complex analysis of cairn shape and size may be possible, and in particular it would be of interest to test MacKie's (1977a) ideas on prehistoric metrology and geometry for monuments of the Orcadian Neolithic. Such analysis was not attempted here for two reasons: firstly, the plans which are available were made by more than one person and at a variety of standards, none of which match up to the exacting standards of the modern archaeological metrologists and secondly, there are very few chambered cairns in Orkney where it would be possible to make such accurate plans even given the necessary time and equipment.

6.3.3. SUMMARY

From this overview of the construction, shape and size of the cairns of Orkney, it is possible to make certain observations:

1. the material of construction is, almost invariably, stone
2. many cairns contain internal walls, some of which were not visible when the building was complete
3. in some cases, external walling was constructed with a decorative pattern
4. there are many relatively small cairns, and only a few relatively large cairns

5. cairns are either about twice as long as they are wide or have the same length and width
6. by far the most popular shape for cairns is round, or nearly round; some are rectangular or oval and a few have more complex shapes.

6.4. THE CHAMBERS

6.4.1. CONSTRUCTION

The chambers of the Orcadian cairns are invariably constructed of stone. There is no known example of an excavated cairn containing a structure of wood or any other material. Admittedly, the possibility of stone or earth mounds concealing substantial structures of timber has only been realised recently in Britain, and the lack of complete excavation of an Orkney cairn would make the recognition of any such structure improbable, but the evidence to date is clear: every Orcadian chamber is built in stone.

There are many different ways to build in stone, especially where the stone is as good a building material as it is in Orkney. The building of a chamber is an easy task in one way, since only one facing wall need be constructed: the back face of the wall was never meant to be seen. This same fact makes the building of a chamber difficult in another way: the single wall-face is required to withstand the thrust of a mass of cairn material behind it. This difficulty is compounded when the ratio of cairn area to chamber area is large.

Two major constructional techniques may be identified. The first of these is orthostatic construction where the structural strength of the wall is contained in a few, relatively large, upright standing stones or "orthostats". The size of these orthostats does not vary greatly. Heights of between 1.0 and 2.0 m are very common and can be found in different styles of tombs: Sandyhill Smithy (ORK 47) has orthostats of around 1.5 m above the ground surface (Calder, 1938: 205) while Isbister (Plate C) has orthostats between 1.5 m and 2.3 m high (Hedges, forthcoming). Stones up to about this height and volume may be handled and manoeuvred with minimal equipment by a small group of people. In certain cases, of which the best example is Midhowe (ORK 37) the top edge of the orthostats have a uniform tilt or gable (perhaps conditioned by a natural fracture) lending an element of decoration to the rough stones (Callander and Grant, 1934: 327). One exception to the portable scale of these orthostats occurs at Maes Howe: four buttresses in the corners of the central chamber are considerably larger, being up to 3 m tall, and bulky in cross-section. Henshall (1963: 221) notes that one block used at Maes Howe may be three tons in weight.

Orthostats may protrude into the chamber and delimit space into compartments (Plate C), or they may be flush with the chamber wall. Again, orthostats may be the only components of the chamber wall (at least at ground level) or the space between them may be linked with sections of horizontally laid stones forming a conventional dry stone wall between neighbouring orthostats. By far the most common arrangement for orthostatically constructed chambers in Orkney is for the walls to be a mixture of dry stone walling and orthostats protruding into the chamber. In the known cairns, at least 26 chambers are constructed in this way (see Table 6.21). There are no certain examples of chambers constructed of orthostats side by side and parallel to the wall of the chamber. One possible example is Cantick (ORK T13) a category Gamma cairn in South Walls.

The second constructional technique is to build the chamber with horizontally laid slabs throughout. There are six chambers of this type in Orkney, compared with the 26 of orthostatic construction. These chambers (also listed in Table 6.21) are all of complex shape and large area. Although it may not be wise to draw subjective conclusions from such a small group of chambers, it does seem as if the standard of stonework on these five is higher than on most of the larger group of 26. The epitome of meticulous construction must surely be the stone walling of the chamber at Cuween Hill (ORK 12). There the walls are constructed true and even, with small eke stones levelling larger slabs. Some of the constructional slabs are massive, and are up to 2 m in length. The quality of the stone work is superb and, as an example of undressed dry stone masonry, Cuween Hill has few parallels in prehistory or in any later period. Quanterness (ORK 43) and Quoyness (ORK 44) (Plate D) also have excellent masonry. The method of horizontally coursed construction has the potential of employing stones which are smaller and more manoeuvrable than the orthostatic method, but this potential was not always taken up: there has been as much, if not more, creative effort expended in the construction of horizontally coursed chambers as in the orthostatic chambers.

As happens so frequently, Maes Howe (ORK 36) emerges as an exception: although it has orthostatic buttresses, the stone walling is as meticulously built as those of Quanterness and Quoyness.

For the same reason that walling of chambers required to be of strong construction, roofing needed to be capable of withstanding great pressures. The method commonly adopted was corbelling - the gradual overlapping of successive courses of wall so that opposite walls oversailed the floor and came closer and closer together. Daykin's architectural drawings in Renfrew's (1979) Quanterness report illustrate the principle clearly. The oversailing courses were finally capped by lintel stones once opposing walls could be safely bridged. Plates D and E show two views of corbelling at Quoyness (ORK 44).

This method of construction leads to chambers which are high in comparison to their width since each successive course may only overlap by a small proportion of its depth. There are only about seven chambers still retaining their Neolithic roofs, or most of their Neolithic roofs. These vary in height from 2.3 m at Cuween Hill (ORK 12) to 4.0 m at Quoyness (ORK 44) and about 4.6 m at Maes Howe (ORK 36).

Of the seven, Knowe of Lairo (ORK 28) has the only orthostatically constructed chamber attaining, in its first phase, a height of 4.1 m.

These few chambers are the exception, with very few of the Orkney monuments standing to their original height. Furthermore, it is often very difficult to estimate original heights. In particular, there are many cairns, which do not today exhibit any positive evidence of corbelling (because the walls only stand to a metre or so), and yet which also do not exhibit any signs of any other kind of roofing. The sites on Rousay with rectangular cairns and simple chambers are examples of this group. To take Midhowe (ORK 37) as an example, the excavators, Callander and Grant (1934) noted that the tallest orthostats, about 2.2 m high, were in the centre of the long chamber, and the orthostats decreased in height towards both ends of the chamber. The chamber is 23.2 m long and up to 2.4 m wide. Callander and Grant were of the opinion that there were enough large slabs in the debris-choked chamber (1934: 328) to cover the complete area of chamber (53 sq m) with a complex pattern of longitudinal and transverse lintels. It seems much more probable that there was some element of corbelling in Midhowe, and in most of the large rectangular cairns, which would reduce the final gap between opposing walls so that fewer, and smaller, lintels could be used. This implies that many chambers, and hence cairns, were higher than is visible today.

Not every chamber was corbelled. There are four chambers roofed completely by lintels. These are the lower chamber at Taversoe Tuick (ORK 49), roofed at a height of 1.6 m; the chambers of Calf of Eday North-West (ORK 9) and South-East (ORK 10), roofed at a height of 1.2 m and 1.3 m respectively; and the lower chamber of Huntersquoy (ORK 23) with a maximum height of 2.2 m. Taversoe Tuick and Huntersquoy are special cases, being the only known examples of "double decker" chambers, and will be discussed below. The two Calf of Eday sites are among the smallest in Orkney, both in cairn area and chamber area. Indeed, the floor area which required to be roofed in these chambers is only 3.4 m and 2.6 m. For chambers of such a small size, lintelling directly across the top of the orthostats represents an efficient solution. This does not change the argument that the solution to the roofing problem of most of the Orcadian chambers involved an element of corbelling.

Flooring of chambers is a more straight-forward problem for the modern archaeologist. In nearly every case of an excavated chamber in Orkney, the floor has consisted of beaten earth, or "clay". One exception is of Cuween Hill (ORK 12), already noted as being constructed to a high standard. There the floor is of natural rock, with the chamber cut into bedrock. Certain compartments at Knowe of Ramsay (ORK 30) are floored with rough paving. However, paving or cobbling of any kind is unusual.

Another element of the construction of chambers is the presence of internal furniture. As noted before, no excavator has ever observed any structure associated with a chamber built of timber or any other material but stone, so the discussion here is limited to internal furniture of stone. The first comment is that there is not a great deal of such furniture: the interiors of chambered cairns were uncluttered. Mention has already been made of orthostats protruding into the body of the chamber. Such orthostats must be regarded as pertaining to the interior layout of the chamber because they are not simply structural necessities. Hence they must be regarded as furnishings of the chamber. Their presence divides a chamber into demarcated spaces which are discussed in Chapter 15.

A few chambers have low shelves or benches incorporated in their design. At Calf of Eday Long (ORK 8) the eastern chamber was thought to have originally incorporated a shelf between 0.3 and 0.4 m high between every pair of orthostats (Calder, 1937: 121). There are similar shelves at Huntersquoy (ORK 23), Knowe of Rowiegar (ORK 31), Midhowe (ORK 37), Sandyhill Smithy (ORK 47), Taversoe Tuick (ORK 49) and perhaps also in Calf of Eday North-West (ORK 9), Knowe of Craie (ORK 27) and Knowe of Yarso (ORK 32). The north-most and south-most compartments at Isbister (ORK 25) each had a shelf at a height of about 1.1 m above floor level.

In a way, separate cells within a chamber are another example of internal furniture in that they demarcate space within a chamber in much the same way as protruding orthostats. The difference is that the division of space is more marked: the common feature of cells is that their entrances are so low that it is necessary to crawl into them. It is possible today to measure the heights of the entrances of nearly fifty cells. None is less than 0.4 m; none is greater than 0.8 m. Every cell is roughly circular in shape, and the vast majority have corbelled roofing (Plate E). A rare exception is the single cell at Unstan (ORK 51), the roof of which, although oversailing slightly about a metre from the ground, is mainly formed by lintelled stones.

Perhaps the most extreme example of an enclosed space being demarcated from another enclosed space is for a cairn to have more than one chamber. In Orkney, the maximum number of chambers known to exist under a single cairn is two. These are arranged in two differnet ways: on top of one another or side by side in the same cairn.

There are two definite examples of the "double-decker" chamber. At Huntersquoy (ORK 23) there is a conventional simple chamber and passage, but underneath this, dug into the ground, is another chamber with a separate passage leading to it. The two chambers were not interconnecting, but there is no relative dating evidence to ascertain whether the two were built at different times or were in use at different times. Much the same arrangement is found at Taversoe Tuick (ORK 49) where a subterranean chamber with passage lies underneath another chamber with its own passage. At one time there was no access between the two, but again their relative dates are a mystery. The excavators of Midhowe (ORK 37) (Calder and Grant, 1934: 329) were of the opinion that the inner portion of the long chamber had, at one time, a second storey. This second storey may have been entered from the main chamber or, like Huntersquoy and Taversoe Tuick, could have been entered by a separate passage.

There is but one definite example of two chambers under the same cairn. This is Calf. of Eday Long (ORK 8). According to Calder (1936-37: 118) a sequence of building can be suggested, with the east-most chamber being built first, followed by the west-most chamber, with the two subsequently being encased by the peristalith of the cairn. Unfortunately it is impossible to confirm this sequence from the excavation report but it is possible to say that the west-most chamber could not have been entered after the enclosing cairn had been constructed. It is tempting to reverse Calder's sequence of chambers, but impossible to do so without re-excavation. A second possible example of a double-chambered cairn has been pointed out by Henshall (1963: 187). Braeside (ORK 5) has a very similar layout to Calf of Eday Long with a simple chamber occupying one end of an enlarged rectangular cairn. Henshall suggests that a second chamber may exist within the body of Braeside.

6.4.2. SIZE AND SHAPE

The enclosed spaces, or chambers, within the bodies of the chambered cairns of Orkney are subject to even more variation than the cairns themselves. This section explores five parameters which are helpful in the description of that variation:

1. chamber length: the maximum measurable distance in a straight line from end to end of the chamber
2. chamber width: the maximum measurable distance within the chamber in a straight line at right angles to the one used to measure chamber length
3. chamber ratio: the ratio of chamber width to chamber length
4. chamber area: the floor area of the chamber
5. chamber shape: a description of the plan shape of the chamber.

The individual values of each of these variables for each cairn, where measurable, are to be found in Appendix A. The measurement of the first four variables was taken from published and unpublished plans at a number of scales which vary between 1:50 and 1:360. As such the accuracy of these measurements, and in particular that of chamber area, is not as high as could be wished.

Chamber length could be measured for 46 different chambers. These chambers are contained within 43 cairns, with three cairns containing two separate chambers each. The 46 chambers fall into only two categories with 31 in category Alpha and 15 in category Beta: there is no significant difference between the distributions for each category. The results for chamber length are displayed in histograms in Figures 6.22 and 6.23. The shortest chamber is that of Calf of Eday South-East (ORK 10) at 2.6 m while the longest is that of Knowe of Ramsay (ORK 30) at 26.8 m.

The distribution is positively skewed, and massively so: the median length is 5.6 m while the mean is 7.6 m. There is a suspicion of bimodality: 24 chambers are between 3.0 and 5.9 m long but there is a second minor peak between 18.0 and 20.9 m. In descriptive terms, there is a large number of short chambers with a few longer ones.

Chamber width could be measured for the same 46 chambers, and the distribution of this variable was very similar. By definition, chamber width is less than chamber length and so the absolute range was less. The relevant histograms are displayed in Figures 6.24 and 6.25. Chamber widths range from 1.5 m at Kierfea Hill (ORK 26) to 7.0 m at Maes Howe. Again the distribution is massively skewed in a positive direction: the median width is 2.2 m while the mean is 2.7 m. For this variable there is no suggestion of bimodality: there is a large number of narrow chambers and increasingly few wider ones.

Chamber width was divided by chamber length to give chamber ratio for each example. The results are displayed in Figures 6.26 and 6.27. This ratio is greater than zero and less than or equal to one. It was calculated for the same 46 category Alpha and Beta chambers: again there was no significant difference between categories. Almost the full theoretical range of chamber ratios was found among the 46: the minimum value was 0.07 for Knowe of Ramsay (ORK 30), and the maximum value was 0.91 for Bookan (ORK 4). The distribution of chamber ratios is not skewed in either direction:

median and mean are equal at 0.47, while the modal class is 0.51 to 0.60. This indicates that it is very common for chambers to be about twice as long as they are wide. However, this is not a universal rule: the standard deviation of the distribution at 0.22 shows a large spread.

Chamber area was measured for the same 46 chambers. Results are displayed as histograms in Figures 6.28 and 6.29. Category Alpha and category Beta results are similar. The range of chamber area is wide, with two chambers having areas of five sq m, up to Holm of Papa Westray South (ORK 22) which has a chamber area of 56 sq m. This is not as wide a spread, however, as that for cairn areas. The distribution of chamber areas is positively skewed with a median of 11 sq m and a mean of 16.6 sq m. Almost half of the chambers fall into the five to nine sq m class; in addition there is a second peak at the tail of the distribution.

The next variable to be explored was chamber shape. The most meaningful categoric division was found to be a bipartite division into "simple" and "complex". These terms are explained thus:

1. simple chambers are fundamentally a single enclosed space or room. That room may be divided into different compartments but each compartment is easily accessible from the others.
2. complex chambers consist of two or more enclosed spaces or rooms. Each space may be further divided but there is some barrier to accessibility, usually manifested by a narrow and low entrance, to an area or areas within the chamber.

Of the 46 chambers which are clearly outlined, 36 are simple while 10 are complex. The block diagrams in Figure 6.30 show that there is a significant difference between chambers in categories Alpha and Beta. Indeed, there are no complex chambers in category Beta sites, implying that complex chambers may go unrecognised until a site is excavated. For this reason, subsequent analysis concerning chamber shape is restricted to category Alpha chambers only.

Comparison of chamber shape with chamber ratio revealed no new insights (Figure 6.31). The distribution of chamber ratio of simple chambers does not differ from that of complex chambers. That is, partition of the chambers into simple and complex did not produce a related differentiation of chamber ratios.

Comparison of chamber shape with chamber area was slightly more revealing (Figure 6.32). Distributions of chamber area for both simple and complex chambers were positively skewed but the mean chamber area for simple chambers was 14.9 sq m compared with 20.9 sq m for complex chambers. The sample size is very small and this result is not statistically significant, but it does lead towards the suggestion that complex chambers are larger than simple chambers.

Another component of chamber shape, as implied in the descriptions of simple and complex chambers, is the number of divisions of space within the chamber. Two different types of division are recognised here:

1. compartment: a division of an enclosed space which is easily accessible from other divisions of the same chamber.
2. cell: a division of an enclosed space which is entered by a low passage from other divisions of the same chamber.

This dichotomy is, naturally, closely related to the dichotomy between simple and complex chambers: cells are only found in complex chambers. Figures 6.33 and 6.34 show the number of compartments found in the 46 chambers. The histogram for category Alpha chambers is distorted by six of the ten complex chambers having only one compartment but there is no significant difference between the distributions for Alpha and Beta categories. At the other extreme are three chambers on Rousay: Knowe of Rowiegar (ORK 31) and Midhowe (ORK 37) with twelve compartments each, and Knowe of Ramsay (ORK 30) with fourteen. The combined distribution of Alpha and Beta chambers is positively skewed, but has a median and mode both equal to three: the most common form of chamber has three compartments. Plate F shows Bigland Round (ORK 2), an example of a chambered cairn with the cairn removed to reveal a three compartment chamber.

Figure 6.35 shows the number of cells in the ten category Alpha complex chambers. There is no simple pattern here. Figure 6.35 also shows the number of divisions of space (compartments and cells combined) in these ten chambers. Again, the pattern is not easily described. In the group of complex chambers there are only two pairs of similar chambers: Maes

Howe (ORK 36) and Wideford Hill (ORK 54) both have one compartment and three cells (but there is a vast difference in their construction) while Quanterness (ORK 43) and Quoyness (ORK 44) both have one compartment and six cells.

Three comparisons were made between the size and shape of cairns and the size and shape of chambers. The first of these was between cairn ratio and chamber ratio. The latter was divided by the former to give a new ratio, the chamber/cairn ratio which can, potentially, take any value greater than zero (Figures 6.36 and 6.37). In fact, the ratio for 39 sites (25 in category Alpha and 14 in category Beta, cairns with two chambers being excluded) varied only between 0.25 at Bigland Long (ORK 1) and Midhowe (ORK 37), and 1.00, at Knowe of Lairo (ORK 28). This indicates that, invariably, chambers are as elongated, or more elongated than, cairns. The scatter diagram of chamber ratio against cairn ratio (Figure 6.37) illustrates this comment visually with every observation being contained in the top left of the diagram. Apart from this broad comment, the distribution of chamber/cairn ratio is normally distributed with a mean and a median equal at 0.58.

The second comparison was between cairn area and chamber area. The latter was divided by the former to give a ratio, the <u>chamber/cairn area</u>, which potentially varies between 0.00 and 1.00 and, multiplied by 100, might be expressed as the percentage of the cairn area taken up by the chamber area. Values for chamber/cairn area for the above 39 sites are displayed in Figures 6.38 and 6.39. Every chamber takes up less than 25% of the floor area of the cairn and the minimum values for this variable show that five chambers take up 2% or less. The chamber invariably takes up less than a quarter of the cairn and frequently much less. The need for different scales on the axes of the scatter diagram of chamber area against cairn area (Figure 6.39) underline this point. The scatter diagram also shows that there is very little connection between rank size of chamber and cairn: a relatively large chamber may be contained in a relatively small cairn, and vice versa. Thus there seems to be no general connection between the size of chamber and cairn.

The third comparison was between cairn shape and chamber shape. For a sample reduced to 24 cairn and chamber pairs, the correspondence of cairn shape to chamber shape is displayed in Figure 6.40. The contingency table associated with a random distribution (of the 15 simple and nine complex chambers among the 14 round, six rectangular, one oval, and three complex cairns) contains too many low values to perform any of the standard significance tests, but a glance at Figure 6.40 is enough to suggest that there is no obvious connection between cairn shape and chamber shape.

A subsidiary feature of most of the chambers which have been excavated among the Orkney cairns is the existence of a physical connection between the inner enclosed space and the outer world. This physical connection, or passage, is invariably of a simple shape in plan view, and almost always is an elongated rectangle with constant width along its length. Three measures were used to explore the size of passages:

1. passage length: the distance in a straight line from the outer wall of the cairn to the demarcated inner space of the chamber.
2. passage width: the distance from wall to wall of the passage in a straight line at right angles to the one used to measure passage length.
3. passage area: the floor area covered by the passage.

The individual values for each of these variables could be measured for 29 passages, connected to 29 chambers in 26 cairns. Every one of the 29 was found in a category Alpha site, and so there is no need to examine the evidence for passages of different categories before considering the evidence _in toto_.

Passage length varies from 1.2 m in the case of Bigland Round (ORK 2) up to 16.3 m in the case of Maes Howe (ORK 36). The latter site is an extreme anomaly; the next longest passage is at Quoyness (ORK 44) and is less than half the length of that at Maes Howe. The distribution of passage lengths is displayed in Figure 6.41, the histogram showing that passage lengths between 2.0 and 6.0 m are common. One interesting distinction is also illustrated in Figure 6.41. If the frequency distribution of passage lengths is partitioned into those passages which lead to complex chambers and those which lead to simple chambers, the differencesshown in the two histograms emerge. Passages leading to simple chambers have a mean length of 3.0 m while passages leading to complex chambers have a mean length of 6.4 m.

Passage width varies between 0.5 m in the case of seven passages, up to 1.2 m in the case of the passage leading to the west chamber at Calf of Eday Long (ORK 8). This latter measurement, however, may not be a true reflection of the original passage width, since that chamber itself was the result of an unusual series of circumstances (Calder, 1937: 123). The distribution of passage widths (Figure 6.42) is remarkably uniform - ignoring this single passage, the widest passage is less than double the width of the narrowest. Indeed, the median width is 0.6 m, the mode is 0.6 or 0.7 m, while the mean is 0.7 m. Such minimal variation is rare among the variables of cairn, chamber, and passage structure which are under examination here.

Passage area, while not quite a direct product of passage length and width, exhibits no surprises, with a frequency distribution (Figure 6.42) closely allied to that of passage length. The passage of Bigland Round (ORK 2) covers least area (0.6 sq m) while Maes Howe (ORK 36) again emerges as an outstanding anomaly with a passage area (14.7 sq m) more than three times greater than its nearest rival.

Since passage length was as distinctive a criterion as passage area, cairn area was compared directly with passage length. The latter was divided by the former to give a ratio, a ratio which varied from 0.005 at Braeside (ORK 5) to 0.044 at Sandyhill Smithy (ORK 47). Cairns with more than one chamber were excluded from Figure 6.43, leaving 23 cairns and passages, all in category Alpha. The distribution of the passage/cairn ratio appears to be bimodal, but no common feature is apparent among the cairns of either group. That passage length is independent of cairn area is confirmed by the scatter diagram in Figure 6.43 in which no clustering is visible and in which only Maes Howe (ORK 36) stands remote from the other cairns having the longest passage and greatest cairn area. The observation that passages connected to complex chambers tend to be longer was tested in this scatter diagram by visually distinguishing the complex chambers. The pattern which emerges is that complex chambers tend to be associated with long passages and cairns of large area, while simple chambers tend to be associated with short passages and cairns of small area.

6.4.3. SUMMARY

From this overview of the construction, shape and size of the chambers of the known Orcadian chambered cairns, it is possible to make certain observations:

1. two types of chamber construction are found: horizontally laid slabs of dry stone walling throughout, and walling interspersed with orthostats. The latter is more common: the former is often associated with chambers of complex shape.
2. corbelled roofing may have been the general rule for all kinds of chambers.
3. with the exception of protruding orthostats and low shelves, the interior of chambers were devoid of internal stone furniture.

4. there are many relatively small chambers, and only a few relatively large chambers.
5. chambers of all proportions are found, but it is most common for chambers to be about twice as long as they are wide.
6. chambers can be divided into simple shapes, which are fundamentally a single enclosed space, and complex shapes, which contain more than one enclosed space.
7. passage width is remarkably uniform, with the most common widths being between 0.5 and 0.7 m.

In addition, comparison of the evidence for chambers with that for cairns enables five more comments to be made:

8. chambers are invariably more elongated than cairns.
9. every chamber is less than a quarter of the area of its enclosing cairn: having noted this, there is no further correlation between cairn area and chamber area.
10. there is no correlation between cairn shape and chamber shape.
11. complex chambers tend to be associated with long passages, and to be contained in cairns of large area.
12. rarely, two chambers are found under a single cairn.

6.5. CERTAINTY OF CLASSIFICATION

These structural analyses of cairns and chambers have gone to some length to distinguish the evidence for monuments of categories Alpha, Beta, and Gamma. In almost every case, it has been shown that the evidence from category Gamma monuments does not conflict with that for category Beta, and that the evidence from both does not conflict with that for category Alpha. This means that the composite group of monuments represented by the amalgamation of categories Alpha, Beta, and Gamma is a coherent group and that observations and conclusions drawn about a single category may be interpreted as being valid for the group as a whole.

Accordingly, the categories Alpha, Beta, and Gamma are not used hereafter: the 76 monuments are treated as one class of prehistoric site. By showing that all 76 are indistinguishable on the known evidence from those excavated sites which are indisputably "chambered cairns", it becomes possible to make statements about other aspects of the monuments, notably their location in the landscape, which apply to a great number of cairns. Such statements are conditional upon the monuments of categories Beta and Gamma belonging to the class of "chambered cairns" but, as has been demonstrated, there is every reason to suppose that this is a valid proposition.

6.6. CLUSTER ANALYSIS

This chapter has so far dealt with characteristics of cairns and chambers one at a time. That is, each detail of construction has been considered in relation to the same detail of construction at other tombs, but not in relation to other details of construction at the same tomb. This is patently an artificial analytical device since it is certain that each chambered cairn was built as a unified structure or, if multi-period construction is allowed for, as a sequence of unified structures. That device has certainly produced results, but an examination of the physical characteristics of chambered cairns would be incomplete without a study of each tomb, and all its characteristics, in relation to every other tomb, with all their characteristics.

Immediately, this leads into the field of classification. The process of ordering has always been prominent in archaeology and Chapter 9 of this thesis examines some classifications of the chambered cairns of Orkney proposed by previous writers. Those classifications, or typologies, have been based on the consideration of many attributes of chambered cairns. Such attributes have been ordered according to the knowledge and experience gathered during field-work and other research by the archaeologists concerned. The end results have been multivariate classifications of chambered cairns expressed in terms of groups such as "Maes Howe type" cairns or "stalled" cairns. Classifications constructed by this method might be termed "intuitive" because they depend on direct apprehension and arational assimilation of data.

Cluster analysis is another method of multivariate classification. Like the intuitive methods, it relies on knowledge and experience for the selection of the data to be analysed. Unlike the intuitive method, it depends on manipulation and rational ordering of that data. In common with all methods of classification

> "the object of a cluster analysis is to sort a sample of cases under consideration into groups such that the degree of association is high between members of the same group and low between members of different groups"
>
> (Wishart, 1978: 1)

A disadvantage of cluster analysis, which it shares with most methods of numerical analysis, is that it does not deal comfortably with missing values. This means that the variables to be studied must be available for every case. Practically, cases for which some variables are missing are omitted from the analysis. A second disadvantage is that all variables must be measured in numerical form. This means that attributes measured in discrete (including binary) form may not be used. The variables which were finally selected were:

1. cairn length
2. cairn width
3. cairn area
4. chamber length
5. chamber width
6. chamber area
7. number of compartments
8. number of cells.

Each of these terms is exactly as defined in previous sections of this chapter. Note that the last two variables, concerning the number of compartments and cells, are considered as being continuous although, strictly, they should be considered as discontinuous variables.

The first three variables are measures of the enclosing cairn and the last five are measures of the enclosed chamber. Thus the cluster analysis will divide the monuments into groups which take account of the nature of both cairn and chamber. (In a later chapter it will be shown that many of the more recent chambered tomb typologies rely only on the attributes of the chamber).

The first six variables are measured in metres or square metres; the last two are dimensionless. The effect of using these variables will be to place some emphasis on physical size in the results of the cluster analysis. (Again, this is an aspect of tomb construction that has not been of primary importance in published typologies).

The eight variables can be measured for 41 monuments. Table 6.44 lists these monuments. The complete data matrix can be reconstructed by referring to Appendix A. The number of cases was increased to 44 because three of the monuments contain two chambers. Thus, in the analysis that follows, ORK 23U and ORK 23L refer respectively to the upper and lower chambers of Huntersquoy, with the three cairn variables being the same in each case. Similarly, ORK 49U and ORK 49L refer to the upper and lower chambers of Taversoe Tuick, and ORK 8W and ORK 8E refer to the west and east chambers of Calf of Eday Long.

The cluster analysis was conducted using the program package CLUSTAN (documented in Wishart (1978)) implemented on the University of Glasgow ICL 2976. Using the procedure

CORREL, the data matrix was transformed to a matrix of standard scores, with each variable having a mean of 0.00 and a standard deviation of 1.00. The Euclidean distance between each pair of cases was then calculated and a matrix of these similarities was filed. Using the procedure HIERARCHY, a series of cluster analyses were performed. Initially the two cases which are most similar (closest together in n-dimensional space) are joined to form one cluster. The distance between the new cluster and every case is calculated. At every succeeding cycle, the two most similar clusters, or cases, are joined to make a new cluster. This continues for a number of cycles (one less than the original number of cases) until every case has been linked together and there is only one large cluster left. Finally the procedure TREE was used to print a dendogram of the completed cluster analysis and the procedure RESULT was used to print diagnostic statistics for each cluster.

Four methods of cluster analyses were employed, each using a different method of computing the similarity of clusters. They were:

1. single linkage. The similarity of two clusters is defined as the highest single similarity coefficient between two cases, one from each cluster.
2. complete linkage. The similarity of two clusters is defined as the lowest single similarity coefficient between two cases, one from each cluster.

3. average linkage. The similarity of two clusters is the average of all the similarity coefficients for pairs of individuals, one from each cluster.
4. median linkage. The similarity of cluster P and the cluster which results from the fusion of clusters Q and R is the n-dimensional distance between the centroid (or geometric mean) of P and the midpoint of the line joining the centroids of Q and R.

The first three of these methods failed to produce clusters with coherent group structures: a high degree of chaining was visible in the respective dendograms. The dendogram for the fourth method - median linkage - is illustrated in Figure 6.45. This dendogram exhibits a minimum of chaining and, moreover, shows more evidence of group structure than any of the other three. The cluster analysis which lies behind this particular dendogram was selected for further discussion.

Figure 6.45 shows that if a cut-off at a similarity coefficient of 1.000 is effected, six clusters are produced - indicated by Roman numerals I through VI. The number of chambered cairns in each cluster is variable, with only a single site in cluster V and 28 sites in cluster III. When reference was made to the original data matrix, it was found that all six clusters could be interpreted in simple terms:

<u>Cluster I</u> (illustrated in Figure 6.46): long cairns with large, many-compartmented, simple chambers. There are five cairns in this cluster: Bigland Long (ORK 1), Knowe of Ramsay (ORK 30), Knowe of Rowiegar (ORK 31), Midhowe (ORK 37), and

Redland South (ORK T20). Their most distinctive common feature is a large number of compartments in their chambers: no monument in this cluster has less than ten compartments and no other monument in the sample has more than seven compartments. The chambers of cluster I are also remarkable for their large size. The smallest chamber area is 40 sq m: Figure 6.29 shows that only one other known chamber in Orkney is as large in area. The other common feature shared by these five is a low cairn ratio: Bigland Long has the highest in the cluster at 0.56 and Figure 6.13 confirms that this is a low cairn ratio among the chambered cairns of Orkney.

<u>Cluster II</u> (illustrated in Figure 6.47): large long cairns with various chambers. This cluster contains four chambered cairns: Braeside (ORK 5), Helliar Holm (ORK 19), Isbister (ORK 25), and Knowe of Lairo (ORK 28). Their most distinctive feature is the nature of the cairn with all four having large cairn areas (the smallest being 410 sq m - compare with Figure 6.15) and elongated cairns (the highest cairn ratio being 0.74 - compare with Figure 6.13). This cluster is the least coherent of the six in that the chambers fall into no pattern. Three monuments have simple chambers but Isbister has a complex chamber of five compartments and three cells.

<u>Cluster III</u> (illustrated in Figures 6.48 and 6.49): small cairns with simple chambers. This is by far the largest cluster in numbers, with 28 members. Comparison with Figure 6.15 demonstrates that their cairn areas are small in relation

to other cairns: 18 have areas less than 150 sq m and no member of cluster III has a cairn area in excess of 333 sq m. With only two exceptions, every chamber in the cluster is simple, with the number of compartments ranging from two to seven (three being the most common number). The two exceptions are Unstan (ORK 51) and the upper chamber of Taversoe Tuick (ORK 49U) each of which have a single cell.

Cluster IV (illustrated in Figure 6.50): small round cairns with complex chambers. Another grouping with four members, this cluster contains Cuween Hill (ORK 12), Quoyness (ORK 44), Vinquoy Hill (ORK 53), and Wideford Hill (ORK 54). The cairns are uniformly round and relatively small in area, with Quoyness having the largest cairn area at 289 sq m. The chambers are of a common pattern, each consisting of a single compartment surrounded by a number of cells. This number is variable, being five, six, four and three respectively.

Cluster IV (illustrated in Figure 6.50): large, long cairn with complex chamber. Holm of Papa Westray South (ORK 22) is the sole member. This monument consists of an elongated cairn of 514 sq m with a very large complex chamber containing three compartments and fourteen cells. The form of this monument is unique by any standards.

Cluster VI (illustrated in Figure 6.50): large, round cairns with complex chambers. Maes Howe (ORK 36) and Quanterness (ORK 43) are the only two members of this cluster. Both are round cairns with diameters of 35 m and 30 m respectively. Both have complex chambers with three and six cells respectively.

As predicted, this cluster analysis of the structures of the chambered cairns of Orkney has produced a classification which is largely based on the physical size of the monuments and which takes into consideration both the enclosing cairn and the enclosed chamber.

Further discussion of the analysis will be deferred until previous classifications of the monuments have been examined. Then, at the end of Chapter 9, the cluster analysis will be compared and contrasted with the classifications suggested by Anderson, Henshall, and other workers in the field.

CHAPTER SEVEN: THE OTHER BUILDINGS

7.1. INTRODUCTION

In addition to the chambered cairns, there are several sites of archaeological interest in Orkney which may belong to the Neolithic period. At the present time we know of six such major sites: the domestic settlements of Skara Brae, Rinyo, Knap of Howar and Links of Noltland; and the henge monuments of the Ring of Brogar and the Stones of Stenness. To these may be added the fifty or so standing stones, mostly found singly but in some places found in twos or threes, scattered throughout the islands.

At once the problem of this maldistribution of numbers must be faced. Why, to our present knowledge, are there only four settlements, and over seventy cairns? What relationship do the henges and standing stones have to the other classes of site? Is paucity of numbers an indication of relative importance? Even more fundamentally, are all of these sites contemporary, even in the widest of senses? These are all imponderable questions and little attempt has been made to frame answers to them in the archaeological literature. Before such questions can be faced, it is necessary to look at the nature of these sites. Accordingly this chapter will review the accepted data on the settlements, henges and standing stones of Orkney. Questions of relative chronology, and discussions of portable artefacts, are largely deferred to later chapters.

7.2. THE SETTLEMENTS

Four settlements to which a date in the third or second millennia bc has been attributed are known in Orkney. All of these have been excavated. What is more, three of them have been excavated in the last ten years. This partly accounts for the paucity of recognised Neolithic settlements: the dating for all of these sites rests largely on the use of radiocarbon and few sites of any description in Orkney have been dated by this method. Therefore, there may be many other places in Orkney which will be identified as being of contemporary date when, or if, physical methods of dating are applied to them.

The four known settlements are located on Figure 1.2. Skara Brae is situated on the south shore of the Bay of Skaill in the West Mainland. Rinyo is situated at the foot of Faraclett Hill in the north-west of Rousay. Knap of Howar is close to the western shore of the island of Papa Westray, and Links of Noltland is situated on a north-facing bay in the neighbouring island of Westray.

Because all four settlements have been excavated, there is a wealth of information on their construction and design. It is not the place of this study to attempt a detailed re-evaluation of the four, not least because excavations at three are still unpublished. Instead, a résumé of the published information will be given here, accompanied by the addition of material from interim excavation reports kindly made available by Dr David V. Clarke and Dr Anna Ritchie.

Skara Brae

Excavations have taken place at Skara Brae on seven occasions in the last 130 years. (Table 4.1). The literature which has arisen from these investigations and subsequent syntheses is impressive in quantity while the site itself has been taken into state guardianship and attracts many thousands of visitors every year. Skara Brae is arguably the best known prehistoric monument in Britain after Stonehenge and must play a significant part in the modern economy of Orkney by attracting tourism to the islands.

The site itself, in its major phase, consisted of a collection of dwelling houses connected by passages. The outline plan of the village is reproduced in Figure 7.1. Each house contains individual features but there are similarities as well. The method of construction is uniform: dry stone walling of a high standard, using flagstone from the adjacent shore. Some of the original walls stand today to a height of three metres. The houses are roughly square in plan shape, but have rounded corners. There is no indication that the houses had roofs of stone, and they may have been roofed with more ephemeral materials. Within each house is a central hearth, formed by four flagstones on edge. On each side of the hearth, against the inner wall, are found rectangular structures, which may have been beds. Above the beds there are recesses built into the wall, perhaps store-places for personal possessions. In some of the houses another store-place, in the form of a series of stone shelves - dressers - were found. Let into the floor of most of the houses were a number of clay lined and water-tight boxes. These might be seen as storage for shell-fish, or simply as receptacles for drinking water. Each house has one or more small cells opening off the main room: they are constructed either with corbelled or lintelled roofs. All of the houses were entered by a low roofed passage that includes a door demarcated by a sill stone and a pair of jambs. These passages lead into a series of connecting passages or walkways, one of which (passage A) runs almost the entire length of the known village. One of the buildings, number 8, stands separate from the others and does not contain any of the bed boxes: this building has been interpreted as a workshop, or industrial structure. Apart from the workshop, it is likely that the village was completely covered over with a mound of midden material. That is, the houses were constructed and afterwards (perhaps very shortly afterwards), they were buried in layers of deposited debris to promote warmth and insulation.

One result of Childe's investigations in the late 1920s was his postulation of five periods of occupation of the settlement. According to Childe (1931a: 92-95), the first settlement, or Period I of Skara Brae was situated to the south-west of the extant buildings and was responsible for the accumulation of a vast amount of midden material. This material provided the foundation for the houses of Period II, occupying roughly the same area as the later settlements.

Gradual dilapidation and the onslaught of sandblow followed, until houses 7, 1 and 5 were reconstructed as the basis of Skara Brae's Period III. This phase represents the village largely as presented to the public today with eight houses connected by passages and surrounded by encasing walls. In Period IV more midden was deposited and some of the external walls were rebuilt. After this the village was abandoned, perhaps catastrophically. Indeed, Childe was confident enough of this to write the following graphic description of the abandonment:

> "Definite evidence of a hasty flight is, however, afforded by a trail of beads.... All had fallen from a necklace broken as its wearer squeezed hurriedly through the narrow gap where she lost most beads while the rest continued to fall from her as she scampered up the passage".
>
> (1931a: 41)

Childe's last phase of occupation is regarded as a re-occupation of the village after the catastrophe. In house 7, he found no less than four levels of re-occupation by people of the same material culture. It is not certain if the modern excavations at Skara Brae will support the suggestion of so many distinct phases of settlement, but indisputably the site of the village was lived in for a long period of time.

Clarke's excavations at Skara Brae in the early 1970s have been published in interim form (Clarke, 1976). His use of modern recovery techniques including wet seiving and froth flotation led to a greater understanding of the economic life of the settlement. Fish bones were found in quantity. Shell-fish such as limpets may have been used as bait to catch fish. Cattle were always the most important species of domesticated animal, but caprines may have become more important in the later life of the settlement. These excavations also produced a series of radiocarbon dates, ranging seven hundred years from 2500 bc to 1800 bc (Figure 9.12). Discussion of these dates, and the full range of economic evidence from Skara Brae, must await full publication.

Rinyo

The settlement site of Rinyo has not figured as prominently in the archaeological literature as Skara Brae, despite Childe's original claim that its "full excavation ... may be expcted to prove no less revolutionary for British prehistory than that of Köln-Lindenthal has been for Central European" (Childe and Grant, 1939: 6). Certainly the artefacts from Rinyo have been a source of puzzlement to prehistorians, but the structure itself has been largely undiscussed and unvisited. Indeed, the contrast between Skara Brae, a well displayed tourist attraction, and Rinyo, a convenient rubbish dump at the edge of a field, is remarkable. It is all the more remarkable in the light of Childe's remark that Rinyo is probably larger in extent than Skara Brae (1939: 7). Partial explanations may be that the site is not so well preserved as Skara Brae and that excavations there were interrupted by the war.

The published drawings of Rinyo are very poor, but are reproduced here as Figure 7.2. This reveals a settlement of at least seven houses (Childe's A through G), not all of which are necessarily contemporary. The details of the architecture correspond largely to those observed at Skara Brae. All structures are built in local sandstone, and the typical house is a squat rectangle with rounded corners. In the centre of each house is a square fire-place demarcated by four upright slabs. On each side of the fire-place, and sometimes constructed into the house wall, are rectangular bed spaces. In Rinyo there are examples of these structures being constructed with dry stone masonry instead of massive slabs. The water-tight tanks, thought to be shell-fish boxes, are present, as are suggestions of storage dressers. Under-floor drains run throughout the settlement and, although it is not as clear as at Skara Brae, the houses appear to have been connected by passages and enclosed by a circling wall. One feature peculiar to Rinyo was uncovered in house C: a clay-built oven adjacent to the hearth.

Childe and Grant were unable to relate a coherent stratigraphical development for the settlement of Rinyo. Nevertheless, after the first excavations, they were sure of two major phases, separated by an episode of rebuilding. Rinyo I is represented by stratified deposits from below the floors of houses A, B, C, D. Material from the floor of house D represents an indeterminate intermediate phase while Rinyo II includes the material on or above the floors of houses A, B and C. (1939: 22). By the time of the second report on excavations at Rinyo (Childe and Grant, 1947), this simple two part division had been rejected, but had not been replaced by an alternative scheme. Another house, labelled 'G', had been discovered and while exhibiting a full complement of Rinyo-type furniture, no less than five distinct deposits were uncovered beneath the level of this furniture. The second report finishes abruptly: there is a possibility that Childe intended further seasons of excavation at Rinyo which would have exposed the bounds of the settlement, elucidated the stratigraphical sequence, and enabled an internally consistent history of the site to be constructed.

Knap of Howar

The domestic settlement at Knap of Howar (or Hower) was excavated by William Traill and William Kirkness in the mid 1930s and again, somewhat more carefully, by Dr Anna Ritchie in 1973 and 1975. At the time of the final explorations the great antiquity of the site was unsuspected: although a date contemporary with Skara Brae was discussed, even Skara Brae was still thought to date from later prehistory. Due to the recent excavations, Knap of Howar is now recognised as the oldest occupation site in Scotland north of Boghead mound in Moray.

The plan of the known settlement is shown in Figure 7.3. Unlike the two sites discussed above, there appear to be only two separate domestic structures, or individual houses, at Knap of Howar. House 1, the larger of the two, is slightly larger in area than the largest house at Skara Brae and is more elongated in shape. Both house 1 and house 2 (plate G) display the same rounded corners and both contain certain items of furniture which are common at Skara Brae. There is a square hearth in the centre of house 1 and several structures parallel to the walls which are reminiscent of bed spaces. Small keeping-places ("aumbries") are built into the structure of the walls. In place of the Skara Brae dressers, there are complexes of orthostats in the south-east end of house 2 and along the south wall of house 1. In addition bedding grooves for wooden benches were found in house 1. Another feature peculiar to Knap of Howar is the partitioning of houses by impermanent divisions: house 1 is partitioned into two areas while house 2 contains three different areas. These partitions, together with the observation that, at one period, house 2 could only be entered from house 1, suggest that the entire complex was intended to be one functional entity with spaces designated for different uses.

The stratigraphy of Knap of Howar was unclear after the excavations in the 1930s. The later excavations determined that the two houses are of different periods, with house 2 post-dating house 1, but the difference in dating may be a matter of months. The complex is built on top of a midden which runs under both houses and extends in all directions from them. Because the artefact assemblage from both houses and the midden is uniform, the informed suggestion is that the midden may be roughly contemporary with both houses. This impression is supported by the radiocarbon date (Figure 9.11) from upper and lower contexts.

The major references to Knap of Howar are Traill and Kirkness (1937) and A. Ritchie (1973 and 1975).

Links of Noltland

In 1866 George Petrie found a midden in the island of Westray which contained material similar to that excavated from Skara Brae. He recorded his find in notebooks but no attention was given to the site until a few years ago when Dr David V. Clarke of the National Museum of Antiquities of Scotland uncovered the reference and started looking for the precise locality (Clarke, Hope and Wickham-Jones, 1978). It was found on the Links of Noltland to the north-west of Pierowall village. The site is undergoing severe and irreversible deflation, and four seasons of rescue excavation have taken place since 1978: at the time of writing, a summary account is available for three of those seasons (Clarke, 1980).

Links of Noltland was first noted because of a spread of midden material containing artefacts. The extent of this midden has not yet been gauged, but its known limits suggest an area of occupation more than four times greater than Skara Brae. One area, the West Midden, has revealed a clear stratigraphical sequence beginning with early prehistoric ploughing shown in plate H. The beginning of midden deposition predates the insertion of a wall and the deposition of a number of completely articulated deer skeletons. After this, a period of sand-blow was followed by a further episode of ploughing and the construction of a second wall. Even if it emerges that the latter wall dates from a much later period, radiocarbon dates and artefacts associated with the primary midden are a strong indication that there were people in Westray, at the time of the chambered cairns, who cultivated land for a long period of time. The nearest chambered cairn to Links of Noltland is Iphs (ORK 24) on a prominent terrace about 700 m to the south-east.

Another area under excavation, named Grobust, has revealed a complex of structural remains, with extant dry stone walling standing to over a metre in height. The building (or buildings) has a major compartment with recessed enclosures and, to the north of this, linked by a passage, an oval compartment which has undergone structural alterations in prehistory. The nature of these structures cannot be adequately discussed until their excavation is complete but the fact that it is not easy to draw parallels with any other structure of similar age in Britain suggests that the excavations at Grobust will be instrumental in greatly enlarging our view of the third and second millennia bc.

The structures at Grobust are not the only potentially important aspect of the excavations at Links of Noltland. Meticulous techniques of excavation at the site have produced a vast amount of occupation debris, including animal bones, macro- and microscopic plant remains, and the remains of marine life. In addition, there is a vast quantity of human artefacts awaiting study, including flints, worked bone, worked stone, and pottery. When post-excavation work is completed on this debris, we will be in possession of much information of the economy of Neolithic Orkney.

7.3. THE HENGES

Henges (the name is unsatisfactory) are circular, or near circular, banks with internal ditches and one or more causewayed entrances. They are a relatively rare phenomenon in Britain with only about 80 examples known (Megaw and Simpson, 1979: 148). In Orkney, there are two known examples, both of them associated with stone circles. This latter class of structure is more common: there are perhaps 900 such circles in the British Isles. (Burl, 1976: 8). The Ring of Brogar (or Brodgar) and the Stones of Stenness are located less than 1500 m apart between the Lochs of Harray and Stenness in an area which contains a complex of prehistoric remains (Figure 7.4). Both sites have been recognised for centuries as being of ancient construction, and both are presently under the guardianship of the state. As such, they play their part in attracting visitors to the Orkney Islands and contribute to the economic well-being of the inhabitants of the twentieth century.

The Ring of Brogar

This henge (plate I) fails on the primary definition of "henge" since it has no circular bank. At present it consists of a ditch about 9 m across and forming a circle about 120 m in diameter. The ditch is crossed by two causeways, placing the monument in Atkinson's (1948) class II group of henge monuments. The causeways are opposite each other and face north-west and south-east. On the inner lip of the ditch, forming a circle about 103 m in diameter is a ring of stones.

There may have been originally no less than 60 evenly spaced upright stones in the circle, but in 1848 there were only 14 upstanding (J. Fraser, 1926: 17). Today, after reconstruction by the then Office of Works, there are 27 upright, with four prone stones, and several others indicated by stumps. In May 1980 one of the stones was hit and shattered by lightning, a graphic reminder of the natural powers of catastrophic destruction. Figure 7.5 is a plan of the Ring of Brogar from Renfrew (1979: Fig. 14) which in turn is based on a plan by Thom. The most complete description of the site is given in RCAMS (1946: 299-302).

In 1973, Professor Colin Renfrew made three small-scale excavations at the Ring of Brogar. His intentions were three-fold: to explore the nature of the ditch; to attempt to date the construction of the ditch; and to examine the possibility of there having been a bank outside the ditch at an early stage in the history of the monument. The second objective was not achieved: no artefacts were found and isotopic dating revealed only that peat had formed in the ditch in the last centuries of the first millennium bc. Sections across the ditch disclosed that it was originally over 3.0 m deep with a sectional area of 120 sq m - suggesting that 4700 cu m of living rock had been quarried away. No positive trace of an outer bank was found in any of the three trenches, but Renfrew, quoting Thomas (1852: 103), suggests that any such bank might have been reduced completely by natural erosion, including the infilling of the ditch, and by deliberate removal as every newly-formed layer of soil was removed for use as organic enrichment on cultivated land throughout the centuries. The point is unproven, but when it is considered that the removal of the material from the ditch and its transport away (even if it is allowed that the stones of the circle may have been quarried from the ditch) would have involved immense labour, it seems reasonable to postulate the existence in prehistory of a bank outside the ditch where that material might have been deposited. Thus the Ring of Brogar might fit more easily into the same category as henge monuments further south in Britain.

The Stones of Stenness

The other known henge monument in Orkney is visible from the Ring of Brogar and is situated to the south-east of the narrow channel that connects the Lochs of Harray and Stenness (Figure 7.4). The Stones of Stenness consist of an outer bank, an internal ditch with a single spanning causeway (making this a Class I henge), a circle of upright standing stones, and some internal features. There is no sign of the bank and ditch today, but G. Ritchie (1976) in the course of a review of the historical documentation relating to the site makes it clear that there has been much visual and material change since the first descriptions in the eighteenth century. Not only were the bank and ditch visible into the nineteenth century but the number and configuration of stones has altered over historical time.

The Stones of Stenness were excavated in 1973 and 1974 by Dr Graham Ritchie. His report (1976) is an example of the highest standards of archaeological publication, and enables a description to be made of the monument as it stood in prehistory. A plan based on the excavation is displayed here as Figure 7.6. This shows that the ditch forms a circle about 50 m in diameter and 4.0 m wide, and ended in two terminals leaving a north-facing causeway from the interior of the circle. The causeway is about 8.0 m across. The ditch itself was cut into the solid rock to a depth of about a metre making the original declivity about two metres deep. The external bank survived only as a thin layer of clay. Ritchie suggests that the bank was constructed from material in the top half of the ditch. The almost complete disappearance of the bank in the last two hundred years gives added support to Renfrew's suggestion that the Ring of Brogar was also furnished with an external bank.

Within the ditch of the henge was a circle of stones with a diameter of about 31 m. The number of stones which survive today is four; and one of these has been re-erected. The original number was most probably twelve: Ritchie found stone holes or sub-surface indications for all but one of the seven missing stones and their regular spacing implies the existence of twelve originals. The size of the existing stones is massive - one of them is no less than 5.7 m in height. In the centre of the circle, formed by the postulated twelve stones, was found a stone setting of four slabs enclosing a rectangular space. At one time this space may have contained some kind of timber structure. In addition, the interior of the circle contained other features and structures, including several post-holes. The interiors of henges have elsewhere proved to contain curious and unexplainable features, and their function and meaning to late Neolithic society has always been a complete mystery. The Stones of Stenness with its interior structures and the massive Ring of Brogar (whose interior has never been investigated) are no exception.

7.4. THE STANDING STONES

Unlike settlements and henges, it is extremely difficult to identify a standing stone of the third or second millennia bc. On strictly morphological grounds, it is impossible to tell apart a prehistoric stone from one erected last century. Standing stones may have been erected as rubbing stones for cattle or as strainers for barbed wire fences. It has been suggested (RCAMS, 1946: 1,27) that at least one stone in Shetland saw use as a mediaeval boundary-mark. Even if the socket and surround of a standing stone is excavated, it may not produce any artefacts or organic material which may be dated. In any case, no such excavations have taken place in Orkney and so no standing stone can be securely attributed to the Neolithic period.

This conclusion is unduly pessimistic. It is generally accepted that single standing stones fall into the same tradition as circles of standing stones and other ritual monuments of the third and second millennia bc. In Orkney there are examples so massive and examples found in such associations that it is straining credulity to imagine they are anything but monuments of prehistory erected for some religious or social purpose. Thus the known standing stones in Orkney will be treated here as being worthy of inclusion among the other Neolithic constructions. However, no quantitative or statistical analysis will be carried out on them or their locations because of the real possibility that a few standing stones may date from thousands of years after the others.

The computer file OSORK, compiled from the records of the Archaeology Division of the Ordnance Survey in Edinburgh, identifies 43 separate locations in Orkney for standing stones of the Neolithic and Bronze Ages. At 12 of the sites there are two or three stones making a total of about 55 suspected standing stones. These sites are listed in Appendix C. and are displayed in Figure 7.7, a location map of standing stones in Orkney.

The distribution of these stones shows a marked preference for land that is presently uncultivated suggesting either that such land was regarded as being a favourable location or that stones originally erected on land that was subsequently cultivated have been destroyed. In this particular case, the balance of the argument must come down on the side of the latter suggestion. Single standing stones, particularly the less massive examples, may not be perceived as remnants of past societies in the same way that "knowes" and "picts' houses" have been, and hence may be destroyed with impunity. The very act of pulling down an erect stone can be achieved with far less labour than the destruction of many other prehistoric sites. Furthermore, in the case of the destroyed stone of Odin, we have a historical account of such an incident taking place. In December 1814, Captain MacKay, tenant of farmlands in Stenness, caused the stone to be felled and to be shattered (Marwick, 1976). The stone of Odin was remarkable because it had acquired a host of superstitions but, nevertheless, it is an example of a standing stone located on good agricultural land which was deliberately destroyed by a farmer. Further corroborative evidence that such events are not uncommon comes from the island of Eday. Of the four sites recorded by the Royal Commission (1946: 1, 53-4), the standing stones at three had been thrown down in living memory. Two had since been re-erected, but the general point remains the same: among the spectrum of prehistoric erections, standing stones are relatively impermanent structures.

The standing stones of Orkney are not uniform in size or shape. One of the largest is the Stone of Setter (plate J). This remarkable monolith is of irregular form and is badly weathered into oblate masses, perhaps the result of weathering of the rock before the stone was erected in its present position. The stone is 4.8 m high and a maximum of 2.2 m across. It is situated at the saddle point of a low ridge between Calf Sound and the valley containing Mill Loch (Figure 11.9), with views both to the north and south. A more shapely standing stone is the Mor Stein of Shapinsay, another stone which has been re-erected. Today it stands 3.1 m high. Like the Stone of Setter, it commands extensive views across Orkney, being located on an elevated summit of of Shapinsay.

Not all the stones of Orkney are so massive. The standing stone at Trenabie in Westray is no higher than 0.9 m. On the island of Auskerry is a stone which is a maximum of 1.1 m high but is 1.6 m broad. Thus there is no conformity in size of shape among the standing stones: a possible conclusion is that each stone was erected with raw material that was to hand and that the shape of the stone was of secondary importance. Rather, the importance of a standing stone resides in its position.

This suggestion will be pursued later but it must be pointed out again that it may not be possible to derive any meaningful conclusions from looking at the standing stones of Orkney. It is certainly possible to postulate any manner of statement but (using the terminology of inferential statistics) the nature of the data-base is inadequate with the known specimens being a grossly biassed sample of the original population. Accordingly, generalisations about that population are open to rejection.

CHAPTER EIGHT: THE MATERIAL CULTURE

8.1. INTRODUCTION

For the purposes of this chapter, "material culture" is interpreted narrowly in one sense and widely in another. Although the monuments and the landscape in which they reside are as much a part of material culture as the small finds from excavation of monuments, this chapter will only consider the latter. However, the variety of finds to be considered will be expanded to include not only the portable artefacts (such as pottery and flint scrapers) but also the economic evidence of resource utilisation (such as animal bones and grains of domesticated plants).

The approach adopted towards material remains here is a pragmatic one. Artefacts and other remains found by archaeologists are regarded as an integral part of the society in which they were created. Artefacts define, and are defined by, society. An object is not of interest to an archaeologist solely because of itself, but rather because it is (and was) part of a greater entity. This entity, which includes the actions of people, is the proper object of study for archaeology.

The questions to be considered revolve around two issues: the nature of the material remains, and the context in which they were found. The first issue requires a discussion of the type of artefacts recovered and an attempt to discover the use and meaning of these artefacts. This immediately involves the second issue, and in particular the distinction between objects associated with chambered cairns and objects found in other associations. A connected problem concerns the processes of deposition of material remains which must be distinguished from processes of survival and recovery.

The study of the material culture of chambered cairns is beset with difficulties that are not always shared with other prehistoric sites. There are some chambered cairns which produce very few objects on excavation: the Rousay excavations of the 1930s commonly produced less than ten artefacts and we know of no artefacts from Holm of Papa Westray South (ORK 22) and Maes Howe (ORK 36). The possibility that chambers were periodically cleared out and that all finds consequently date from late in the use of the cairn or that finds from all periods are mixed in a chamber (Henshall, 1972: 165) introduces a note of caution into any interpretation. Experience at sites in mainland Scotland suggests that, unless a cairn is completely excavated, there is a possibility that objects found "within" a chamber may belong to a period of activity before the chamber was built and hence predate the monument (Masters, pers. comm.). These difficulties have led to a note of pessimism among writers on megalithic monuments. Daniel's account of the grave goods from Breton megalithic tombs was "necessarily brief" (1960: 105) and the same writer, when discussing his summary of finds from the monuments of England and Wales, remarks:

> "The result is a dismal catalogue, but it illustrates forcibly the paucity and lack of variety of the finds from our burial chambers".
>
> (Daniel, 1950: 122)

The opinion of Henshall, whose work on the Scottish chambered tombs must be highly regarded, is that "the contents of the tombs make little contribution to the elucidation of their history" (1972: 722).

One further difficulty peculiar to the Neolithic period of Orkney is that excavation reports on three settlement sites are awaiting publication. The material remains from Skara Brae, Knap of Howar and Links of Noltland are extensive and will certainly bring new light to bear on the material cultures of Orkney. Thus any conclusions which can be drawn now are liable to radical revision within a decade.

These difficulties will be taken into consideration but an attempt will be made to place the material remains of the chambered cairns into the context of the rest of the thesis. For convenience, the remains will be treated according to their physical substance and this chapter will analyse them by the following categories: pottery, worked bone and related substances, worked flint and chert, worked stone of other types, unworked animal remains, and plant remains.

8.2. <u>POTTERY</u>

Pottery associated with the primary use of the monument has been found at 22 chambered cairns (Table 8.1), four settlement sites and at the Stones of Stenness. Much of this pottery is extremely fragmentary and in total there are probably not many more than 50 reconstructable pots from the cairns and fewer from Skara Brae and Rinyo. The amount of pottery recovered from midden deposits at Links of Noltland

and Knap of Howar and from burial deposits at Isbister will radically increase this number. Two important statements about the Neolithic pottery of Orkney and its wider affinities are awaiting publication. The first of these is Henshall's discussion of the Isbister pottery which includes a modern polythetic definition of Unstan ware, and the second is Clarke's discussion of Rinyo and the Orcadian Neolithic which reassesses the Unstan ware - Grooved Ware - Beaker sequence.

The majority of Orcadian pottery from Neolithic contexts is presently described by one of the two terms mentioned above - "Unstan" ware and "Grooved Ware". As with many prehistoric pottery styles, these wares are not rigorously defined and can only be understood by reference to the academic context in which they originated. This remark may be supported by reference to a typical single shard from Rinyo which has variously been described as "Grooved Ware", of "Rinyo I" type, of "Skara Brae style C", as "Rinyo-Clacton" ware, and lately as "Grooved Ware" again. The shard has not changed since 1938; only its modern academic context has shifted.

Unstan ware (Figure 8.2) is composed of fabrics which have been variously described as "friable black-brown-buff vesicular ware, traces of a fine burnished black surface" (Henshall, 1963: 185); "hard slightly vesicular red-brown ware, traces of burnishing" (1963: 189); "hard brown ware with some grits, fine outer surface, slight burnishing"

(1963: 236); and "fine hard black ware with traces of burnishing" (1963: 240). There has been no suggestion that such pottery has been made with clay found outwith Orkney. A very common feature of the Unstan ware of Orkney is that it has been reburnt and exhibits red or orange colouration in part. This reburning has been unequivocally attributed to "the ritual fires in the chambers" (1963: 106).

Slab-construction seems to be the common rule in pottery of Unstan type. The thickness of the wall shards varies from about 0.2 in (5 mm) to about 0.7 in (18 mm). Henshall suggests that the bowls were made in two pieces using a mould for shaping (1963: 109).

The most characteristic feature of Unstan ware is the form of the pots. Commonly they are round-bottomed and shallow in proportion to their width. The collars are vertical or near-vertical and there is a pronounced carination on the outer surface, although the inner surface is frequently smooth. The rims are of various forms including rounded, pointed, flat, inturned, everted and expanded. The collar between rim and carination is commonly decorated, while the rest of the bowl is undecorated. The decoration consists of incised or stab-and-drag lines arranged in parallel with a common motif being lines arranged to form triangles, each triangle having the lines running at 60° to those in neighbouring triangles.

Within Orkney, pottery of Unstan type has been found at a minimum of nine chambered cairns (Table 8.1), with major collections at Calf of Eday Long (ORK 8), Isbister (ORK 25), Taversoe Tuick (ORK 49) and at Unstan (ORK 51), the type-site for the class. Unstan ware has also been found at Knap of Howar (A. Ritchie, 1975: 37). It has been claimed by Renfrew (1979: 208) that a type of pottery related to Unstan ware was found in the lowest levels of Rinyo but Childe was by no means confident of this attribution. Indeed, to support this statement, he used only two shards (Childe and Grant, 1947: Fig. 6, nos 18 and 19) and compared them with a pot from Calf of Eday Long (Henshall, 1963: 249, no. 29). Henshall's reconstruction of this pot can be by no means described as having "the same general profile as classical bowls from Unstan" (Childe and Grant, 1947: 37).

Outwith Orkney, Unstan ware is restricted to the north of Scotland. It is found in the Western Isles, at the settlement sites of Eilean nan Tighe (Scott, 1951) and Northton (Simpson, 1976). Indeed, at least one writer (McInnes, 1969: 22) has suggested a Hebridean origin for Unstan ware. Recently, fragments of well-constructed, carinated pots with line decoration have been found at the third millennium bc timber house of Balbridie in Grampian (Ralston, pers. comm.).

The Grooved Ware (Figure 8.3) found in Orkney has fabrics variously described as "exceedingly coarse" (Childe, 1931a: 127) "coarse and poorly fired with large grits (Childe and Grant, 1939: 23) and "the inside is dull brown-grey, the outside brown-black with sooty accretions, the outside of the base burnt pink" (Renfrew, 1979: 84).

The construction of Grooved Ware has been described meticulously by Childe in these terms:

> "The flat base of the vessels was a disc of clay formed by patting or coiling. Upon this the walls of the vessels were built up by the addition of successive rings, each a couple of inches high in the case of large vessels. The top of each ring was thinned out presumably between finger and thumb to form an edge. When the ring had begun to harden the next ring was pressed down on this edge so as to overlap on either side, and the join was rubbed over with the wet fingers".
>
> (Childe, 1931a: 127)

Construction rings of the type described are clearly seen in the illustration of pots from Quanterness (Renfrew, 1979: Fig. 33).

The form of the pots is less uniform than that of Unstan ware. At Skara Brae, the most common shape was a flat-based cylindrical tub, but inverted truncated cones were also found. No pots had carinations or handles. Rims were variable but generally simple in form (Childe 1931a: 128-9). The most complete pots at Quanterness conform to these descriptions, being "flat-based and tub-shaped, with walls either splayed or nearly vertical and notably straight in profile" (Renfrew, 1979: 75). Decoration may be either incised or applied, and consists of a variety of regular geometric patterns. At Skara Brae, three classes of decoration were recognised (Childe, 1931a: 130).

1. Class A: applied strips or pellets
2. Class B: applied strips subsequently embellished by incision
3. Class C: incised decoration in a thick slip.

These classes were all recognised at Rinyo. At Quanterness and the Stones of Stenness, classes B and C were found but Class A was rare at the cairn and absent from the henge.

The distribution of Grooved Ware within Orkney is restricted to only a few sites. The settlements of Skara Brae, Rinyo, and Links of Noltland (Clarke et al., 1978), and the Stones of Stenness (JNG Ritchie, 1976) certainly have produced classic forms of Grooved Ware. Stray finds have come from Dingieshowe in Deerness and from Evie (Stevenson, 1946). If, as Clarke (forthcoming) suggests, there are grounds for including certain types of round-based pottery in the Grooved Ware assemblage, then it is arguable that Grooved Ware has been found at seven chambered cairns in Orkney (Table 8.1). This suggestion has the merit of removing from the Unstan ware assemblage certain pots, such as No.1 from Knowe of Craie (ORK 27), No.2 from Sandyhill Smithy (ORK 47), No.5 from Midhowe (ORK 37) and No.22 from Taversoe Tuick (ORK 49), which have never fitted comfortably into any definition of Unstan ware. A corollary is that five chambered cairns, namely Calf of Eday Long (ORK 8), Knowe of Rowiegar (ORK 31), Taversoe Tuick (ORK 49), and Unstan (ORK 51), and perhaps Sandyhill Smithy (ORK 47), have contained pottery of both types.

The most comprehensive discussion of Grooved Ware in Britain is contained in the excavation report on Durrington Walls (Wainwright with Longworth, 1971). There the authors suggest that the previously used term "Rinyo-Clacton" should be enlarged to embrace other sub-styles of pottery and the whole ceramic tradition should be referred to as Grooved Ware. As can be seen from Figure 8.4, the tradition is found from Orkney to Devon, with visible concentrations in the Wessex province, Essex, and Yorkshire. In Scotland, Grooved Ware is rare, but widespread. It has been found at three chambered tombs: Unival (UST 34), Tormore (ARN 4), and at the Ord North (SUT 48). Elsewhere, it has been found in a number of surface collections, surely an indication that the style is more common than Figure 8.4 reveals.

A metrical analysis of some of the Orcadian pottery was carried out to see if the distinction between Unstan ware and Grooved Ware could be supported. The analysis was restricted to the 52 reconstructed pots from chambered cairns illustrated at a scale of 1:4 in Henshall (1963) and one pot from Quanterness illustrated at a scale of 1:3 in Renfrew (1979). Illustrations of sufficient quality do not exist from any other site to perform such a secondary analysis.

Table 8.5 displays the raw data used. The pot numbers refer to the original illustrator's numbering system. The radius of a reconstructed pot is the distance from the inside edge of the rim to the centre of the circle formed by the rim. The depth is the distance from that centre to the deepest part of the pot measured in a line at right angles to the line of the radius. The radius to depth ratio is the former divided by the latter. The volume is the sum of a series of conic frustra calculated by the formula outlined in Barrett (1980: 316). The error in such a calculation is no more than the error induced by the reconstruction of whole pots from fragmentary remains.

Perhaps the most remarkable observation about the assemblage is its uniformity of size. The pot with the largest radius is less than four times the width of the smallest, and the range of depth is even less. Volumes range from 742 to 11851 cc, a range which is distorted by one pot, Calf of Eday Long No.29.

The distribution of radius to depth ratios is shown in Figure 8.6. This distribution appears to be bimodal with one group having a mode in the 0.70 to 0.79 class, and another group having a mode in the 1.30 to 1.39 class. If this ratio is to be used as one element of a polythetic distinction between Unstan ware and Grooved Ware, then the natural break at 1.00 could be utilised. Thus pots that have radii greater than their depths are more likely to be termed Unstan ware, while pots that have radii less than their depths are more likely to be termed Grooved Ware.

The frequency distribution of volumes is shown in Figure 8.7. This reveals that the most common volume is between 1000 and 2000 cc and there are increasingly fewer pots of large volume: the distribution is negatively skewed. There is little distinction between Unstan ware and Grooved Ware lying behind Figure 8.7. The volume of Unstan ware bowls varies from 1290 cc in the case of Calf of Eday No.2 to 7604 cc in the case of Unstan No.11.

The evidence on the circumstances of deposition of pottery within chambered cairns is partial. Almost without exception, all the pot shards were found in the chambers or passages of the monuments - but this is readily attributed to those areas being more meticulously examined than other parts of the buildings. In most cases, pot shards were widely scattered throughout the chamber, both horizontally and vertically. This is illustrated by the example of Quanterness (ORK 43) where Henshall was able to join shards from different areas of the main compartment and from strata I through 5. Pot No.8 had shards from grid squares in the extreme north-east and the extreme south-west of the compartment, separated by over five metres laterally and three strata vertically (Renfrew, 1979). One exception to this rule was at Isbister (ORK 25) where much of the pottery appeared to be localised in a restricted area opposite the passage entrance (Hedges, forthcoming). Two similar exceptions were Midhowe (ORK 37) where most of the pottery was in a single pile in the seventh compartment from the entrance (Callander and Grant, 1934) and Calf of Eday Long (ORK 8) where many of the shards were in a single pile near the centre of the eastern chamber (Calder, 1937).

The condition of the pots may be examined with reference to wholeness, and to treatment with fire. It is very rare to find a whole pot and the most common state is for pots to be broken up into many pieces and for some pieces to be missing. That is, the general rule is that pots found in the chambered cairns are fragmented and incomplete. There are only two unfragmented complete pots known, and both come from a structure outside the external cairn wall at Taversoe Tuick (ORK 49). Many pot fragments show signs of burning, having been heated after firing until pink or red, and two pots at Sandyhill Smithy (ORK 47) have remains of soot inside the rim. There are unmistakable signs of fires having been lit inside chambers (Henshall, 1963: 93) and it is possible that reburning of pottery took place in the chambers, a possibility strengthened by several cases where burnt and unburnt shards fit together, indicating the pot was broken before reburning. Contrary to this, the bases of some pots are abraded and some have burnt deposits adhering to both inside and outside (1963: 96) suggesting that they were in normal domestic use before being brought into the chambered cairn. The range of volumes portrayed in Figure 8.7 is not inconsistent with the supposition that all the pottery found in the chambered cairns of Orkney was originally domestic ware intended for everyday purposes of cooking and storage.

The following conclusions might be drawn from this examination of the pottery evidence:

1. in Orkney, there are two distinctive pottery styles, Grooved Ware and Unstan ware.
2. the limited evidence from settlements suggests that there was no mixing of pottery styles within settlements.
3. at a number of chambered cairns, pottery of both styles was deposited.

4. pots within chambered cairns are commonly broken pots which may have formerly been used for domestic purposes, suggesting that new complete pots were not deliberately deposited.

8.3. <u>WORKED BONE AND RELATED SUBSTANCES</u>

At many archaeological sites in Orkney, conditions are excellent for the preservation of bone, antler and similar substances. This is especially true of those sites buried in calcareous sand, such as Skara Brae and Links of Noltland. Objects of worked bone are comparatively rare in the chambered cairns, and Table 8.8 shows that only seven cairns have produced such objects. Again, despite the vast amount of work that has taken place in the last decade, there is as yet no published synthesis of the bone material and Childe (1931a) remains the only overview of the northern Neolithic material. He divided the implements at Skara Brae into three classes, each of which was further sub-divided into variants:

Class A, <u>piercing tools</u>, includes the objects variously called pins, points, awls, and needles. Some examples are shown in Figure 8.9. Implements of form A1 are made by splitting a long bone obliquely through the middle of an articulation. Implements of form A2 are also split but the entire articulation is retained. Implements of form A3 are needles made from bone splinters: they are very rare. Implements of form A4 are points made of ivory and sometimes have a projecting bulb or loop. Class A tools have been found at all the settlement sites and at five chambered cairns. The forms present in the cairns are commonly A1 or A2, but there is a polished bone pin with a lateral projection from Quoyness (ORK 44) which is of form A4.

Class B, cutting or smoothing tools, includes a motley of shaped bones with the common characteristic of showing wear by abrasion. Alternative names include fabricators, chisels, and rubbers. Figure 8.10 displays some examples and Table 8.8 shows that the class is relatively rare in Orkney. Apart from the settlements of Skara Brae and Rinyo, only one other published site has produced an implement of class B. This is Knowe of Yarso (ORK 32) at which a smoothing tool of form B3 was found in one of the central compartments (Foxon, pers. comm.).

Class C, heavy tools, is divided into form C1, perforated adzes made from bovine metapodials; form C2, shovels made from bovine scapulae; and various larger analogues of tools from classes A and B. Some examples are illustrated in Figure 8.10. There are no artefacts of class C from any chambered cairn.

Other common artefacts of worked bone at Skara Brae are the decorative items of beads and pendants. Beads were made by notching long bones of small animals and birds before snapping off individual fragments, or by removing the roots of teeth: both processes are attested by the finding of manufacturing debris. The number of beads found at Skara Brae runs into thousands, and there are several hundred reported from Links of Noltland. In contrast, only two bone beads have been published from chambered cairns - one from Isbister (ORK 25), and a fish bone bead from Quanterness (ORK 43).

Objects of worked skeletal material which do not fit into any of the above categories and yet were excavated from chambered cairns include worked antler from Quanterness (ORK 43), Quoyness (ORK 44), and Unstan (ORK 51) and a perforated ox phalange - perhaps the result of animal knawing (Foxon, pers. comm.) - from Knowe of Rowiegar (ORK 31). Various objects of whale bone were recovered from Skara Brae (Childe, 1931a: plates L and LI), but there appears to be no worked whale bone from the cairns.

Little can be said about the worked bone assemblage from the chambered cairns of Orkney other than it does not appear to be radically different from that found at the contemporary settlement sites. This observation is conditioned by the very paucity of bone artefacts from the cairns compared with the settlements: the total number of such finds from Skara Brae is a magnitude higher than the total number from all the cairns and the discrepancy will be even more apparent when the finds from Links of Noltland are fully examined. One possible conclusion is that objects of worked bone were neither deliberately deposited nor accidentally lost in quantity inside the chambers, both implying that such objects were not commonly used in connection with activities taking place inside chambered cairns.

8.4. WORKED FLINT AND CHERT

Worked objects of flint and chert have been recovered from every recent excavation on prehistoric sites in Orkney. Table 8.11 indicates those sites of interest here. A variety of forms have been isolated, of which scrapers and knives are by far the most common. These tools have been found at all three published settlements, the Stones of Stenness, and 12 chambered cairns: typical examples of these and other flint tools are illustrated in Figure 8.12.

Leaf-shaped points, or arrowheads, have been found at four chambered cairns, and at the Knap of Howar. In addition, barbed and tanged arrowheads have been recovered from Knowe of Yarso (ORK 32), stratified above a beaker vessel, and from the passage at Unstan (ORK 51). Flint cores were found at Knowe of Yarso and another Rousay chambered cairn, Knowe of Rowiegar (ORK 31) while finely reworked fabricators were found at Unstan and Taversoe Tuick (ORK 49).

The number of sites at which flint-making debris has been discovered in the form of chips and flakes leads to the conclusion that tools of flint were ubiquitous in Neolithic Orkney. As Clarke (1978: 65) has pointed out, flint need not be very visible in the course of an archaeological excavation and the possibility must be considered that Table 8.11 is more of a partial representation of the prehistoric past than is the case for other classes of artefact. Certainly that table does not contradict the conclusion of the two previous sections and suggests that there was no special usage of flint and chert tools which was distinctive to either chambered cairns or settlement sites.

8.5. WORKED STONE

Again, no more useful categorisation of the worked stone (excluding flint and chert) from Orcadian Neolithic contexts has emerged since Childe's (1931) description of the Skara Brae material. He divided the implements into three groups, to which the very common class of objects called Skaill knives may be added. Table 8.13 shows the distribution of stone objects and Figure 8.14 illustrates some selected examples.

Axes, or celts, are the second most common stone artefact with about 15 being found at Skara Brae, three at Rinyo, one at Knap of Howar, one or two at five different chambered cairns, and at least three from the cairn itself at Isbister (ORK 25). Perforated pestle-shaped maceheads were found at Isbister and Taversoe Tuick (ORK 49), and at Skara Brae. There has been no suggestion that these axes were manufactured using stone of exotic origin, although it is true that the latest treatise on stone axes fails to place the northern Scottish material in a British context (Clough and Cummings, 1979).

Carved stone balls have been a mystery to archaeologists since they were first discovered. Marshall (1977) lists 14 or 15 from Orkney. Skara Brae again figures prominently as a find-spot with two balls of type 7 (with between 10 and 55 knobs), two balls of type 9c (decorated with hatchings and incised lines), and three balls of type 10 (oval). Stray finds, all but one from the Mainland, account for three more balls of type 7, one more ball of type 10, one ball of type 5 (with seven knobs), and two more decorated balls of type 9. (Marshall's type 1 ball from Orkney cannot be traced). To the carved stone balls listed by Marshall should perhaps be added four spherical balls from Rinyo (Childe and Grant, 1939: 27 and 1947: 39), "a round sandstone ball" from Cuween Hill (ORK 12) (Henshall, 1963: 196) and "a ball of quartz" from Korkquoy. (ORK 34) (1963:218).

The Skaill knife, an artefact first described by Petrie (1868: 215) consists of a beach pebble dashed on the ground, resulting in a clean break that serves as a cutting edge. At Skara Brae, Childe found them "throughout the midden in such numbers that we ceased collecting them" (Childe, 1931a: 114). At Rinyo, none were found in 1938, but no less than 160 were noted during the second season (Childe and Grant, 1947: 39). The presence of large numbers of Skaill knives was instrumental in Petrie's original discovery of Links of Noltland (Clarke et al., 1978: 45). Compared with the vast numbers found on settlement sites, only five have been discovered in chambered cairns: three at Quanterness (ORK 43) and two at Quoyness (ORK 44).

Decorated stones, with pecked designs of spirals and diamonds have been found in association with six sites of early prehistoric date in Orkney. They are fully considered in Chapter 15 and illustrated in Figures 15.20 through 15.24.

Their distribution is limited but it does seem as if complex, finely executed designs are restricted to chambered cairns while the designs in settlement sites exhibit a lesser degree of planning and control.

"Stone implements of exceptional form" was the phrase used by Childe to describe a miscellany of stone objects found at Skara Brae. To Childe's list of these objects (1931: 109-112) might be added an equally heterogenous group of worked stones found elsewhere in Orkney and listed in Table 8.13. Some of these have seemingly obvious functions such as pot lids (found at four chambered cairns, a settlement site and a henge), hammerstones (also found at all three classes of site), clubs, whetstones, and beads. Others may not be so easily categorised, but it is of note that the carved stone objects with spikes found at Skara Brae and Rinyo (an example being illustrated in Childe 1931a, plate XXXIX) has a counterpart in the three-spiked object from Quoyness (ORK 44) chambered cairn.

To conclude, objects of worked stone survive in many contexts in Neolithic Orkney. The majority of these objects are items of daily use and were deposited in great quantities in and around settlement sites but in lesser quantities at chambered cairns and henges. This suggests that although the interiors of chambered cairns (the only parts commonly examined by archaeologists) were not in constant daily use for domestic purposes, they were not conceptually distinct from other places of activity and there were occasions when the outward actions of daily life were performed there.

Those items which do not have a use obvious to us - carved stone balls, decorated stones, and spiked objects - were also found at chambered cairns and settlements. This supports the suggestion that chambered cairns were not places apart from the circles of everyday living, but were involved in the daily existence of the Neolithic Orcadians.

8.6. UNWORKED ANIMAL REMAINS

This section and the next seek to discuss the remains of animals and plants found in contexts of the third and second millennia bc within Orkney. The major problem in such a discussion is the variability of the evidence. Survival processes in Orkney tend to be more favourable in areas of calcareous sand, but there are several chambered cairns outwith such areas where animal bone has survived in quantity. The efficacy of recovery processes has improved since last century. Early excavators rarely mentioned the finding of animal bones and never gathered environmental samples for post-excavation study. In contrast, Renfrew's (1979) report of the excavation at Quanterness contains a mass of analysis of charcoal fragments, mammalian and rodent remains, bird bones and fish bones. The published excavations of the last decade have generally contained some kind of quantitative analysis of the proportions of different species present: in early excavations, such data is commonly reported in presence/absence form.

Nevertheless, it is possible to tabulate some of the published information. Tables 8.15 and 8.16 display the finds of mammal, bird, fish and mollusc remains that have been found during the excavation of stratified Neolithic deposits at 19 chambered cairns, three settlements, and the Stones of Stenness. These will be considered species by species.

Bovids, or cattle, or mammals of the genus *Bos*, are, along with ovicaprids and deer, the most widespread of Neolithic species having been found at 16 published excavations. Little information can be gleaned from the remains found in chambered cairns but the report from Skara Brae by Watson (Childe 1931a: 198-204) makes several relevant conclusions:

1. cattle were butchered, in some cases by pole-axing, and used as meat providers
2. there was one uniform breed of cattle
3. some bull calves were castrated
4. young animals were regularly slaughtered at the beginning of winter.

Ovicaprids, or sheep and goats of the genus *Ovis*, were reported from 15 excavations. At Skara Brae, there were as many individual sheep as cattle and Watson suggests that they resembled the present day breed of "Soya" (= Soay?) sheep and that flocks were left to forage for themselves throughout the year. (Childe, 1931a: 203). Two of the chambered cairns contained large numbers of sheep: Blackhammer (ORK 3) and Quanterness (ORK 43). At Blackhammer at least 16 sheep and eight sheep were found, respectively, in the top and bottom layers of the deposits of the chamber. Furthermore, these remains were all restricted to just two of the seven compartments (Callander and Grant, 1937: 307). At

Quanterness seven adult sheep and 18 lambs were recovered, a total which "greatly outnumbered those of any other species of large mammals from the tomb" (Renfrew, 1979: 121).

Deer, almost all being identified as red deer (*Cervus elaphus*) have been recovered from 14 archaeological sites. Again, Table 8.15 shows that a few sites contained a large number of individuals of this particular species. At Holm of Papa Westray North (ORK 21), Petrie and Hebden found at least 13 pairs of "deer horns" (Petrie, 1857: 62). At Knowe of Ramsay (ORK 30), Platt found that deer bone was the most common type of bone found in ten compartments of the chamber and that a minimum of 14 individuals was represented. (Callander and Grant, 1936: 418). Platt had already found a similar abundance of deer at Knowe of Yarso (ORK 32) where a minimum number of 35 were noted, compared with just one ox and three sheep. (Callander and Grant, 1935: 343).

Dogs. The only other mammal to appear in large quantities at any single chambered cairn was of the genus *Canis*. At the excavation of the main chamber of Cuween Hill (ORK 12), "the deposit had a somewhat fatty, unctuous appearance and contained two dozen skulls of the dog" (Charleson, 1902: 733). Dog bones were also found at other cairns, and at least three wolves (*Canis lupus*) were recovered from the ditch around the Stones of Stenness (Ritchie, 1976: 34-36).

The remains of certain other large mammals have been recovered from Neolithic contexts in Orkney. Pigs (or animals of the genus *Sus*) were utilised at the settlements of Skara

Brae and Knap of Howar, and pig remains were also found at five chambered cairns. Evidence of whale was also recovered from two settlements - Skara Brae and Rinyo - but only, as a worked artefact, from one chambered cairn. Otter and horse bones have been found in small quantities at two and five chambered cairns respectively.

Once the large mammals have been considered, the quality of evidence deteriorates and it is rarely possible to discern minimum number of individuals from the published excavation reports. Table 8.16 portrays the minimum number of species of rodents, fish, birds and molluscs found at excavated sites. Rodents, which include the Orcadian vole, a species unique to Orkney, have only been found at a few sites, but with the introduction of wet-sieving as an excavation technique, it is certain rodent bones will be recovered from more prehistoric deposits than hitherto. The same technique has already suggested that Childe's comment about the economy of Skara Brae - that "fishing seems to have played a very small role in the community's economy" (1931: 96) - may be a misinterpretation as during Clarke's recent excavations, fish bones were recovered in quantity from the sieves (1976:22).

At Skara Brae, the most common bird recovered was the gannet, but certain chambered cairns appear to have contained a large number of different species of bird. For instance, at Quanterness, Bramwell identified the presence of no less than 28 species. He did suggest, however, that many of the smaller birds might have been introduced in the form of pellets from owls living in the chambers (Renfrew, 1979: 139).

Another observation of interest comes from the bird remains at Isbister: a minimum number of 14 white-tailed eagles, (Haliaetus albicilla) were recovered. This observation, and several other observations already noted in this section, will be further discussed in Chapter 15.

Finally, Table 8.16 shows the sites at which molluscs have been found. Every prehistoric midden that has been sampled in the last decade in Orkney has contained large quantities of sea molluscs, notably limpets, razorshells, mussels, and oysters. The paucity of chambered cairns with such shells may be a reflection of poor recovery - molluscs not being deemed worthy of collection by archaeologists - but it may equally be a sign that the rationale behind the deposition of bones of large land mammals and birds inside chambered cairns did not extend equally to lowly sea creatures.

The most important question about all these faunal remains is the method of their introduction into chambered cairns. While there is the possibility that some bones may have been deposited since the Neolithic period, it is generally accepted that the majority of bones discussed above are the result of activity by the cairn-users. The most recent protagonists of this view are Clutton-Brock (Renfrew, 1979: 112-3) and Barker (Hedges, forthcoming) who argue that at Quanterness and Isbister respectively, due to the stratigraphic integrity of the samples and the relative absence of gnawing marks, the faunal remains are most likely to be the result of deposition during the primary use of the chambered cairns.

Beyond this, the available evidence for condition of the bones at time of deposition is not strong. At both Quanterness and Isbister, there is little evidence for extensive butchery or cooking of meat and it would seem that animals were deposited whole or nearly whole in the chambers, a conclusion supported by the missing bones of an animal generally being the small bones which may be poorly represented due to differential recovery during excavation. This would tend to rule out the possibility of animal bones being present as a result of food being eaten inside the chamber. However, the very presence of animal bones inside a chambered cairn requires explanation: in Chapter 15 the possibility of totemic symbolism will be explored.

8.7. PLANT REMAINS

The pollen analyses carried out by Keatinge and Dickson (1979) reveal that the vegetation of Neolithic Orkney was typical of a pastoral landscape suggesting that certain grasses were encouraged to grow. Other circumstantial evidence for the human exploitation of plant life lies in the plough marks observed at the base of a Grooved Ware midden at Links of Noltland (plate H). Organic plant remains survive best in water-logged deposits and the recent excavations at Skara Brae (Clarke, 1976) were partially designed to locate a wet midden discovered by Childe. This midden was found and produced a variety of macroscopic plant remains including artefacts such as a wooden handle and a length of heather rope. From the wood remains Clarke concluded that there may have been an ample supply of large timber from driftwood at Skara Brae suggesting that the construction of houses and furniture in stone was a deliberate choice.

The evidence for cultivated grain in Neolithic Orkney does not rest solely on circumstantial observations. Carbonised barley has been recovered from Skara Brae (Clarke, pers. comm.). Two chambered cairns have produced stratified pottery with impressions of cereal grain. A rim shard of a carinated bowl (No.11) from Calf of Eday Long (ORK 8) is marked with the impression of a grain of naked barley, and a wall shard from Unstan (ORK 51) has an impression of a grain of hulled barley (Jessen and Helbaek, 1944: 18). Undoubtedly though, the best evidence for cultivated grain from a chambered cairn comes from Isbister. The seed report by Lynch (in Hedges, forthcoming) analyses a sample from the floor of the central compartment. Among a large number of seeds from weeds of disturbed and cultivated places, including seeds of chickweed and curled dock, Lynch found 56 grains of cultivated barley and a single grain of emmer wheat.

More so than other objects dealt with above, plant remains are ephemeral and are not liable to survive in archaeological deposits. Only with modern methods of recovery has evidence begun to emerge that the people of the cairns used, as a part of daily life, objects of vegetable matter. It is probable that our knowledge of such objects will expand radically in the years to come: our present information can only point the way for future research.

8.8. ONE OR TWO CULTURES?

The purpose of this chapter has been to explore the nature of the material culture of Neolithic Orkney at the scale of small portable objects in order to see if any light can be cast on the relationships between land and society in the islands at the intra-regional scale.

A large amount of the information above has contributed to an assessment of the economy of Neolithic Orkney. The regime was one of mixed agriculture with pastured cattle and sheep providing a large part of the food supply but with arable crops also being cultivated. In addition, hunting, fishing and gathering were important in the subsistence economy. There is no evidence that this pattern differed within the island-group: for the objectives under consideration here, the means of subsistence can be assumed to be uniform throughout Orkney and throughout the third and second millennia bc.

Any other differentiation in the material culture must be discussed, because of the particular way the archaeological literature has evolved, in terms of the Unstan/Grooved Ware distinction. There is no doubt that such a distinction is valid: there are assemblages of objects, not purely restricted to pottery, which are very different to other assemblages of objects found in Neolithic contexts in Orkney. The Unstan assemblage is typified by the finds from Knap of Howar which contain artefacts of bone and stone unparalleled elsewhere (A. Ritchie, pers. comm.). The Grooved Ware assemblage is typified by the finds from Skara Brae.

Having affirmed that there is a valid distinction between material cultures of Unstan type and Grooved Ware type, the nature of the distinction, and its application to the study of chambered cairns can now be considered. Figure 8.17 shows the distribution of artefacts of Unstan type and of Grooved Ware type in Orkney. Skara Brae and Rinyo are assigned to the latter and Knap of Howar to the former. Links of Noltland, although primarily producing artefacts of Grooved Ware type, has also produced objects similar to those of the Knap of Howar assemblage (D.V. Clarke pers. comm.). The Stones of Stenness and two stray find sites, the Sands of Evie and Dingieshowe, have produced Grooved Ware. The remaining symbols on Figure 8.17 correspond to the distribution of pottery of the two types displayed in Table 8.1 with the inclusion of Quoyness (ORK 44) as a Grooved Ware site on the strength of the spiked stone object and the pin with lateral projection, both paralleled at Skara Brae.

Figure 8.17 shows clearly that the Unstan/Grooved Ware distinction is blurred among the chambered cairns of Orkney. Although there are monuments at which artefacts of just one type have been discovered, there are also monuments at which artefacts of both types have been found. There is no distinctive intra-regional patterning of the two types: Grooved Ware and Unstan sites are mixed throughout the island-group, the mixing being typified by the island of

Rousay. To pre-empt the discussion of Chapter 9, a chronological perspective on the finds does not help to resolve distinctive patterns.

In short, the question posed in the title of this section - one or two cultures? - is answered by the conclusion that there are two distinctive cultural assemblages but that the boundary between them is not definite, either in space or time. The Unstan/Grooved Ware controversy will re-emerge at intervals throughout the following chapters, but the evidence of the small portable artefacts is equivocal for a study of societal relationships in Neolithic Orkney.

Perhaps the most important conclusion to be drawn from this chapter is that the artefacts and other objects found in chambered cairns are not peculiar to chambered cairns. With very few exceptions (the few decorated stones discussed in Chapter 15 being the major ones) there are no objects found inside chambers which have not also been recovered from settlement sites. This generalisation holds true for both Unstan and Grooved Ware sites. It is also valid despite the small number of settlement sites excavated. Chambered cairns may be regarded as places which are not outwith the routine of daily life, but as places where ordinary activities of unexceptional significance are carried on - activities which do not require the manufacture and use of special objects. This theme, of chambered cairns as ordinary places, will be developed in later chapters.

CHAPTER NINE: RELATIVE TYPOLOGIES AND ABSOLUTE CHRONOLOGIES

9.1. TYPOLOGY, SERIATION, CHRONOLOGY

Classification has always been a common pursuit among students of chambered cairns, and among archaeologists in general. This is not the place to discuss the history of archaeological classification but it must be pointed out that the specialist vocabulary used in the discipline has undergone, and continues to undergo, considerable definitional shift over the decades. For instance, the word "typology", which to Pitt Rivers in 1891 meant the study of "sequence of type" (Thompson, 1977: 41) now appears to have lost the concept of evolutional succession and to have become "a system of classification based on attributes" (Joukowsky, 1980: 281). Again, "typology" is now frequently used as a noun meaning a particular classification. Henceforth, the following definitions will be used:

typology: a multi-attribute system of classification producing a number of classes. The members of each class are more similar to each other than to members of other classes.

seriation or typological seriation: a typology in which the classes are arranged in a sequence over time, from early to late, and some evolutionary process is assumed between classes.

chronology: the imposition of an absolute time-scale, measured in years, upon a seriation.

These three types of classification have all been used by antiquarians and archaeologists studying the chambered cairns of Orkney and the north of Scotland. An early typology of prehistoric monuments including chambered cairns was proposed by Barry in 1805 (Barry, 1975) and the intervening time up to the present has seen the publication of at least ten more pertinent classifications. Those known to this writer are presented in Wilson (1851), Petrie (1856), Anderson (1886), Childe (1940), Royal Commission on the Ancient Monuments of Scotland (1946), Piggott (1954), Henshall (1963 and 1972), Renfrew (1979), Sharples (1979), and Hedges (forthcoming). Some of these are discussed in detail in the ensuing chapter. Finally, the relationship of these classifications to the classification produced by cluster analysis in Chapter 6 will be discussed.

9.2. ANDERSON'S TYPOLOGY

During the course of the Rhind lectures for 1882, Joseph Anderson devoted his fourth and fifth lectures to the chambered cairns of Scotland, and concentrated largely on those of Caithness and Orkney. (Anderson, 1886). From the outset, based on his own excavations in Caithness, he was confident that the monuments had been places of collective burial, and was able to date them to the Age of Stone. Using type examples, Anderson identified eight different types of chambered cairn (illustrated here in Figure 9.1) which could be found in the north of Scotland:

1. long horned cairns. Typified by South Yarrows South (CAT 55), these cairns were described as elongated in form, orientated east and west, with the east end being more massive. At the four extremities are horn-like projections. The cairn conceals a chamber which is commonly tri-partite.

2. short horned cairns. Ormiegill (CAT 42) presented many of the characteristics of Anderson's previous type, but was distinguished by being as short as it was wide. The style of chamber and the objects found therein were indistinguishable from the long cairns.

3. round cairns with tri-partite chambers. Using Camster Round (CAT 13) and the group of cairns on Warehouse Hill as his examples, Anderson described these cairns as being circular with single or double retaining walls, and concealing a chamber of similar design to the chambers of the horned cairns. Orcadian examples were also cited.

4. round cairn with bi-partite chamber and side cell. A single example, Kenny's Cairn (CAT 31), was seen by Anderson as "a connecting link between the Caithness form and the Orkney form of chambered cairn" (1886: 258).

5. multiple chambered cairns. At Rhinavie in Sutherland is a complex of chambers and cairns, now designated Coille na Borgie North and South (SUT 22 and 23).

6. round cairns with passages leading to large chambers with side cells. This type, restricted to Orkney, was exemplified by Maes Howe (ORK 36), Holm of Papa Westray South (ORK 22) and Quanterness (ORK 43).

7. round cairn with a passage leading to a chamber with side chambers demarcated by sill-stones. Bookan (ORK 4), the sole example, is, like Kenny's Cairn "a connecting link between the triply divided chamber of the Caithness group (type 3) and the chamber surrounded by side cells (type 6), which is the prevailing variety in Orkney" (1886: 291).

8. round cairn with a multi-partite chamber. Anderson's example, Unstan (ORK 51), was regarded as being of particular importance because of the quantity of artefactual remains found there.

In summary, Joseph Anderson recognised a variety of cairn forms, with less uniformity in Caithness than in Orkney. He recognised two types of chamber form. The first, more commonly found in Caithness, consisted of a tri-partite chamber. The second, seemingly restricted to Orkney, consisted of a central chamber with separate side cells. Two chambered cairns, one in Orkney and one in Caithness, were seen as transitional between the two forms. No attempt was made to relate the material culture to this typology and there was no suggestion of a chronological succession.

The wider background of the cairn-builders, as seen in 1886, is explicitly stated. After comparing the tombs of northern Scotland with several known examples from southern England, Anderson concluded the similarities of such monuments all over Britain were such as to make inescapable "the inference that they are all the work of one race of man" (1886: 267).

9.3. CHILDE'S PENTLAND CULTURE

When Gordon Childe turned his attention to the chambered tombs of the north, he regarded them as the most remote examples of burial chambers united by a common idea through the length of Europe. This idea, the "megalithic religion" was so pervasive in Europe that it formed the basis for a distinctive pan-European society still existing today (Childe, 1958: 124). In different parts of the continent the megalithic religion found its permanent expression in the landscape in different ways, but however rare or bizarre a particular built structure was, it had been erected to sustain and commemorate a system of belief which stretched throughout Europe.

The megalithic religion as represented in the British Isles left its most permanent mark in the form of collective tombs of three types: gallery graves, "unchambered" long barrows, and passage graves (Childe, 1940: 47). In the extreme north of Britain, on both sides of the Pentland Firth, was a group of the latter - a collection of passage graves which Childe further sub-divided into three (1940: 70- 4):

1. the Caithness type. The cairns of this type are mostly round, but long horned and short horned cairns are also included. The most common style of chamber is oval and corbelled, and contains three compartments divided by projecting slabs. The finds from these tombs could be paralleled by pottery and flint tools of the Windmill Hill culture and by pottery from the Beaker period.

2. the Unstan type. Defined exclusively by the shape of the chamber, tombs of Unstan type are divided into compartments, the compartment containing benches, and are entered by a passage leading into the long side. Taversoe Tuick (ORK 49) and Huntersquoy (ORK 23) were cited as examples and the type presumably included Unstan (ORK 51). (Note that the last two sentences in Childe's (1940:72) description of the Unstan type are erroneous). A distinctive style of pottery, Unstan ware, was seen as having parallels in the Hebrides, Ireland, and in Brittany.

3. the Long Stalled type. In these cairns, the chamber is elongated, and sub-divided by pairs of orthostats with compartments, numbering from four to twelve. Usually the passage enters from one end. The Knowe of Yarso (ORK 32) and Blackhammer (ORK 3) were referred to as examples. Again, affinities with the Windmill Hill culture, in the form of axes, arrowheads, and pottery, were observed.

Childe's Pentland culture is an example of a typology which was erected to sustain a particular belief - that of cultural diffusion from the south and east. His description of the variety of structural forms found among the chambered cairns of northern Scotland is unformulated and inadequate. Two major criticisms may be levelled. The first concerns the definition of the Unstan type whose only distinctive characteristic appears to be a passage entering from the long side of the chamber - but this is a characteristic which is also found, according to Childe, among the Long Stalled cairns. The second criticism concerns the failure to give full prominence to the tombs which have side cells opening from a corbelled chamber, such as Maes Howe. These tombs are mentioned parenthetically, but only to assert the possibility of connections with Ireland. According to Childe, Maes Howe itself, bearing such a close resemblance to New Grange in County Meath, must "surely have been the tomb of a chieftain from the Boyne" (1940: 70).

In summary, Childe's classification of the chambered cairns of Orkney was explicitly designed to support his concept of a megalithic religion expanding into the corners of Europe. As such, it is focussed on a scale of analysis which is far removed from that which is of interest to this thesis. While the Pentland culture was undoubtedly of benefit in the understanding of a pan-European movement as conceived by the prehistorians of forty years ago, it is of little use in the understanding of the people of prehistoric Orkney against the archaeological background of the present decade.

9.4. THE ROYAL COMMISSION'S TYPOLOGY

In 1946 the Royal Commission on the Ancient Monuments of Scotland published its twelfth report, an inventory of the monuments of Orkney and Shetland. Their attempt at a typology of the chambered cairns of Orkney (RCAMS, 1946: 1, 15-19) was prefaced by this statement:

"It will be found ... that their varieties are so numerous as to defy orderly classification on typological grounds. The difficulty is accentuated by the fact that there has been nothing in the character of the relics discovered in the excavation of the cairns to distinguish one variety from another".

Nevertheless, the Commission was able to identify seven different classes of chambered cairn in Orkney. These classes, illustrated in Figure 9.2, are described below:

1. Variety A, corresponding to Anderson's long horned cairns, is represented by two cairns in the Inventory: Knowe of Lairo (ORK 28) and Head of Work (ORK 18).

2. Variety B, corresponding to Anderson's short horned cairns, is represented by only one cairn in the Inventory: the demolished cairn of Burray (ORK 7).

3. Variety C did not figure in Anderson's typology and had been recognised as a result of excavations on the island of Rousay in the 1930s. Corresponding to Childe's stalled cairns, these monuments consist of a long chamber, containing up to twelve compartments, contained in a cairn which conforms to the shape of the chamber. The Commission suggest that stalled chambers are elongated versions of tri-partite chambers. Examples include Midhowe (ORK 37) and Knowe of Rowiegar (ORK 31).

4. Variety D, represented by the single example of Holm of Papa Westray South (ORK 22) was seen by the Commission as a development of type C where the orthostatic divisional slabs had been replaced by masonry piers and the side stalls converted into bee-hive cells. The reaffirment of a tri-partite division in the chamber plan was also noted.

5. Variety E was represented solely by Unstan (ORK 51). Its significance to the Commission was that it contained some of the features of variety C - the stalled chamber - and some of variety G - a lateral bee-hive cell.

6. Variety F was seen as another class intermediate between varieties C and G, having a chamber sub-divided by slabs but also possessing lateral cells. These lateral cells were not fully distinct from the chamber being separated by low slabs and not by a passage. Examples include Bookan (ORK 4), Taversoe Tuick (ORK 49) and Calf of Eday North-West (ORK 9).

7. Variety G, corresponding to Anderson's class which included Maes Howe, was defined by the Commission as having a central chamber with lateral cells. The number of cells is either three (as at Maes Howe), four (as at Cuween Hill (ORK 12)), or six (as at Quanterness (ORK 43)).

In summary, the Royal Commission constructed a typology of tomb structures for Orkney which only differed from Joseph Anderson's typology in that it admitted the new class of cairns from Rousay. Their scheme recognised the close connections between Caithness and Orkney and saw two extreme structural designs: variety C, the stalled cairns; and variety G, the cairns of Maes Howe type. Furthermore, two different types of structure were recognised as being intermediate between the two extremes. Although never stated explicitly, the impression is given that the cairns of Caithness were the progenitors of varieties C and G. Thus a single tradition in Caithness evolved into two distinct traditions in Orkney. No use was made of the artefactual record in constructing this typology and, apart from the general impression of a Caithness to Orkney transition, no attempt was made at a seriated connection between the seven varieties.

9.5. PIGGOTT'S TYPOLOGICAL SERIATION

With the publication of Professor Stuart Piggott's The Neolithic Cultures of the British Isles in 1954, the Neolithic period received its last great synthesis of the era before the introduction of radiocarbon dating. In retrospect, Piggott was faced with two constraints: the necessity for compressing the entire British Neolithic period into just five hundred years, and the necessity for explaining every new appearance of an artefact or monument by invasion and contagious diffusion. The former constraint led to the suggestion that every chambered cairn in the Orkney-Cromarty province was constructed and used in a space of about 150 years, ending shortly after 1500 BC (Piggott, 1954: Figure 64). The latter constraint required the Neolithic activity of the north of Scotland to have exact or similar antecedents further south in the British Isles: any argument was rendered stronger by the production of artefactual parallels and the assumption that one object "evolved" from another by a process of cultural diffusion. As a model of prehistory, Piggott's exposition of the British Neolithic was internally coherent and conceptually satisfying in 1954, but it has since been replaced by more information and new modes of thought.

When considering the chambered tombs of the north of Scotland, Piggott recognised a coherent grouping of cairns stretching from the head of Glen Mor up the western shore of the Moray Firth to Caithness and into Sutherland, with a large number to be found in Orkney. This grouping, termed the "Orkney-Cromarty group" (1954: 232-256), was seen as the result of an episode of colonisation by sea-faring folk who travelled northwards in search of land to establish agricultural communities. In order to "clarify the problem of the routes of colonization" (1954: 234). Piggott identified three classes of chambered cairn:

1. Chambered long cairns of the Yarrows type
2. Chambered round cairns of the Camster type, with derivatives which include the Stalled Cairns of Orkney
3. Chambered round cairns of the Maes Howe type (1954:234)

Figure 9.3 shows Piggott's conception - two disjoint typological seriations - of the relationships between his three classes. The chambered round cairns with oval tri-partite chambers (class 2) were thought to be the precursors of two distinct sequences. One sequence was the development of elongated cairns with crescentic façades (class 1) as seen at South Yarrows (CAT 54 and CAT 55). Although not explicitly stated, Piggott also included the short cairns with crescentic façades such as Ormiegill (CAT 42) in his Yarrows class: this class equates exactly with Anderson's first two types, the long horned cairns and the short horned cairns.

A second line of development from the round cairn with tri-partite chamber led through small round cairns with a tri-partite chamber orientated at right angles to the passage (such as the lower chamber at Taversoe Tuick (ORK 49)) and elongated chambers with more than three compartments enclosed in a similarly elongated cairn (as seen at Blackhammer (ORK 3)), to elongated chambers with twelve or more compartments enclosed in a long rectangular cairn (the ultimate expression of this series being Midhowe (ORK 37)). These stalled cairns, the final derivatives of the original Camster type, were thought to be restricted to the islands of Rousay and Eday.

The remainder of Figure 9.3 is devoted to a small group of chambered round cairns related to Maes Howe (ORK 36). Piggott regarded Maes Howe as "a superlative monument that by its originality of execution is lifted out of its class into a unique position". (1954: 244). This monument was seen as the archetype of a group of tombs with the common characteristic (to which Piggott does not explicitly refer) of corbelled cells entered by low passages. One sequence of development from the archetype saw a degeneration of the symmetrical plan of the chamber and a merging of the side cells into the central compartment, with the cairn at Vinquoy Hill (ORK 53) being the final expression of this sequence. A second sequence, running through Quoyness (ORK 44) to Holm of Papa Westray South (ORK 22), saw the rectangular plan of the central compartment being retained, but a multiplication of the number of side cells to six and fourteen respectively, with a functional elongation of the enclosing cairn on the Holm to contain the elongated chamber.

Piggott continues with a discussion of the artefacts found in the tombs of the Orkney-Cromarty group. He makes some observations on the distribution of artefacts: Unstan ware is restricted to Orkney and is probably associated with the builders of the Camster type tombs and their derivatives, and the Maes Howe type tombs have artefacts which suggest affinities with the Secondary Neolithic settlement sites of Rinyo and Skara Brae. These observations consider the material culture of the tomb-builders in the context of the typological seriation developed previously and demonstrate that that classification has some utility outwith a purely structural analysis of the chambers and cairns.

Nevertheless, it is possible to criticise Piggott's classification of the Orkney-Cromarty cairns on several grounds. Piggott knew of about 130 such monuments in the province, yet his three diagrams of typical chambered cairns (1954: Figures 37, 38 and 39) concentrate exclusively on the tombs of the northern half: the tomb furthest to the south illustrated is Ormiegill One (CAT 42). This concentration on the northern region is emphasised in Figure 9.3 where eleven of the fourteen illustrated type-examples are in Orkney. The lack of evidence in 1954 from the tombs of Cromarty and Inverness is a contributory factor to this bias, but the classification outlined above should be regarded as being a typology of the tombs of Orkney and Caithness and not of the Orkney-Cromarty province as a whole.

Further, the structural connections noted by Piggott had, almost without exception, appeared in the text of the Royal Commission Report and Inventory (RCAMS, 1946): his work is one of synthesis rather than original survey. In one case, that of his acceptance of the Ring of Bookan as a Maes Howe type tomb (Piggott, 1954: 244, footnote), he makes a statement which is not substantiated with an account of his field-work. In another case, his sequence of degeneration from Maes Howe to Vinquoy Hill is not supported by field observation: Cuween Hill is one of the most regular and well-constructed tombs in Orkney.

The Maes Howe type tombs and their two sequences of development are the subject of another fundamental criticism. These sequences depend on the chronological primacy of Maes Howe itself. Piggott's attempt to suggest this primacy is unsupported by argument: he uses eleven words of excellence (such as "accomplished", "magnificent" and "sophisticated") within a short passage of text and continues with the unwritten assumption that Maes Howe is thereby first in the sequence. He gives no explanation as to why structural excellence should imply chronological primacy and, indeed, his sequence for the Camster type tombs in Orkney begins with a very simple, small, tomb (Sandyhill Smithy) which is unremarkable in terms of style and construction.

Piggott's contribution to the classification of the chambered cairns of the north is thus seen to be of marginal significance to the present study. His typological seriation was explicitly designed to investigate the pathways by which the Neolithic inhabitants of the north arrived in Caithness and Orkney, an objective which is not a prime concern of this thesis. In summary the Neolithic Cultures of the British Isles attempted to relate the tomb-builders of Orkney to the tomb-builders of Britain: the emphasis here is to relate the cairn-builders of Orkney to the land of Orkney.

9.6. HENSHALL'S TYPOLOGY

Volume One of The Chambered Tombs of Scotland, by Audrey Henshall, was published in 1963 and is the single most important influence upon the present work. Henshall accepted Piggott's regional grouping of the Orkney-Cromarty cairns, but regarded the sub-group of Maes Howe cairns as a separate entity worthy of consideration in their own right. The remaining Orkney-Cromarty cairns were divided into three sub-groups purely on the basis of their chamber plans:

1. cairns with rectangular chambers. This type, of which there are few examples, is almost restricted to Easter Ross. Figure 9.4 shows the distribution of the nine known examples.
2. cairns with polygonal chambers. This type, widespread in Sutherland and Ross-shire, commonly consists of an antechamber and an inner chamber with the latter constructed out of large orthostatic slabs, arranged to form (in plan view) a polygon of more than four sides. Henshall distinguishes three sub-varieties:
   - A. with both antechamber and chamber being circular or polygonal
   - B. with the chamber being polygonal, and the antechamber being a simple rectangle.

C. with a large polygonal chamber, and no antechamber. Figure 9.5 shows the distribution of cairns with polygonal chambers.

3. cairns with Camster type chambers. Typified by Camster Round (CAT 13), the chambers are commonly oval in plan and are divided into three compartments by two pairs of projecting orthostats. Two portal stones and a backslab complete the common plan of seven orthostats. Roofing designs are variable, with a common arrangement consisting of the two innermost compartments having corbelled roofs and the outermost compartment being lintelled over. Camster type chambers are widespread in Caithness and Sutherland, as is shown by Figure 9.6.

Within Orkney, Henshall did not recognise any cairns with rectangular or polygonal chambers. Her typology contained four groups, three of which belong to the Orkney-Cromarty tradition, with the Maes Howe type tombs forming a separate group. These four groups are:

1. cairns with tri-partite (Camster) chambers. A small number of chambers, of which Bigland Round (ORK 2) and Sandyhill Smithy (ORK 47) are examples, appear to be very similar to the tri-partite chambers of Caithness.
2. cairns with stalled chambers. Derived, by a process of elongation, from the tri-partite chambers, the stalled chambered cairns of Orkney have, as their extreme examples, Midhowe (ORK 37) and Knowe of Ramsay (ORK 30).

The basic design is a long rectangular chamber, subdivided by means of pairs of orthostats, into a number of compartments which can vary from four to fourteen.

3. cairns with Bookan type chambers. Named after the type-site of Bookan (ORK 4), a small number of chambers in Orkney consist of an oval space divided into compartments by slabs projecting radially from the walls of the chamber. Common features of Bookan type chambers include a subterranean position and a small round cairn.

4. cairns with Maes Howe type chambers. Henshall accepted Piggott's typology of the ten monuments of this type, although she did not explicitly accept the details of his seriation. The typology was expressed as two groups, one with three or four corbelled cells leading from a rectangular chamber, and the other with six or more corbelled cells. Maes Howe (ORK 36) itself was not seen as belonging to either of these groups but was regarded as a prototype of both.

Figure 9.7 shows the distribution within Orkney of the certain examples of Henshall's four groups.

The objects found within the monuments and the ritual associated with their use were also considered by Miss Henshall. She was unable to differentiate between the chambered cairns of her first three groups on these grounds - "there appears to be a remarkable uniformity in both the grave goods and ritual" (1963: 77) of the Orkney-Cromarty tombs - but on the basis of the finds from a single example of the Maes Howe group suggested that there was some close connection between the Maes Howe tombs and the Rinyo culture. Thus a distinction was made between two cultural groupings of tomb-builders: the builders of the Maes Howe tombs who lived in settlements like Rinyo and Skara Brae, and the builders of the Orkney-Cromarty tombs whose settlements had not been found. This distinction was not made with great conviction (1963: 163), however, largely because of the paucity of finds from the Maes Howe type tombs and specifically because of the uncertain contexts of those few finds. In 1972, Henshall was equally cautious and beyond postulating the existence of some relationship between Maes Howe type tombs, Skara Brae, Rinyo, and the Grooved Ware cultures (and, indeed, the passage graves of Ireland), she was unable to specify the nature of the connection (1972: 264, 286). The possibility that the Maes Howe type tomb-builders and the Orkney-Cromarty type tomb-builders may have existed contemporaneously within Orkney was suggested explicitly for the first time (1972: 265): this suggestion was made before the appearance of many isotopic dates, but was to find support in the succeeding decade.

<u>The Chambered Tombs of Scotland</u> is a brilliant synthesis of a large mass of information. Perhaps its strongest point of all is that it is based on an encyclopedic knowledge of the primary evidence and in particular on an efficient and meticulous command of field survey. No individual, before or since, has visited the sites of so many chambered cairns in Scotland, and nobody has acquired such an understanding of

the monuments in the field. This, combined with an equal understanding of the artefactual evidence, means that Henshall's conclusions must be treated with the highest respect. There are three underlying themes in her conclusions (themes applying to all the Scottish cairns and not only the northern province):

1. the contents of the tombs are of little utility in discussing their history. This is largely due to the suspicion that objects found in a tomb are very likely to date from its final period of use.
2. the shape of the cairn is not helpful in producing a useful typology. The shape of the chamber, without reference to the enclosing cairn, may be of use in defining a structural typology and regional groupings.
3. it is very difficult to use the structural evidence to suggest a seriation of chambered cairns, especially within one of the regional groups. Regarding Orkney, Henshall could only postulate that the majority of tombs were constructed during her fourth, and final, phase of tomb construction.

In essence, Henshall's division of the Orcadian tombs into two major groups, the Maes Howe type and the Orkney-Cromarty type, with the latter group being sub-divided into three, echoed the structural typologies which had been erected by previous writers from Anderson to Piggott. Joseph Anderson's typology, with the addition of monument types undiscovered in the 1880s, has remained the basis of Henshall's typology. This is a satisfactory state of affairs since it implies the existence of an order in the data which has been recognised despite changes in archaeological fashion and the discovery and excavation of many sites. There is a fundamental pattern in the structures of chambered cairns which is highly visible and might be expected, in some way, to mirror a pattern in the lives of their original builders.

9.7. RENFREW'S CHRONOLOGY AND TYPOLOGY

In 1972 there was no absolute dating evidence available for Neolithic Orkney. Ten years later, radiocarbon dates have been published (or have been kindly made available in advance of publication) for seven chambered cairns, a henge monument and four settlements. In addition, there is a small number of thermoluminescent dates from Quanterness. In all, somewhat more than 60 absolute dates have been procured, from a variety of monuments and from a great variety of contexts. These dates are tabulated in Tables 9.8 to 9.14, displayed in Figures 9.15 to 9.20, and summarised in Figure 9.21.

The seven chambered cairns with radiocarbon dates (Tables 9.8 to 9.10) are Isbister (ORK 24), Knowe of Ramsay (ORK 30), Knowe of Rowiegar (ORK 31), Knowe of Yarso (ORK 32), Maes Howe (ORK 36), Quanterness (ORK 43), and Quoyness (ORK 44). Of these, only two have a sequence of dates relating to secure contexts in the tomb. Quanterness has a sequence ranging from 2640 bc $\pm$ 75 (Q - 1294) for an early stratum of the main chamber infill to 1920 bc $\pm$ 55 (SRR - 755) for a late stratum of the same infill (Renfrew 1979: 70). Isbister has a sequence ranging from 2530 bc $\pm$ 80 (GU - 1182) dating the use of the tomb, to 2080 bc ± 50 (Q - 3017) dating the final infilling of the chamber. (Hedges, forthcoming). Two dates from Maes Howe relate to the bottom of the ditch surrounding the cairn and not certainly to any period of archaeological activity (Renfrew, 1979: 36). Dates for the other four chambered cairns were obtained by Renfrew (1979:72) using bone material preserved in museums from excavations by Callander, Grant, and Childe earlier this century. The bones used were human in the case of Quoyness, and a mixture of <u>Bos</u> and <u>Cervus</u> remains in the case of the Rousay cairns. They range from 2355 bc ± 60 (Q - 1221) to 2055 bc ± 60 (Q - 1227), both of these dates originating from Knowe of Rowiegar. Despite such consistency, this last group of radiocarbon dates must be treated with caution for two reasons. The bone material was not collected specifically for isotopic dating and had been stored for more than thirty years: there is thus a distinct possibility of sample contamination. Secondly, none of the dates for these four cairns relate to material whose stratification is securely documented: the archaeological contexts of the bone are in doubt.

Using all the available evidence, old and new, Renfrew constructed an account which he believed was a reasonable framework for discussing the Neolithic period in Orkney. This account was largely based on the acceptance of Piggott's (1954) pottery sequence of Unstan ware being earlier in date than Grooved Ware. It also accepted Henshall's structural typology of the chambered cairns (outlined in the previous section) with one minor exception. This exception was the exclusion of Maes Howe itself from the Maes Howe group of tombs on the grounds that the monument is vastly different from the other tombs of the group. The former Maes Howe group was relabelled the Quanterness-Quoyness group after its two most explored members.

Renfrew's account of the Orcadian Neolithic envisages two phases separated by a transition period of about 200 radiocarbon years. The first phase, lasting from about 3000 bc to 2550 bc, would see Orkney populated by an "Unstan Ware People" who interred their dead in stalled tombs, such as the Knowes of Rowiegar and Ramsay. The settlement site of Knap of Howar which has produced Unstan ware, and from which come the earliest radiocarbon dates for an Orcadian settlement, would also have been built by these people. There then followed a period of transition during which Grooved Ware gradually replaced Unstan ware as the main ceramic type. From about 2350 bc to 1850 bc the "Grooved Ware People" lived in Orkney in settlements akin to Skara Brae and Rinyo. These people evolved a local style of chambered cairn of which Quanterness and Quoyness are examples. The two anomalous chambered cairns of Holm of Papa Westray South and Maes Howe were the last tombs to be built, followed closely by the two great henges of Brogar and Stenness. The majority of the tombs continued in use throughout and some may have still been in use after the floruit of the "Grooved Ware People". Figure 9.22 illustrates the Unstan ware to Grooved Ware transition as seen by Renfrew (1979: 209).

This account by Renfrew was accompanied by an evolutionary sequence for the Orcadian chambered cairns, illustrated here in Figure 9.23. The first cairns in Orkney were those with small simple tri-partite chambers, suggesting that the first Neolithic colonisers of Orkney were people from Caithness or perhaps the Hebrides. About 2700 bc three distinct styles of cairn-building had emerged. The first change would be the elongation of the simple chamber by the addition of compartments. This led, through the four-compartment Knowe of Yarso, to the long stalled cairns such as Midhowe and Knowe of Ramsay. A second evolutionary path led towards the chambers of Bookan type, with a small central chamber divided radially into compartments. Renfrew's major departure from Piggott's (1954) evolutionary sequence is the suggestion that the tombs of Maes Howe (or Quanterness-Quoyness) type are derived from tombs of the Orkney-Cromarty tradition. This idea is not new, having been promulgated by Joseph Anderson, but has not received attention this century. Renfrew envisaged chambers like that of Unstan (ORK 51), with an elongated stalled central compartment and a single side cell, as being representative of an intermediary stage of this derivation. Hedges (forthcoming) agrees with this view and has instituted another class of chamber form. This class is a "hybrid" between the stalled cairns and the Maes Howe type cairns and would include Unstan and Isbister (ORK 25) which has a central compartment of five stalls with three corbelled side cells.

Renfrew's evolutionary sequence continues from these hybrids to tombs, such as Wideford Hill (ORK 54), with three corbelled side cells grouped around a central compartment, through Quanterness and Quoyness to the final two large cairns. According to this scheme, Holm of Papa Westray South was built around 2350 bc, at the very end of the Unstan ware/

Grooved Ware transitional period. Maes Howe was one of the last chambered cairns to be constructed, a century or two into the Grooved Ware period.

An important element of Renfrew's evolutionary sequence is the realisation that most chambered cairns may have been in use, for burial or other purposes, for several centuries. This is a recognition of the possibility that all four, or five, major classes of chambered cairn in Orkney may have been in operation at the same time. Indeed, the period of pottery transition from 2550 bc to 2350 bc (which represents about three centuries in calendar years) may have seen all the known types of Orcadian chambered cairns in active use.

This important statement on the chronology and typology of the chambered cairns of Orkney is open to many criticisms simply because of the breadth of its synthesis. Some of these criticisms have been aired elsewhere (Fraser, 1980b). Briefly, there are three major items of contention. Firstly, there is some doubt about the archaeological evidence for an Unstan ware/Grooved Ware Sequence. Secondly, there is no evidence at all that the simple tri-partite tombs of underived Orkney-Cromarty origin are early in date. Thirdly, since the publication of Renfrew's work, the radiocarbon dates from the chambered cairn of Isbister have shown that Unstan ware may have been in use for several centuries after the end of the postulated pottery transition period (Hedges, forthcoming). These criticisms are enough to question seriously the chronological distinctiveness of Unstan ware and Grooved Ware, but Renfrew's general evolutionary sequence of chamber forms is still, incorporating as it does the work of previous writers, a reasonable and coherent descriptive explanation of the differing structural designs to be found among the chambered cairns of Orkney.

9.8. COMPARISON AND CRITIQUE

At the conclusion of this discourse on the classification of the chambered cairns of Orkney, it is instructive to compare the typologies which have been published by archaeologists with the cluster analysis of numerical data described in Chapter 6 of this work. Two groups of comparisons will be made. In the first place, the criteria used to construct classifications will be compared. In the second place, the details of the constructed classifications will be examined.

All the classifications under discussion here share a common characteristic. From the nineteenth century to the present, every typology and seriation has depended on the physical structure of the chambered cairn. That physical structure has been expressed in terms of the relationship of the building stones of the monument to each other - the shape and size of, and the pattern formed by, those building stones. Other items of information have always been secondary. This emphasis on a single group of attributes of the monuments inevitably means that any classification is limited in its applicability. Without further justification, statements should strictly be made only about the structural design of the chambered cairns. This is a truism, but one which has not uncommonly been ignored.

The criteria used to construct the typologies outlined in this chapter are rarely stated from the beginning in explicit terms. Rather, the typology is first described and then justified. This has the advantage of leading to very flexible classifications in which newly discovered monuments may be easily fitted and in which monuments showing little detail to the field surveyor may be provisionally attributed to a specific class. In contrast, the cluster analysis required an explicit statement of eight numerical parameters for each monument. The resulting classification is totally inflexible: if an additional site is discovered, the cluster analysis must be re-run from the beginning, and there is a real possibility that individual sites may move from cluster to cluster under the new analysis. Moreover, the cluster analysis as performed required a relatively high level of information from each monument, such that about half of the monuments in Orkney commonly suspected to be chambered cairns were excluded from the analysis. In other words the traditional typological approach, from Anderson to Renfrew, is more robust than the cluster analysis, being more capable of constructing a classification with incomplete information.

A final comparison of criteria selected for classification involves the selection of particular attributes. As mentioned above, the traditional intuitive typologies do not explicitly specify which attributes are to be used in classification. However, it is possible to identify implicitly, from the written description of traditional typologies, those characteristics of chambered cairns thought to be of importance. For instance, while the orientation of the passage has not been considered, the layout of the internal chamber has always figured prominently in classifications. Such priorities are rarely discussed. As a generalisation, most of the earlier typologies, and the classification by cluster analysis, consider attributes of the cairn and chamber, while the later typologies, including those of Henshall and Renfrew, consider only attributes of the chamber. Thus, in strict terms, the later typologies are not comparable with other classifications, because they are classifications of different sets of data. In practical terms, there are many similarities between the groupings of chambered cairns produced by all methods. The traditional intuitive typologies have been compared earlier in this chapter and the conclusion reached that each of them has arrived at similar groupings, and that the most recent, Renfrew (1979), is the most satisfactory because it incorporates the work of previous writers. In particular the work of Renfrew has followed closely the work of Henshall (1963 and 1972).

The next question to be considered is the relationship between groupings produced by the traditional typologies and those produced by the cluster analysis in this thesis. The best way to answer this question is to take each cluster in turn and compare its members in terms of their classification according to other typologies.

Cluster I, long cairns with many-compartmented simple chambers, contains chambered cairns of the stalled variety and no other. Not all stalled cairns are included in cluster I, but only those which contain ten or more compartments. Henshall includes in her class of stalled cairns some, such as Knowe of Yarso (ORK 32) and Holm of Papa Westray North (ORK 21), which have as few as four compartments. As with the stalled cairns, the members of Cluster I are concentrated on the island of Rousay.

Cluster II, cairns containing a variety of chambers, is, as previously noted, a grouping with less coherency than the other clusters. In terms of Henshall's typology, all four monuments fall into the Orkney-Cromarty group according to the design of their chambers, but the associated cairns include an elongated oval cairn and a long horned cairn.

Cluster III, small cairns with simple chambers, corresponds closely to Henshall's Orkney-Cromarty group. It contains monuments with tri-partite chambers, with Bookan type chambers, and with stalled chambers of seven or fewer compartments. This cluster fails to distinguish between the three sub-classes of the Orkney-Cromarty group but the small ground area of the cairns in cluster III can be added to the attributes which distinguish the typological group of Orkney-Cromarty chambered cairns. There are no chambered cairns in cluster III which do not belong to the Orkney-Cromarty group.

Clusters IV, V and VI contain all the monuments of Henshall's Maes Howe type and no other. This corresponds to the members of Renfrew's Quanterness-Quoyness group with Maes Howe. In addition, the cluster analysis has described three clusters within the Maes-Howe group. Clusters IV and VI are distinguished by relative size, with the cairns of cluster IV being relatively small in area and the cairns of cluster VI (Maes Howe and Quanterness) being relatively large in area. Cluster V contains only Holm of Papa Westray South, an anomalous monument.

Because of the general uniformity between clusters IV, V, and VI noted by most of the typologies examined above, these three clusters will be treated as a composite and labelled cluster IV-VI in every analysis hereafter. This treatment is antithetical to a strict intrepretation of the dendogram in Figure 6.45: it is justified by the consideration of more information than originally dealt with by the cluster analysis.

The relationship of the cluster analysis of cairn and chamber structure to the traditional typologies may be summarised as follows:

1. The major division between Orkney-Cromarty type chambered cairns and Maes Howe-type chambered cairns is supported and emphasised by the cluster analysis.
2. In terms of the attributes used in the cluster analysis (which placed emphasis on physical size and included attributes of both cairn and chamber), there is comparative uniformity among the monuments of Orkney-Cromarty type.
3. Again, in terms of the attributes used in the cluster analysis, the Maes-Howe group of monuments is relatively diverse.
4. The cluster analysis identified a number of members of the class of stalled cairns as being distinct. These monuments are distinguished by containing ten or more compartments or stalls.

PART THREE

THE LAND

CHAPTER 10: THE RESOURCES OF ORKNEY

10.1. INTRODUCTION

Humanity is part of the world. There is an intimate relationship between people and the surface of this planet. This has long been recognised: even the Judaeo-Christian Bible proclaims that Adam was fashioned from the dust of the earth. Everything that we have done from the making of the first tool to the composition of a symphony has been conditioned by the circumstances that surround us - by the materials that are available and by the way they have been used. Earlier in the twentieth century this view reached extreme proportions in the doctrine of environmental determinism, promulgated by such personalities as Ellsworth Huntingdon and Ellen Semple. Environmental determinists were able to make such startling claims as:

> "...give me a map of a country, its configuration, its climate, its waters, its winds and all its physical geography; give me its natural products, its flora, its zoology, and I will pledge myself to tell you, a priori, what the man in this country will be, and what part this country will play in history, not by accident but of necessity, <u>not at one epoch but at all epochs</u>".
>
> (V. Cousin, cited by Wooldridge and East, 1966:62, emphasis added)

This radical view has since been modified in received opinion perhaps partly because it is manifestly not true for the stuff of archaeology. It has been replaced by a variety of stances including the possibilism of Paul Vidal de la Blache, the landscape appreciation of Carl Sauer and Karl Butzer, and the topophilia of Yi-fu Tuan. All of these approaches share one precept, however disguised the expression of it may be or whatever fashionable philosophical stance is being adopted: they recognise that humans and their environment are inextricably bonded.

Accordingly this chapter will examine the environment of Orkney. The procedure will be to gather together all that exists in Orkney of which humanity has made use, or could conceivably make use. The objective will be to compile a list of all the properties of the natural environment which were available or potentially available, to the Neolithic inhabitants of Orkney. An eclectic approach will be adopted, using information from more than one source, including archaeological reports, historical writings, statistical accounts, modern published reports, and observation in the field. It is only by considering a wide spectrum of possibilities that the relationship of Neolithic men and women to their surroundings may be discerned. To support this argument, suppose that for some reason, the possibility that prehistoric Orcadians were cultivators of the land had never been considered by archaeologists. It would then be a staggering conceptual leap to assimilate the evidence for the growing of crops in the islands that has accumulated over the last two decades. In order to reduce the number of conceptual leaps that may be necessary, as many potential links as possible between humanity and its environment will be considered.

For convenience these potential links will be divided into two categories: physical resources of the natural landscape, and organic resources of the living landscape.

10.2. PHYSICAL RESOURCES

Physical resources of the natural landscape are those which exist without the intervention of living organisms. The dividing line is not absolute: soils, for example, are living entities and could not develop without life. Indeed, it is only in combination with other resources that physical resources take on meaning for humanity. Nevertheless, it is possible to identify certain aspects of the environment of Orkney which are not predominantly organic. Some of these have been discussed in Chapter 2, and so the exposition here will be brief. An excellent review of the natural environment of Orkney, the result of a Nature Conservancy Council Symposium, was recently published (Goodier, 1975).

Land. The Orcadian archipelago (Figure 1.2) contains somewhere between 30 and 70 islands, depending on the definition of an island. Together the area of these islands is about 963 sq km or 96300 ha. There is one major island, the Mainland, which divides the island-group into two - the north isles and the south isles. Most of the north isles are low-lying: there is no point on the islands of North Ronaldsay, Papa Westray, Sanday, Stronsay or Shapinsay higher than 65 m. Three of the north isles - Westray, Eday and Rousay - have hills over 100 m with Blotchnie Fiold on Rousay rising to 250 m. The highest point on the Mainland is the Ward Hill of Orphir at an altitude of 268 m. The south isles have more relief amplitude than the north isles: in particular the island of Hoy is an anomaly with its Ward Hill rising to 479 m and over half the area of the island being over 100 m.

Sea. The natural corollary of Orkney being a group of islands is the presence of the sea and its effects. Being at the junction of the North Sea and the North Atlantic Ocean (Figure 1.1) the sea is a constant, unforgettable presence in the islands. The tidal currents between Scotland and Orkney are complex and fierce (Jones 1975: 86) and the Pentland Skerries experience four high tides in a day. Between the islands themselves the direction of current can change rapidly and sailing between islands is a task for experienced sailors. This pronounced oceanicity is a fundamental, and often neglected, aspect of the natural environment of Orkney.

Coast. Between the sea and the land is the coastal fringe, an area, as will be seen, of rich organic resources. A survey in the early 1970s sponsored by the Countryside Commission for Scotland (Mather et al., 1974) is a valuable source on the beaches and other coastlines of Orkney. The authors of that survey identified three different types of coastal morphology: high cliffs, low rocky shores, and sandy beaches. Of these, low rocky shores account for about 561 km (71%) of the length of the coastline with high cliffs and sandy beaches accounting for 142 km (18%) and 90 km (11%) respectively. Figure 12.26 is a map of the different coastline types, based on Mather et al (1975).

Stone. The stone found in Orkney is, almost without exception, Old Red Sandstone of various ages (Figure 2.1). This stone, also found in Caithness, is renowned for its building qualities. It can be quarried very easily: large foliated slabs can be prised away from bedrock with remarkably little effort. A practical ad hoc experiment at Pierowall Quarry, Westray in March 1981 showed that blocks of sandstone over a metre long could be separated from the living rock using only wooden wedges and unshaped stone pounders. Throughout Orkney bedrock is available at or very near the surface of the ground. Even where superficial deposits exist (Figure 2.4) bedrock is liable to be only a matter of a few metres below the surface. The quarried slabs can thereafter be broken into building blocks of any convenient size by using the subsidiary lines of weakness in the stone. This results in rectangular or rhomboidal blocks which are ideal for the construction of dry stone walling. Throughout Orkney the presence of quarry pits, widely dispersed in the landscape, is mute evidence that builders have quarried stone from the closest convenient outcrop or hollow. It has been suggested that the quarry situated on the slopes of Vestra Fiold and 250 m away from the eponymous chambered cairn (ORK T1) has been used to provide building stones for prehistoric monuments (RCAMS, 1946: 1, 269). There is little doubt that some Orcadian quarries date from very early in the history of the islands.

Flint. Another type of stone has been considered a valuable resource in times past. Flint, a very hard concretion of silica with properties of conchoidal fracture which may be struck to produce hard cutting edges, has been found on many prehistoric sites, including those of the Neolithic period (Table 8.11). Wickham-Jones and Collins (1978) list two sources of flint and three sources of chert (an inferior form of flint) within the islands. If glacial erratics are included, then the number of places where flint has been found jumps to about 15, the majority of the extra sites having been found by Rae (1976) during his doctoral research on the glaciation of Orkney. Figure 10.1 is an amalgamation of the work of these three authors and portrays all the known sources of flint and chert in Orkney. Two points may be added. Firstly, if the archaeological sites which have produced flint were added to this figure, there would be many more symbols on the maps. This implies that, however uncommon the material is, it has been widely disseminated in prehistory. Secondly, Wickham-Jones and Collins' conclusion that "on a general scale (flint and chert) sources are more abundant than previously thought" (1978: 8) has the ring of truth: archaeologists have not yet looked for flint as assiduously as the prehistoric inhabitants of Scotland evidently did.

Soil. The most widespread soils in Orkney are podzols, peaty podzols, non-calcareous gleys, and peaty gleys (Macaulay Institute for Soil Science, 1978). The extent of these various soils is shown in Figure 12.6. As a resource exploited by humanity, soil is one of the most precious in the world: it may have been the perception of soil as a resource which set the human race on the path to agriculture and urbanisation. The soils of Orkney have long been part of the intimate relationship and the plaggensols recently mapped by the Soil Survey for Scotland (see Chapter 2) are testimony to that long relationship. Soil and matters connected with soil are considered in detail in Chapter 12 when the importance of the resource to the Neolithic inhabitants of Orkney will be fully outlined.

Weather. In Chapter 2, the conclusion was reached that the climate of Orkney in Neolithic times was not dissimilar to that experienced today. The day to day expression of a climatic regime is the weather of a particular place. Weather can be a positive resource - growing crops benefit from sun and rain - or can have negative effects - the same crops can be flattened by a fierce storm. Figures 2.6 to 2.9 illustrate some aspects of the climate of Orkney but these figures do portray the times

"whan lood swaps gouster at the door
An' the nort' wind tirls the sneck"

(from "Salt i' the bluid" by Robert Rendall)

The weather of Orkney is distinctive. A visitor to the islands is struck by three overwhelming impressions. The weather can change radically and rapidly: George Mackay Brown's "chequer-board" landscape is the result of different weather patterns sweeping across the islands. In summer the days are very long and sometimes it does not get dark: in winter the sky sometimes never lightens. Lastly, the longest lasting impression that a visitor takes away from Orkney is the wind constantly blowing: so much so that the sound of the Orcadian wind is a significant influence on composer Peter Maxwell Davies (Radio Orkney, 24 August 1981). As a corollary of the first two impressions, the quality of light in the islands is remarkable. The landscape of Orkney is many-facetted: it is possible to be in the same place for weeks and still to be astonished, on a new day, by a familiar scene displayed in a new light.

10.3. ORGANIC RESOURCES

The organic resources contained in a landscape are those living organisms which may be used by humanity. Some of these may be encouraged to exist by fostering or cultivation; others may be simply harvested or hunted without any previous human intervention. Thus some organic elements would be present in the landscape without humanity while some require active nurture by men and women. Again, this distinction is not rigid: the quantity or quality of a resource or potential resource may be affected by the arrival of human life or by the changing actions of humans.

As with physical resources, the procedure here will be to list as many potential organic resources as possible, even if there is no direct evidence for the exploitation of a resource by the Neolithic inhabitants of Orkney.

10.3.1. PLANT RESOURCES

Trees. A list of vascular plants found in the island-group has been published by Elaine R. Bullard (n.d.), a local botanist. This list is complemented by Bullard and Good (1975), a description of the semi-natural vegetation of Orkney. At the present time the tree species found in the islands include ash (*Fraximus*), beech (*Fagus*), elm (*Ulmus*), plum (*Prunus*), larch (*Larix*), birch (*Betula*), alder (*Alnus*), hazel (*Corylus*), aspen and poplar (*Populus*), rowan or mountain-ash (*Sorbus*), sycamore (*Acer*), juniper (*Juniperus*), and more than twenty varieties of willow (*Salix*). It is true that some of these are modern escapees from plantations and that many of them do not thrive mightily due to exposure. Nevertheless the popular notion that Orkney is completely tree-less is a fallacy and "it is clear that many tree species can grow and produce fruit in Orkney" (1975: 35). In addition, supplies of wood may have drifted from Scotland or across the Atlantic ocean from North America: at the excavation of Staneydale "temple" in Shetland, Calder (1950: 191) found spruce (Picea) and pine (Pinus). The conclusion must be that, although timber may have been rare or found only in stunted lengths, it is by no means impossible to obtain in Orkney.

Food plants. Although grass is the most productive crop of the islands today, a wide variety of food crops is still grown and have been grown in the past. The cereals which thrive best of all are oats (Avena) and barley (Hordeum) including a primitive variety which may well be now restricted to Orkney called "bere". Other cereals which have been grown in small quantities include rye (Secale) and wheat (Triticum). Other food plants are reported in the Land Utilisation Survey of Orkney (O'Dell, 1939) and include peas (Pisum), beans (Vicia and Phaseolus), potatoes (Solanum), cabbage, swedes and turnips (Brassica) and beets (Beta). Fruits reported as growing today by Bullard (n.d.) include bramble and raspberry (Rubus), gooseberry (Ribes), and strawberry (Fragaria). Bullard also notes the following vascular plants which may have contributed to diets in the past: wild carrot (Daucus), parsley (Sison), radish (Raphanus), nettle (Urtica), rhubarb (Rheum), mint (Mentha) and chives and garlic (Alluim). Obviously some of these did not grow in Orkney in the third millennium bc but the fact that they are ecologically viable suggests that similar food plants may have occupied the same niches in past times.

Other plants. There are uses for plants other than as food. Natural herbs and spices may be used medicinally: a homeopathic doctor today would surely recognise many of the species in Bullard's checklist. John Firth, while discussing disease in his mid-nineteenth century Orkney parish, mentions "strange mixtures compounded from such common plants as chickweed, dandelion, dock, thrift, tansy, tormentil, and wormwood". (1974: 96). Firth also describes the making of rope out of heather and straw, and the construction of thatch, clothing, boots, baskets, mats, and many other articles out of plaited straw (1974: 30-37). Conceivably, there may have been plants in Neolithic Orkney which were used as intoxicants: Bullard (n.d.) mentions such interesting plants growing today as opium poppy (*Papaver sominferum*), hemp (*Cannabis sativa*), hop (*Humulus lupulus*) and foxglove (*Digitalis purpurea*).

Peat. This valuable source of fuel is found in quantity in the islands, but its distribution is localised, with some of the islands having no sources. The distribution of peat in modern times is shown in Figure 2.3. Much of this may be the result of blanket bog formation in the third millennium bp but it is probable that any post-glacial peat existing at the time of the Neolithic occupation would have been restricted to the same localities. George Low, commenting in 1777 on the absence of peat in Sanday and North Ronaldsay, remarks

> "...there is no moss in either of these islands, but the inhabitants are obliged to bring their peats from Eda (= Eday); the principal fuel here among the commons being the dung of their cattle, dried tangle, and other sea-weeds".
>
> (Low, 1978: 197)

This historical evidence from peat-less Sanday, added to Davidson's suggestion that the farm-mounds of the island may have an element of peat ash in their composition (pers. comm.) is adequate support for the possibility of there having been a sea-borne trade in peat among the islands of Orkney.

10.3.2. ANIMAL RESOURCES

Land mammals. Large land animals can adapt to a wide variety of habitats: there are probably few mammals which could not survive and thrive in Orkney. However, the actual range of mammals found in the islands is restricted. The most common, domesticated today and found on archaeological sites of all periods, are cattle (*Bos*), sheep and goats (*Ovis*), dog (*Canis*), pig (*Sus*) and horse (*Equus*). In addition, otter (*Lutra*) is present today (although in decreasing numbers) and deer (*Cervus*) has certainly been native to the islands at one or more period. Other animals which are native today include fox (*Vulpes*), cat (*Felis*), rabbit and hare (*Lepus*), and several species of *Rodentia*. Among these rodents are mice (*Mus*) and rat (*Rattus*), varieties of shrew and a species of vole. The Orcadian vole has also been found in prehistoric contexts and represents a post-glacial relict distribution of a species formerly more widespread.

Birds. In comparison to the mammals, the number of bird species which are seen in Orkney is large. According to Lea and Bourne (1975) there are over 90 species which breed regularly in Orkney, ranging from the very numerous seabirds such as fulmar (*Fulmarus glacialis*), kittiwake (*Rissa tridoctyla*), arctic tern (Sterna paradisea), guillemot (Uria aalge), common gull (Larus Canus) and herring gull (Larus argentatus); through the common birds of moor and farmland such as the hen harrier (Circus cyaneus), lapwing (Vanellus vanellus), curlew (Numenius arquata) and starling (Sturnus vulgaris); to raven breeding species including the grey heron (Andea cinera), cuckoo (Cuculus canorus), yellowhammer (Emberiza citrinella) mute swan (Cygnus olor), and golden eagle (Aquila chrysaetos). In addition to these breeding birds Groundwater (1974) lists a number of rare vagrants and residents. He also tells the tale of the great auk (Pinguinis impennis), driven to extinction by nineteenth century plunderers (1974: 169). Of all these birds, the seabirds have been fully utilised in historic times in Scotland: the fulmar alone was a major item in the economy of St. Kilda and no part of the bird was wasted (Steel, 1975). The most economical way to exploit sea birds is to collect the birds and eggs during their breeding season: Figure 10.2 shows the major sea bird colonies of Orkney ranked by numbers of breeding pairs. By far the largest colony is at Noup Head in Westray, a spectacular cliff 76 m in height.

Sea mammals. This category of organic resource includes seals and whales. There are two species of seal found in Orkney: the common seal (Phoca vitulina) and the grey seal (Halichoerus grypus). The grey seal population has fluctuated wildly in the last two centuries (Vaughan, 1975: 95) but at the present time there may be eight or nine thousand breeding animals in Orkney, no less than one-seventh of the entire world population (Groundwater, 1974: 287). The common seal population has remained more constant: in 1972 there were between two and three thousand in Orkney (Vaughan, 1975: 96). Figure 10.3 shows the distribution of breeding sites of grey seals and haul out sites of common seals. It is apparent that these distributions avoid areas of high human concentration. Offshore skerries and uninhabited islands such as the Muckle Green Holm and the Pentland Skerries are favoured. It is possible that in the past, when human populations were lower, seals were not restricted to such a small range of habitats. Even today, as is shown by the distribution of places where seals were observed (during an unsystematic series of visits to the Orcadian coast-line connected with the main object of this thesis), also displayed in Figure 10.3, seals range over the whole island-group when they are not breeding.

As seals have only one natural predator, and are slow and ponderous while resting on the shore, they are easy to hunt for food and fur. The recognised method of killing them today is to walk up to them and club them to death. It is not so simple to deal with whales since these sea mammals are not amphibious. However, whales do sometimes beach themselves accidentally or swim close enough to the shore so that they can be driven into shallow water by small boats. Such an event is very valuable to a small community because a whale contains massive quantities of meat, oil and bone. Historical records relating to the islands of the North Atlantic relate many instances of an entire community assisting at the death of a whale or school of whales. The largest number reported from Orkney was in 1839 when 195 pilot whales were driven ashore on the island of Flotta. (Groundwater, 1974: 291). In addition to the pilot whale (Globicephala melaena), Groundwater reports other species of whale as having been killed in Orkney. These include the common rorqual (Balaenoptera musculus), lesser rorqual (Balaenoptera acutorostrata), beluga (Delphinapterus leucas), Cuvier's whale (Ziphius cavirostris), and Sowerby's whale (Mesoplodon bidens). The class of cetaceans includes porpoises and dolphins both of which are commonly seen in the seas around Orkney: Groundwater's list of stranded species contains the common porpoise (Phocaena phocaena), the common dolphin (Delphinus delphis), the white-sided delphin (Lagenorhynchus acutus), the white-beaked dolphin (Lagenorhynchus albirotris) and Risso's dolphin (Grampus griseus).

Fish. It seems reasonable to suppose that fish have always played an important role in the economic life of Orkney and that George Mackay Brown's characterisation of the Orcadians as "fishermen with ploughs" is a true representation. In recent years, bigger and more sophisticated boats have fished deeper and deeper waters but it is perhaps with inshore fishing that we should be concerned here. Two methods are still used: fishing from the shore (using baited lines) or fishing from small boats (using the baited long line or several varieties of net). The most common fish caught in the nineteenth century, before modern over-fishing radically altered the ecological balance, were herring (Clupea harengus) cod (Gadus morrhua), ling (Molva molva), haddock (Gadus aeglifinus) and saithe (Gadus virens). Today, the saithe, known locally as "cuithe", is the most numerous fish in the waters around Orkney.

Creatures of the coastal fringe. The interface between land and sea is one of the richest environments in terms of organic resources. All of the archaeological evidence to date suggests that the first occupation of Scotland in Mesolithic times relied largely on habitats of the shore for survival. Archaeological, historical, and fieldwork sources all confirm that a variety of coastal resources have been exploited in Orkney. Of these, the phylum Mollusca has provided food for humanity in great quantities. The most commonly exploited species according to Jones (1975: 90) have been the great scallop or "clam" (Pecten maximus) and the queen scallop or "queen" (Chlamys opercularis). In addition, razor shells or "spoots" (Ensis ensis and Ensis arcuatus), limpets (Patella vulgata) and oyster (Ostrea edulis) have been, and in some cases still are, eaten in the islands. Two more types of shellfish are present in such large quantities today that they can be exploited commercially: these are the edible crab or "partan" (Cancer pagurus) and the common lobster (Homarus vulgaris). The variety of molluscs, crustaceans and other marine invertebrates is large, and many, apart from those cited here, are edible. Robert Rendall's Orkney Shore (1973) should be referred to for a complete list.

The same Robert Rendall will have the last word in this chapter. A naturalist, poet, theologian and archaeologist, Rendall's great love was for the coastal fringes. Although he emphasised the role of the shore, he was well aware that Orkney possessed the physical and organic resources to weave the fabric of human life:

> "Sea-fishing, taking of lobsters, gathering dulse and whelks and mussels, bait-gathering for cod-fishing, carting sand and seaweed for the land, or shingle for road-making, the bleaching of flax, kelp making, quarrying flagstone for house roofs or for paving, beachcombing for driftwood - there was no end to the resources of the shore for the maintenance of that old way of life. Little wonder that the Orkney system of land tenure styles possession as being 'from the lowest stone in the ebb to the highest stone on the hill'. For a mode of life that was more or less self-subsisting everything that nature could provide, from hill or shore, was needed".

(Rendall, 1973: 85-6)

CHAPTER 11: THE CHANGING OF THE LAND

11.1. THE NATURE OF ARCHAEOLOGICAL PATTERNS

In previous chapters the chambered cairns of Orkney have been described in detail, and the landscape in which they are located has been described. In the next chapter (Chapter 12) it is the intention to link these two descriptions: the cairns will be related to the landscape. In recent years much useful information, and some which does not fit into preconceived ideas, has emerged from studying the relationship of cairns to the land around them. Ideally, such analysis depends on a thorough knowledge of the Neolithic landscape and a knowledge of the distribution of chambered cairns therein. The first of these is the province of palaeo-environmentalists whose craft is continually expanding and whose results have been summarised in Chapters 2 and 10. The second has rarely been tackled in any but the most cursory way. It is the task of this chapter to discuss our knowledge of the prehistoric distribution of the chambered cairns of Orkney.

Archaeologists frequently use distribution maps to demonstrate patterns of sites of artefacts, and have been doing so since the beginning of the century - Gordon Childe himself was one of the greatest exponents of the distribution map. It has always been recognised that any archaeological distribution is not an accurate representation of the patterns laid down in prehistory; but nevertheless, statements about the prehistoric distirubiton of sites and artefacts have always been made. The intention here is to investigate the trajectory through time from an original distribution pattern to a modern distribution map. In this way, it might be possible to qualify any statement based on an observed distribution and make that statement more applicable to the original distribution.

There are some indications in the literature that writers in archaeology have been exploring the processes leading to a modern distribution of archaeological sites. Stevenson (1975) discusses the degree of reliability which may be placed on archaeological distributions and points out that "survival value" and "discovery potential" have as much of an effect upon distribution patterns as the destruction of sites. He uses an example from Tummelside, Perthshire (Figure 11.1) where ring-forts have a particular relationship to the extent of modern-day improved land and suggests that other ring-forts have not survived because they form the basis of later settlement patterns. He concludes that the ring-forts

> "that survive are those which were least successful and should not be seen as typical; deductions about the general economy of ring-forts should not be made from the surviving evidence".
>
> (Stevenson, 1975: 106)

Working at a larger scale, Renfrew (1979), in the course of a discussion on the use of Quanterness chambered cairn, was able to discern three types of "formation processes" which affected the archaeological data emerging from his excavation. These processes, which are presented in a diagram in Figure 11.2 are:

"A. Deposition processes (in which aspects of the primary activities are recorded in the material remains, forming the basic original archaeological record)

B. Preservation/decay processes (in which the archaeological remains are differentially preserved between the time of original deposition and the archaeological excavation).

C. Recovery processes (in which aspects of the processed archaeological evidence are recovered and presented as data, while other aspects are not)"

(Renfrew, 1979: 152)

Thus Renfrew is aware that during the excavation of Quanterness, the material recovered was very much a biassed sample of the material originally deposited. Of course, this has always been recognised by archaeologists whose study of material culture has always been based on the accidentally durable remnants of a functioning society. But in order to take such bias into consideration, it must surely be necessary to formalise, or discuss in detail, the nature of the bias: Renfrew is one of the first to do so at the scale of an excavation, and in the following paragraphs an equivalent formalisation will be attempted for the generalised distribution map. The arguments that follow in this chapter are based on, although considerably adapted from, Fojut and Fraser (forthcoming).

Archaeological distributions are the result of many different processes. Figure 11.3 attempts to describe the nature of the distribution patterns which are discussed by archaeologists, and the processes which lead to them. In the first place, archaeological patterns are determined by the original location processes - the decisions taken by the builders in prehistory and the expression of those decisions in the landscape. These decisions lead to an original distribution pattern - the distribution of monuments or artefacts as a functioning whole in prehistory. In the second place, archaeological patterns are affected by subsequent formation processes - the changes undergone by the landscape and all it contains, over the years that stretch between prehistory and the present. Such changes, many of which are destructive, will result in a potentially discoverable pattern - consisting of all the monuments or artefacts which are theoretically open to discovery by archaeologists, given total field-work coverage and perfect recovery of information. This pattern is, perhaps, unattainable because our processes of recognition - techniques of field-work and the experience of field-workers among them - will never be perfect. As a result the observed distribution pattern - the pattern always presented by archaeologists in distribution maps - can only be an imperfect copy of the potentially discoverable pattern.

Most archaeologists are interested in describing or explaining the original location processes of a prehistoric distribution, and this must be accomplished using the observed distribution pattern. It follows that a knowledge of subsequent formation processes and processes of recognition is necessary. An original distribution pattern may be altered radically by changes operating subsequent to the establishment of that pattern. Since such an altered pattern gives us an incomplete knowledge of the prehistoric pattern, we must attempt to know the nature of the incompleteness before we can try to explain the prehistoric pattern.

The remainder of this chapter will deal with the two sets of processes which intervene between the original distribution pattern and the observed distribution pattern. Up to now, the discussion has been of a theoretical nature: in the remaining sections of this chapter, the discussion will be of a more particular nature. Subsequent formation processes and processes of recognition will be outlined in frameworks suitable for application to the problems of this study, and then those frameworks will be used to discuss the distribution of chambered cairns in Orkney.

11.2. PROCESSES OF RECOGNITION

The recognition of a site is the first step in the inclusion of that site in the set of information used by archaeologists. Until a site is recognised as such, it does not enter into any discussion of archaeology. Perceptually, Broxmouth hill-fort did not exist in 1970: ten years later any discussion of the southern Scottish Iron Age must contain reference to Broxmouth. Thus, the nature of recognition in archaeology is a very important and necessary prerequisite in the synthesis of information: any and every statement which purports to concern itself with more than a single individual monument must take into consideration the number and type of sites which have been recognised.

Before going further, the term "recognition" must be examined. Many different meanings could be given to the word.

To take the hypothetical example of a mound in a pastoral field on an Orcadian farm, it is possible to chart a continuum of recognition relating to the mound. From earliest times, the cultivator of the field is aware that there is an upswelling on his farm which may not be a natural feature. During ploughing it may show signs of being different from the rest of the field, with blackened earth or large stones appearing on the surface of the soil. There may be a folk memory of the place being used as a burial ground, or as a house for past inhabitants. There may even be a place name associated with the mound, such as "Fairy Knowe" or "Howe". The inhabitants of the farm accept the mound and are not curious about it: although it is seen as being the work of past humans, it is part of the everyday landscape of experience. In the nineteenth century, a local minister or doctor, reading some learned journal, may begin to suspect that the mound belongs to a class of ancient monuments such as the "picts' houses" or "broughs". He may write to an Edinburgh antiquarian and the mound may enter into the verbal knowledge of local and amateur archaeology. Later in the century, the mound may appear on an Ordnance Survey map with the designation "Tumulus" or "Brough". Some time in this century the site may be visited by a professional archaeologist, such as an officer of the Royal Commission on Ancient Monuments, and be positively identified from surface remains, as a typical broch. A description of the mound is published in the Commission's Inventory for Orkney. Later on, the site may come under threat of destruction and be excavated by a State organisation, revealing a multi-period succession of round-house under broch under Mediaeval settlement. A few years after the excavation, a full academic report is published, and the general conclusions are widely disseminated in more popular literature.

Immediately it becomes apparent that there are two elements of recognition. The first is recognition as a member of a particular class of monument. Our mound was variously recognised as a "howe", a "picts' house", a "brough", a "broch", and as a "multi-period settlement", and, emphatically, these were all correct contemporary designations. Thus, whenever the recognition of a monument is being discussed, it is necessary to specify a term, such as "broch", which conveys a commonly understood meaning to the reader of the time.

The second element of recognition is degree of dissemination. Our mound went through various stages, from being known by a farmer and his family, through being an object of local antiquarian interest, through being printed on a map or in an Inventory, to the final stage of full-scale excavation and into the domain of public and academic knowledge. Where throughout this sequence can a site be said to be "recognised"? Like recognition as a member of a particular class of monument, the answer to this question is a matter of definition, and will depend to what use the concept of recognition is to be put. One possible definition is that a site is recognised when it first appears in print in a publication which is specifically available to the archaeological profession. This definition will be used hereafter, with the modification that a site appearing in a local or national monuments record is also said to be recognised. This modification is designed to include the index cards of the Archaeology Division of the Ordnance Survey, the National Monuments Record, and the Orkney Heritage Society, all of which must be regarded as being published material available to the field-worker in Orkney.

Given these two qualifications of the term "recognition", it is possible to identify a consistent pattern in how a class of archaeological monument becomes recognised by the archaeological world.

Figure 11.4 plots the growth curve of recognition of a class of archaeological site from the time when the site type is unsuspected (no examples of the type are recognised) to the time when all sites of the potentially discoverable distribution are known (all examples of the type are recognised). The diagram has more applicability when there has been no radical change in field-work methodology or improvement in field-work techniques over the time period under study. This last assumption holds true for much of the archaeological field-work in northern Scotland over the last century but holds less validity for these areas of lowland Britain where the introduction of aerial photography as a field-work technique has radically altered the pattern of known sites since the 1940s.

Three distinct periods can be seen in the curve of recognition:

Period I: Only a few sites are known and the class is not firmly established as a distinct entity. The number of recognised sites (N) grows slowly over time (t), with new sites being discovered only at lengthy intervals.

Period 2: The class-type becomes firmly established in the archaeological literature. The number of recognised sites grows very rapidly over a short length of time with new sites being discovered every year.

Period 3: The number of recognised sites is nearing the upper limit (L) of potentially recognisable sites. New sites are becoming harder and harder to find and are only discovered rarely.

An application of the curve of recognition will be demonstrated here on a class of monument which is very dissimilar to the chambered cairns of Orkney. Figure 11.5 shows the history of discovery of forts and fortlets on the Roman Wall in Scotland. Period I stretches from antiquity since several sites have always been recognised as being Roman forts, and appear in very early documentary sources. Period 2 begins about 1900 with the excavations and field survey of Sir George MacDonald. In the last few decades Period 3 has been reached with few new forts being found despite extensive field-work. The suggestion is that we are very close to the limit of potentially discoverable forts on the Roman Wall, and perhaps very close to having knowledge of the original complete distribution. This does not mean that there may not be other Roman structures on the line of the Wall. Indeed, it would seem that recently discovered "extensions" (Hanson, pers. comm.) represent the Period I of a new class of site. It does imply that the potential site map of forts on the Antonine Wall is nearing completion. This suggestion is not contradicted by current theory among Romanists.

Moving on now to a topic more central to this thesis, Figure 11.6 shows the curve of recognition of chambered cairns in Orkney. (This includes all cairns of categories Alpha, Beta and Gamma). In Orkney the assumption of unchanging field-work techniques holds true: archaeologists have been using the same field-working methods in Orkney since the early years of last century. Up until now, aerial photography has added nothing to our knowledge of the Neolithic period in the northern isles.

An analysis of this curve of recognition has clear implications for any study of the location of the monuments. Period I clearly did not end until the mid-nineteenth century when Petrie, Farrer, and Hebden began a series of explorations. The term "chambered cairn" was first used, referring to sites in Orkney, some time in the 1850s. Period 2 continued into this century with the officers of the Royal Commission on Ancient Monuments recognising many sites in Orkney during the 1930s and 1940s. The last two decades have seen the addition of still more chambered cairns to the list of those recognised, mainly the work of the Ordnance Survey and the Orkney Heritage Society. The implication is that this particular distribution -

chambered cairns in Orkney - has not yet reached Period 3 of the curve of recognition. There may be more, perhaps many more, sites to be discovered and so it must be explicitly acknowledged that any statement about the distribution of chambered cairns in Orkney is based on a pattern which may alter in the future.

This conclusion is based on a relatively abstruse theory. How does it conform to popular opinion in the archaeological profession? The sad answer is that few archaeologists have considered the questions raised in this chapter. There is no accepted opinion among archaeologists as to the nature or number of <u>any</u> original prehistoric distribution. Much work has been done on sampling methods (for example, Cherry <u>et al</u>., 1978), but most of this has been directed at ensuring that a sample of the observed distribution pattern is representative of that <u>observed</u> distribution pattern, and little thought has been given to the consideration of a sample of the observed distribution pattern being representative of the <u>original</u> distribution pattern. For the chambered cairns of Scotland, even Henshall's <u>Chambered Tombs of Scotland</u> offers no estimate, or speculation, on the extent to which the tombs catalogued therein are a true representation of the original distribution pattern. One of the few references to the topic comes from Gordon Childe, in <u>The Prehistory of Scotland</u>. Chambered cairns are

> "...conspicuous monuments not likely to be overlooked in a careful field survey. At least in Galloway, Arran and Bute, Caithness and Eastern Sutherland the available records probably give an accurate picture of the present distribution and numbers of tombs... There seem no adequate grounds for postulating any sweeping destruction of vaults, at least in the far north; perhaps the figures might be doubled to allow for the damage done in three thousand years."
>
> (Childe, 1935: 53)

Note that in this quotation Childe makes the distinction between "available records" and "present distribution" which is equivalent to the distinction made in Figure 11.3 between observed distribution pattern and potentially discoverable pattern.

The map which accompanied this passage (1935: 268-9) shows some 250 cairns in Scotland, including perhaps 21 in Orkney. Since 1935 the number of recognised sites in Scotland has risen to well over 600, including 76 in Orkney. Thus Childe's estimate is seen to be an underestimate, and perhaps a gross underestimate.

If there has been very little speculation in recent years on the relationship of observed distribution to original distribution then it becomes impossible to check if the conclusion outlined above - that there may be more chambered cairns to be found in Orkney - is in agreement with established opinion or not. The conclusion must be treated as a theory which will stand or fall in the light of further accumulation of data and further speculation.

11.3. SUBSEQUENT FORMATION PROCESSES

Subsequent formation processes (Figure 11.3) are those processes which transform an original distribution pattern into a potentially discoverable pattern. In the discussion that follows it has not been thought practical to construct a model of wide-spread applicability and use it on Orcadian data, as was the procedure for processes of recognition. Instead, the data will be examined and the results of that examination will be used to construct a model which has some validity for the Orcadian Neolithic landscape and may perhaps be used as a basis for similar models referring to other prehistoric periods and to other areas of the Highland Zone. This is largely a matter of presentation: in the mind of the writer there was possibly little difference between the amalgamation of empirical evidence and theory for the two sets of processes. Nevertheless the two arguments can be best presented to the reader in different ways.

In the first place it is instructive to examine the action of subsequent formation processes in creating spatial bias in distribution patterns. This action has been well documented even if the processes responsible have received little attention. Hamond (1978) points out that subsequent settlement, erosion and deposition, and modern land-use may radically alter a prehistoric settlement pattern. A similar set of processes, including some processes of recognition, has been described by Martlew (1981: 11a). His diagram is reproduced here as Figure 11.7 showing a hypothetical pattern of evenly spaced settlements (a). Coastal erosion (b) and subsequent settlement (c) remove some of the sites from the landscape. Differential landuse (d) is responsible for different degrees of site survival. Finally (and these are processes of recognition), survey, recovery and recording (e) may be unevenly distributed or result in mis-interpretation of sites. The final archaeological distribution map (f) bears little resemblance to the original distribution and conclusions drawn from it may not be an accurate portrayal of the economic or political life of the original group of settlements.

Hamond and Martlew have both expounded hypothetical models. In order to apply these models to a particular place, it would be necessary to have an intimate knowledge of the landscape, and landscape history, of that place. This could be achieved at a variety of different scales but the objectives of the next chapter of this thesis require a knowledge of the landscape of Orkney which can only be acquired at a very large scale. The ideal would be for one field-worker to walk over every island in Orkney, not once, but many times. It is only by constantly revisiting a locality, in different seasons and in different conditions, that the field-worker can become immersed in the meaning of a place. Such a procedure is impractical for an area as large as Orkney and here it has been necessary to concentrate instead on much smaller areas - samples of Orkney - and extrapolate from them to the island-group as a whole.

The island of Eday (Figure 11.8) was chosen as one of the best places to look at subsequent formation processes in detail. Eday is located in the centre of the north isles, north of Shapinsay, north-west of Stronsay, south-west of Sanday, south-east of Westray, and east of Rousay. It is about 13 km long north-south and a maximum of 4 km wide east-west, and rises to an altitude of 101 m at Ward Hill near the south end. The island contains a great variety of terrain and is very close to being a microcosm of the Orkney landscape. There is a chain of low hills down the west side of Eday, and much of the east side is undulating coastal lowland. The west side and Red Head to the north are high cliff coast-lines while much of the east side is a low rock coast-line. In addition there are areas of beach coast-line on both sides of the island, with the combined length of the Sands of Mussetter and Doomy on Fersness Bay being over 2 km. The waist of Eday is crossed by a large area of wind blown sand and active sand dunes. There is one major island loch, Mill Loch, and a few intermittent and smaller bodies of standing water.

The vegetation of Eday today is largely conditioned by modern husbandry practice. Much of the area of Calfsound and most of Southside and Westside is class 3 (land-use capability classification) land used today for high quality cattle pasture, for growing fodder, and for the growing of barley and oats. There is a belt of marginal land, mostly below the altitude of 30 m, which is used for pasture for cattle and sheep. The upland parts of the island are reserved exclusively for sheep grazing, although the land would be used elsewhere in Scotland for the shooting of grouse and deer. Thus the land-use of Eday is a close echo of that of Orkney as a whole, although the proportion of upland may be slightly overrepresented.

The human settlement of Eday has followed, with a single obvious hiatus, the course of human settlement in Orkney. The earliest sites are the chambered cairns, of which there are nine (with a further three on the offshore holm of Calf of Eday). There are at least three standing stones, including the massive Stone of Setter (plate J) situated at the focus of a dense pattern of prehistoric activity. There are cists and burnt mounds dating from the Bronze Age. An unexplained gap in the settlement record is the complete absence of brochs from the island. Brochless Eday may well be a result of differential preservation: there seems no reason why Eday should be the exception among all the Orcadian islands of similar and larger area. The first millennium AD is as destitute of material remains as elsewhere in Orkney but the settlement record picks up again in the Mediaeval period with the castle of Stackel Brae and several old chapels and churches. The island reached its maximum population of 947 in 1851 since when it has shown a gradual process of population decline to the present level of about 180 inhabitants, one third of whom are southern incomers.

The procedure adopted in Eday evolved after a period of experimentation. Three areas of land, each one kilometre square, were chosen to reflect the diversity of terrain. The three areas were designated Eday North, Eday Mid, and Eday South, and are demarcated on Figure 11.8. Each area was walked over in a boustrophedonic pattern ("as the ox ploughs") such that every point on a hundred metre grid imposed on the square kilometre was visited in a regular pattern. The objective was to produce a plan based on the Ordnance Survey 1:10000 plan which would show the formation processes of the human landscape. Any manifestation of the following sets of processes were looked for:

1. processes of evolution of the physical landscape
2. processes of change in the physical landscape due to human interference
3. instances of human imposition in the landscape.

Thus relict periglacial landforms and modern coastal erosion would be included in the first category. An example of the second type of process is seen in the resultant pattern of vegetation due to domestication and cultivation. The third category includes the entire spectrum of human settlement from the earliest midden to the latest airport.

Where possible, the extent of spatial action of each process was mapped on the 1:10000 plan. The accuracy of surveying here is not especially important, since the plans are simply going to be used for a qualitative description of subsequent formation processes. Thus some areal and point data were plotted by eye or by pacing. The important result is that the plans contain data which is not retrievable from published maps or aerial photographs. Perhaps an even more important result is that the producer of the plan comes to know small areas of terrain in intimate detail.

There now follows a description of each of the three plans:

1. Eday North

The plan of Eday North is displayed in Figure 11.9. The square kilometre is bounded by map references HY 560370, HY 560380, HY 570370, and HY 570380, is located in the middle of northern Eday, and consists of the southern half of the modern home farm of Carrick with surrounding grazing. The area is crossed by the road to Carrick House and by the road to Cusbay. Plate K is a view of Eday North looking south-eastwards from HY 561379.

The topography of the area is relatively simple, consisting of a north-facing valley rising to a saddle in the south-west. The north-facing valley overlooks the northern mouth of Calf Sound, that sheltered sea passage between Eday and Calf of Eday. The valley is bordered to the west by a dip slope which rises to the summit of Vinquoy Hill outside the area, with a maximum altitude of 60 m in the extreme north-west of the square. To the east, the valley is bordered by a gentle scarp slope which rises to an altitude of 30 m. The lowest point in the valley is around Carrick Farm, at about 10 m above sea level. The height of the saddle in the south-west is 24 m and in the extreme south-west there is the summit of the Hill of Calfsound at an altitude of 43 m. The extreme south of the area consists of low-lying ground about 15 m above sea level at the head of Mill Loch.

The vegetation of Eday North can be divided into two parts: improved land and unimproved land. The improved land is mainly under grass and is used for pasturing beef cattle and sheep. Barley is also grown. The unimproved land consists of areas of sparse Calluna heathland and areas of thin blanket peat cover. (Note that at this scale the published maps of peat cover are of limited use). The division between improved and unimproved land is not solely conditioned by altitude: the Hill of Calfsound is all under grass.

The effects of human settlement are found throughout Eday North. Two chambered cairns - Braeside (ORK 5) and Huntersquoy (ORK 23) - are located less than 200 m apart in the northern valley. The Stone of Setter (plate J) in association with some as yet unexplained stone settings is located close to the saddle-point. There are two indeterminate but large cairns within the area, the one in the south-west being hitherto undiscovered. Also unreported were two mounds with prominent cists in the same field as the Stone of Setter. Chronologically the next signs of human interference in the landscape must be termed modern. Much of the improved land has been drained: the surface traces of drainage channels are ubiquitous. There are three areas of peat cutting on the floor of the valley and peat has been cut intermittently on the slopes of Vinquoy Hill. Four quarry scoops (for building stone) are apparent around Huntersquoy chambered cairn and another is located on a south-eastern shoulder of Vinquoy Hill. It is not impossible that these date from an early period. Several of the fields of Carrick Farm have dry stone dykes as boundary markers. These dykes rarely exceed 1.5 m in height or 0.4 m in width. In addition, there is a denuded field wall paralleling the contours of Vinquoy Hill and a broken-down wall around an old school building. In total there were perhaps 1950 m of stone built wall within the square kilometre. The Fold of Setter, of which there is little trace on the ground despite being shown on the Ordnance Survey map, may have been an animal enclosure and, if it were constructed of stone, would add about 300 m to this distance. Most of the other field boundaries are now barbed wire fences but in the past may have been of more solid construction. There are three upstanding buildings, two of them being outbuildings of Carrick farm and the third an old school. This latter building may date from the mid nineteenth century but is now derelict. Two surfaces roads cross the area following lines which may have been established for centuries. Both roads are now tarmacadamed.

2. Eday Mid

The plan of Eday Mid is displayed in Figure 11.10. The square kilometre is bounded by map references HY 555330, HY 555340, HY 565330, and HY 565340. It is located just south of the waist of Eday formed by the Loch of Doomy and the Bay of London. The area is mostly open heathland and is crossed by two roads.

The general aspect of Eday Mid is north facing. The area consists of two spurs of Flaughton Hill with altitudes of 50 m and 36 m in the south running northwards down to very nearly sea level in the north of the square kilometre. The relative height difference of Eday Mid is thus not dissimilar to that of Eday North. The only standing water is the intermittent Loch of Doomy, a shallow sandy basin cut off from Fersness Bay by a line of unstable sand dunes. The terrain is archetypical of a glaciated landscape: the hill slopes are gently undulating and there may be the remains of a melt-water channel between the two spurs. In the north-west of the area there is a large patch of wind blown sand: there is, however, no appreciable machair development.

The vegetation of Eday Mid is almost entirely heathland with a thin covering of peat. In places impeded drainage has encouraged the formation of peat over a metre deep, especially in the valley between the two spurs of Flaughton Hill. In the extreme east of the area some effort has been made to improve the land by drainage and some effort has been made to cultivate grass, but this strip east of the main road has not been well managed, as is seen by the abundance of rag-wort. Sheep are pastured on this thin strip, but at the time of three visits to Eday Mid (in the months of May, June, and August), no animals were being grazed on the rest of the land. That is, over 80% of Eday Mid would seem to be completely unproductive to the farmers of Eday.

Despite this, Eday Mid has been, and is being, used by the people of Eday. The earliest evidence of human activity may be the chambered cairn of Eday Church (ORK 15).

Just outside the southern boundary of the area is a standing stone, and another chambered cairn, Sandyhill Smithy (ORK 47). In the north of Eday Mid there is an irregular area, perhaps 900 m long east-west and covering some 13000 sq m, which contains many small mounds. The exact number of these mounds is difficult to estimate, because the vegetation is so dense, but there are at least twenty well defined mounds. They are circular and have diameters of up to eight metres. Some of them show evidence of being constructed of stone and the fact that they are obscured by peat growth suggest they may be of prehistoric date. The entire complex has not been recorded before.

Moving on to historic occupation of the land, the most obvious features are the two roads, one (the B 9063) being the main north-south route along the length of Eday and the other being the branch road to Fersness and the West side. Together they comprise about 1900 m of tarmacadamed road between 3 and 4 m wide and bordered by drains. There are two standing buildings, Sandhill farm with outhouses, and the old Church of Scotland, now used as a visitors' hostel. The church is surrounded by a substantial stone wall. In the south-west of Eday Mid an extensive area has been used for the cutting of peats: some of the banks are still active today. The hill slope north of the West side road has been drained by deep ploughing. Just west of the junction of the two roads is a deep sandstone quarry: the hole is today the central rubbish dump for the entire island.

Three very recent innovations in the economic life of Eday have all had their effects on the landscape. The building of London airport in the 1960s may have been a cause of much of the drainage work. Today, the ends of two runways, grass-sown flattened fields about 80 m across, protrude into the north of the area. In the last few years, a central piped water supply has been introduced to Eday. There is a pumping station just to the west of Eday Mid, but a pipeline runs across the south-west corner of our area running from the station to a storage tank on the top of Flaughton Hill. The pipeline is completely buried but the remains of the trench dug to accommodate it are visible as a scar up to 5 m across. The third innovation was the introduction of mains electricity to Eday in 1980. This is manifested in the landscape by an electricity sub-station surrounded by a fence, located just by the road junction, and by two lines of poles carrying transmission wires.

3. <u>Eday South</u>

The plan of Eday South is displayed in Figure 11.11. The square kilometre is bounded by map references HY 550300, HY 550310, HY 560300, and HY 560310. It is located in the centre of southern Eday and includes the summit of Ward Hill, at 101 m the highest point in the island.

The topography of the area consists of a single unit. From the top of Ward Hill a ridge runs to the north-north-east with the land falling away to the east and west to a minimum of 50 m in the east and 40 m in the west. The crest of the ridge is not uniform, but contains four hummocks. There is a convex break of slope at an altitude of about 65 m on the eastern slope, and the east-most strip of land in the square kilometre is an inclined plain sloping towards the coast.

Again, there are two units of vegetational landscape. Ward Hill and its surrounding slopes are covered with sparse Calluna heathland. In places on the summit ridge there are bare patches of ground. Going down slope the vegetation becomes more luxuriant and in the extreme north-west of the area is a small patch of thin peat. To the east of the break of slope the land has been improved by drainage and is now used for the pasturing of cattle and sheep, being mostly under cultivated grass.

In comparison to Eday North and Eday Mid, there is little trace of human occupation. There are no signs of any of the common prehistoric monuments. Modern occupation of the land is concentrated in the east and south of the area: much of this land is cultivated and fenced. There are two derelict buildings and an Ordnance Survey trigonometrical survey point. A track meanders across the area from south-east to north-west and there are faint signs of other tracks along the crest of the ridge.

Can any conclusions be drawn from this study of three square kilometres of Eday? The first important point is that any statements made about these areas should not be extended with impunity to the rest of Eday, to Orkney, or to Atlantic Scotland. Having said this, the results of these descriptive exercises can suggest general statements about subsequent formation processes in other areas. It is possible, with some validity, to extend statements about sample areas to larger areas as long as two conditions are upheld. The first is that statements about the larger areas should be less specific (more general) than statements about the sample areas. The second is that all a priori knowledge about the nature of the sample must be taken into account when making any statement. Obviously these conditions are not well defined or rigorous: this is an intuitive and preliminary approach to an unexplored field.

With these two conditions in mind, several general statements may be made about the landscape of Orkney and the changes it has undergone since early prehistory:

1. the entire landscape has been affected in one way or another by human activity
2. in terms of differences in terrain, the distinction which is most obvious is that between improved land and unimproved land.
3. every formation process acts on the land unevenly: there is spatial bias in the observed results of each process.
4. it would seem that there are many more prehistoric sites to be discovered and recognised (over twenty sites in three different categories were found in the Eday survey).

This is perhaps the extent of general statements which may be made as a result of the Eday survey. However, the experience gained during the survey, together with less formalised experience gained from walking approximately a thousand kilometres over the land of Orkney, is enough to be able to construct a descriptive model of formation processes liable to have affected the distribution of prehistoric sites in the island-group.

This descriptive model for Orkney is outlined in Table 11.12. (A generalised version of this table with application to Highland Scotland appears in Fojut and Fraser (forthcoming)). These formation processes are divided into two categories: natural processes and cultural processes. The intermediate category used in the Eday survey is dropped as being insufficiently distinct. The two categories left correspond to Schiffer's (1976) distinction between n-transforms (noncultural formation processes) and c-transforms (cultural formation processes).

Natural processes are those which bring about physical changes of the landscape through the agency of the elements - heat, water, wind, fire, and gravity. The particular processes which may be of interest to the archaeologist are those morphological processes which operate over a relatively short time scale of thousands of years or less. In Orkney only two groups of these processes have been of any significance in the last ten thousand years. The first of these are changes at the coastal fringe. In Chapter 2, these changes were divided into horizontal movements of the land-sea boundary, and local changes in the configuration of the coastline caused by erosion and deposition. In Orkney there are, as yet, few signs that the former has been a significant formation process of prehistoric patterns. Erosion and deposition are, however, processes which may have caused some disruption in those patterns. As concrete examples, the chambered cairn at Point of Cott (ORK 41) is undergoing active coastal erosion, and the settlement site of Links of Noltland has undergone periods of both deposition and erosion.

The second natural process of relevance to this discussion of Orkney is the change due to vegetational and climatic variation. The growth of peat, the maximum of which has been dated to the later periods of prehistory (see Chapter 2), is one manifestation of this type of change. There are several chambered cairns in Orkney which have been covered by a layer of peat: two cairns on Calf of Eday (ORK 9 and 10) are examples. Although no other process of this type is potentially as important as peat growth, other changes which may have had some effect include the establishment of machair land (associated with wind blown sand) and the indirect changes in vegetation caused by the cultivation of land in the vicinity.

Cultural processes affecting archaeological site distributions include any changes brought about by the actions of humans. The most immediate of those were brought about by the introduction of agriculture. The domestication of plants instituted a change in the vegetational regime of Orkney which was reflected in the complete pollen spectra of the islands and was not just restricted to localised areas. Similarly, the domestication of animals can be responsible for vegetational changes, either directly or indirectly, and may also have had some effects on the faunal balance of Orkney. Another process of importance is the way in which roads and buildings and other artefacts of the built environment tend to obscure the landscape, if not actually destroying prehistoric sites in the course of their construction. This process of obscuration is closely linked to the supply of building material: structures built of stone, such as dykes and cairns, require an amount of material that must be quarried or collected. As well as the obvious change in the landscape caused by the removal of bedrock for stone, building material has been re-used. That is, an old structure or building has been torn down and its constituent stones used for the construction of another structure, either on the same site or close to the first structure. Examples of this are legion in Orkney: Quanterness chambered cairn (ORK 43) has an Iron Age round house built above it and the cairn at Eday Manse (ORK 16) lies within the perimeter wall of a church constructed in the nineteenth century.

Perhaps the fundamental parameter which influences all other cultural processes of formation is the attitude of successive cultures to the material remains of the past. By this is meant the behaviour adopted by an individual or by society as a whole towards prehistoric (and historic) remains. Such attitudes run through a potential spectrum from positive feelings of reverence, through indifference or ignorance, to negative feelings of disrespect. To make the disentanglement of such attitudes more difficult, the same society may act in a variety of different ways towards its prehistoric heritage. As an example, Orcadian and Scottish society of the 1980s holds the site of Skara Brae in reverence and encourages its preservation for the benefit of visitors to the islands. Conversely, a member of that society in 1981, with knowledge and intent, demolished the remains of a broch "remarkable for the extent and complex character of the outbuildings" which had produced "unusually interesting" finds (RCAMS, 1946: 2, 152-3). Even more revealing, the consensus of societal opinion, as expressed in legal proceedings against the demolisher, was to condemn the action _de jure_ but, by the levy of a paltry fine, to condone the action _de facto_ (various reports in _The Orcadian_, March-July 1981).

Neither natural processes or cultural processes operate uniformly in time or space, as was abundantly clear in the survey of Eday. That is, there is bias in the action of each process: bias in the operation over time, and bias in the operation over space, of each process. With respect to time, some geomorphological processes operate very slowly over periods of time that seem very long to archaeologists (down-wasting by fluvial action might be one example) while others may operate almost instantaneously (floods, landslides and other catastrophic events are examples). Similarly, cultural processes of landscape change may operate over long periods (for example, the gradual dilapidation of an artificial mound by continuous ploughing) or can occur over very short time periods (as when a site is bull-dozed away to make room for a new building). With respect to space, the same type of biases could be exemplified.

It should now be time to attempt to draw conclusions from this section on subsequent formation processes. These conclusions should ideally restrict themselves to the object of this thesis and not attempt to extend outwith that limited province. That is, we are here concerned only with statements which will be of use in the next chapter considering the location of Neolithic monuments with respect to the landscape of Orkney. Unfortunately, this digression into a more theoretical look at landscape has not produced any meaningful results which could not have been deduced at the conclusion of the Eday survey. Thus the statements outlined after that exercise must stand as they are, and must be applied to Orkney as a whole.

11.4. POSTSCRIPT

This has been an unsatisfactory chapter. At the beginning it was known that the present landscape of Orkney was dissimilar to that which prevailed in Neolithic times. It was also known that changes in the landscape since then had distorted the distribution pattern of prehistoric sites and in particular, that of chambered cairns. The object of this chapter was to explore the nature of that distortion and to try and recreate the original distribution pattern. This original distribution pattern would then be used to explore the locational desires of the Neolithic inhabitants of Orkney and to take one step towards a description of their society.

Ideally, the results of this chapter would be a list of transformations undergone by the original distribution pattern on its trajectory through to the present day. To each element in the list would be appended a description of its biassed effect on the landscape, both spatially and temporally. With sufficient time and effort spent on field-work, becoming at one with the Orcadian landscape, these aims might have been achieved. The effects of each process in the list would become better understood and the spatial and temporal biases of each might be expressed, most conveniently in a probabilistic form.

But all is not lost. The limited field-work on which this chapter is based (most of which was a by-product of visiting every chambered cairn) has pointed the way, however dimly, towards an appreciation of the Orcadian Neolithic landscape. Some conclusions have been reached. They are very general conclusions and might conceivably have been arrived at without recourse to the somewhat tortuous argument of this chapter, but nevertheless they have been confirmed by that argument. Henceforth, and in particular during the course of the next chapter, they cannot be ignored during any discussion of the location of prehistoric monuments in Orkney.

In addition, another positive result has been the very beginnings of a general theory of landscape change. As yet it is inadequately expressed and highly idiographic, being orientated towards the description of landscape change in the early prehistoric periods of northern Scotland. Within the confines of the present work, the theory cannot be advanced; but in the future it may be possible to take this nucleus and transform it into a tool of widespread application.

CHAPTER TWELVE: LOCATIONAL ANALYSIS

12.1. INTRODUCTION

Thus far, this thesis has described and classified a group of prehistoric buildings and has described and classified the landscapes in which they are located. The objective of this chapter is to explore the relationships between buildings and landscapes, between chambered cairns and the land of Orkney.

The method of operation will be dual and complementary. The first approach will be univariate: the distribution pattern of chambered cairns will be examined in relation to single aspects of the landscape. The second approach will be multivariate: the distribution pattern of chambered cairns will be examined in relation to the landscape as a whole.

As outlined earlier, the intention is to make probabilistic statements of the behaviour of the cairn-builders and cairn-users and to infer from these their locational objectives and desires. Probabilistic statements of behaviour are not seen as rigid, mechanistic rules but rather as general principles, originated by the people themselves and confirmed by continual restatement as a cairn is used and as new cairns are constructed. The physical location of a monument is an expression of the principles held in common by a particular society. The location of the chambered cairns of Orkney is one way of examining the forces which defined the society of Neolithic Orkney.

Nowhere in this chapter is it assumed that any of the monuments under discussion were contemporary, either in time of building or in period of use. The associations under study are associations between cairn and land, and not between cairn and cairn. The one assumption which is made is that the qualities of land discussed here were relatively unchanging for the duration of the cairns' use. It is sometimes necessary to qualify this assumption, but on the whole the qualities of land are discussed at a general level which is not refined enough to discern landscape change over short periods of the order of a millennium.

The changes in the land of Orkney since the time of the cairn-builders have been discussed earlier. The conclusions of that study are respected and will be introduced as they become appropriate.

Appendix D describes the method used to measure areas throughout this chapter and Appendix E describes the method used to describe the measurement of inexact classes.

12.2. A UNIVARIATE APPROACH

12.2.1. GEOLOGY

The principle published source for the geology of Orkney remains the Geological Survey colour-printed maps at a scale of 1:63360, first issued in the 1880s. This is supplemented by Mykura et al. (1976), the British Regional Geology for Orkney and Shetland.

As described in Chapter 2, the solid geology is dominated by Middle and Upper Old Red Sandstone. (Figure 2.1). There are three major components of the superficial geology - boulder clay or glacial till, peat, and blown sand (Figures 2.3 and 2.4). Table 12.1 shows the distribution of the different geological types over the major islands. (In this, and in following tables, "Westray group" means Westray and its immediate offshore islands. Thus North Ronaldsay is included in the Sanday group, Flotta in the Hoy group, Burray in the South Ronaldsay group, and so on). Table 12.1 demonstrates that Stronsay, Shapinsay, the Mainland, and South Ronaldsay have larger areas covered by boulder clay than by other geological types, and that in four island groups, the greatest area of land is not covered by superficial deposits. The largest concentrations of peat are in the west Mainland and in Hoy.

Using the Geological Survey map, the underlying geology of each chambered cairn was noted. Table 12.2 shows the distribution with respect to geological type of chambered cairns by cluster ("clusters" being defined as in Chapters 6 and 9). There is an obvious preponderance of monuments located on sandstone with no superficial deposits. No less than 65 of the 76 cairns are located directly on sandstone. (Of these 43 are located on the Rousay Flags, but since it requires careful observation to distinguish between Rousay Flags, Stromness Flags, the Eday Beds and the Hoy Beds, no distinction was made between any deposits of Old Red Sandstone).

Only seven cairns are located in areas of boulder clay and only two cairns, Linkertaing (ORK 35) and Wideford Hill (ORK 54) are located, according to the Geological Survey map, directly on areas of peat. Two neighbouring cairns fall into the "miscellaneous" category, with Redland (ORK 57) and Redland South (ORK T20) being located on an area of hummocky moraine.

To test if this distribution could be random, a simple statistical test - the chi-square one sample test (Siegal, 1956: 47) - was employed. The null hypothesis to be tested is that there is no association between the distribution of chambered cairns in Orkney and the distribution of geological types. The significance level was set at 0.05. The contingency table for the test, compiled from the right-hand columns of Tables 12.1 and 12.2 is as follows:

Category	Expected frequency	Observed frequency
Sandstone	29.7	65
Peat	13.6	2
Boulder Clay	28.2	7
Miscellaneous	4.5	2
Totals	76.0	76

For this contingency table, $\chi^2 = 69.2$. From tables (Fisher and Yates, 1963: 47) $\chi^2 > 7.82$ for three degrees of freedom and level of significance 0.05. In fact, χ^2 is greater than the critical value for three degrees of freedom and level of significance 0.001. Thus the null hypothesis can be rejected and it can be stated that there is a very high probability that the 76 known cairns are not situated randomly with respect to underlying geological type.

To see if the same result was obtained from the measurement of inexact classes (Appendix E), the total area of each geological type within one kilometre of each chambered cairn was measured. The results are summarised in Table 12.3. (This table does not sum to 7600 because surface water in the form of sea and lochs is excluded). A similar null hypothesis was tested, namely that there is no association between the distribution of chambered cairns by inexact classes and the distribution of geological types. The significance level was again set at 0.05. The contingency table for the chi-square test, compiled from the right hand columns of Tables 12.1 and 12.3, is as follows:

Category	Expected frequency	Observed frequency
Sandstone	1866	3079
Peat	852	417
Boulder Clay	1767	1095
Miscellaneous	282	176
Totals	4767	4767

For this contingency table, $\chi^2 = 1306$. From published tables (Fisher and Yates, 1963: 47) $\chi^2 > 7.82$ for three degrees of freedom and level of significance 0.05. The χ^2 statistic for this contingency table is massively larger than the critical value for rejection of the null hypothesis at a significance level of 0.001. The null hypothesis is thus rejected conclusively and the alternative hypothesis accepted that there is a very high probability that the 76 known chambered cairns are not situated randomly with respect to geological type.

One further test remains before these results can be interpreted. It is possible that the observations noted above apply unevenly to cairns belonging to different typological classes, or clusters. To examine this possibility, a nonparametric analysis of variance test, the Friedman two-way analysis of variance by ranks (Siegal, 1956: 166), was carried out. The null hypothesis is that the samples represented by the different clusters were drawn from the same population or that there is no difference between clusters as far as their distribution with respect to geological type is concerned. The level of significance was set at 0.05. The ranked table for the test, compiled from Table 12.3 with scores standardised with respect to cluster size (or more strictly with respect to area of land within one kilometre of each site) is as follows:

Category	Cluster I	Cluster II	Cluster III	Clusters IV-VI
Sandstone	1	2	3	4
Peat	4	3	2	1
Boulder Clay	4	2	3	1
Miscellaneous	1.5	3.5	1.5	3.5
Totals	10.5	10.5	9.5	9.5

For this table $\chi^2 = 0.15$ which from published tables for a four-by-four matrix (Siegal, 1976: 281) has an associated probability of greater than 0.992. The null hypothesis is thus accepted and it can be stated that there is no difference between typological classes as far as distribution with respect to geologic types is concerned.

A series of statistical correlations having been established, it is now necessary to explain how such correlations have arisen. Examination of the primary data leads to the observations that the statistical correlations are associated with the under-representation of all chambered cairns on the geologic types of peat and boulder clay, and their over-representation on the geologic type of sandstone with no massive overburden.

The first observation, that land covered in peat does not contain an equitable number of chambered cairns, has been presaged by the conclusions of Chapter 11. There, peat was identified as an agent of obscuration of the cultural landscape. Since the palaeoenvironmental evidence suggests that much of the peat growth in Orkney has occurred since Neolithic times, it seems reasonable to suppose that some chambered cairns have not been discovered because they have been overwhelmed by peat and have not been recognised as archaeological features. In Shetland, Whittle (1980) has recognised extensive field systems preserved under blanket peat, and in Co. Mayo, Ireland, Caulfield (1978) has uncovered a complex of walls, enclosures and a court-cairn at Behy/Glenulra concealed under peat. These examples, and others cited in Bowen and Fowler (1978) are clear evidence from elsewhere in Britain and Ireland of prehistoric monuments being obscured by subsequent peat growth. Furthermore, there are examples from Orkney itself: on the island of Eday there are at least three instances of stone walls emerging from peat (Fraser, 1980c) and Caulfield (1978: 137) quotes Thomas as observing definite evidence of pre-peat land boundaries in South Ronaldsay in 1852.

The second and third observations, that chambered cairns are under-represented on land covered in boulder clay and over-represented on land with no superficial deposits, may be interpreted together. The most reasonable explanation for the statistical correlation relates to the supply of building material. Where there is a covering of boulder clay in Orkney, its depth appears to range in thickness from three to ten metres (Mykura et al. 1976: 113). It is rare to find large stones within the clayey matrix of boulder clay. Conversely, where there are no superficial deposits, the sandstone of Orkney is extremely easy to quarry, being foliated and easily split. The abundance of quarries throughout Orkney, which are impossible to date but must certainly range from prehistoric times to the modern period, testify to the ease with which building stone can be obtained from the beds of the Old Red Sandstone succession. Accordingly, the interpretation placed on these observations is that the builders of chambered cairns located their monuments with regard to the accessibility of building stone. This interpretation is supported by reference to some of the chambered cairns which are located directly on boulder clay. Holm of Huip (ORK 20) is at the centre of a very small island and the rock shore where it is easy to quarry stone in Orkney (plate L) is only 140 m away. Likewise Point of Cott (ORK 41) and Kelsbir (ORK T10) are directly on the shore. Further support is added by the fact that no cairn in Orkney is more than one kilometre away from an area of sandstone with no superficial deposits.

To summarise this section on the distribution of chambered cairns in Orkney with respect to geologic type, three conclusions have been drawn:

1. where there is a mantle of peat, there may be some chambered cairns which have been obscured.
2. the accessibility of building stone may have constrained the cairn-builders to prefer land with no superficial deposits over land with such geologic deposits.
3. the previous two conclusions apply irrespective of the structural design of the chambered cairn.

12.2.2. SOILS

The principal published source for the soils of Orkney is the Soil Survey colour-printed map of soils at a scale of 1:50000, first issued in 1981. This is supplemented by a brief description of the soils of Orkney in an annual report of the Macaulay Institute for Soil Science (1978).

The published map identifies over 50 different varieties of soil in Orkney, many of which are very similar in appearance and are distinguished only by the constituents of their parent materials. For the purposes of this section, the soils were classified as outlined in Table 12.4 into six different groups:

1. Podzols: acidic soils characterised by an organic horizon above a light grey leached horizon caused by the decomposition and downwards translocation of minerals. Ions of calcium, potassium and iron from these minerals are redeposited in a horizon of sesquioxide accumulation above the parent material.
2. Podzolic complexes: areas of mixed soils dominated by podzolic series.
3. Gleys: soils characterised by a thick organic horizon above a horizon of mottled olive or grey material, the mottles a result of partial anaerobism caused by alternating wet and dry periods. The lowest horizon is constantly anaerobic with the resultant reducing conditions producing a uniform olive colour.
4. Gleyic complexes: areas of mixed soils dominated by gleyic series.
5. Peat: basin peat, valley peat, and blanket peat, all characterised by the accumulation of organic matter under wet anaerobic conditions.

6. Miscellaneous: the remainder of the soils and surface materials to be found in Orkney. This group, about 6.6% of the land area, includes alluvial soils, links, and other undifferentiated soils. Only in the island of Sanday does this group figure largely in the areal distribution: on that island there is an expanse of brown calcareous soils developed on shelly sand.

As outlined in Chapter 2, the single most important influence that determines differential soil development in Orkney is moisture status: there is a hydrologic sequence from podzol to gley to peat. Furthermore, many soils in Orkney have been improved by cultivation and in particular by draining. Nevertheless, the pattern of soils found today is representative of a similar differentiated pattern in the third and second millennia bc.

Figure 12.5 shows the distribution of these soil groups over the islands of Orkney, and the same information is summarised in Table 12.6. Gleys predominate in the island groups of Westray, Stronsay, Shapinsay, the Mainland, and South Ronaldsay. Podzols and podzolic complexes predominate in Sanday, Rousay, and Hoy. On the island of Eday, there are similar proportions of podzols, gleys, and peat. The Mainland and Hoy have large expanses of peat.

(Note that the Geological Survey and the Soil Survey have different definitions of peat - compare the areal measurements for peat in Tables 12.1 and 12.6. For each survey these definitions have been accepted as expressed because comparisons are made with other elements of the same survey).

Using the Soil Survey map the underlying soil group of each chambered cairn was noted. Table 12.7 shows the resultant distribution by cluster. There is a notable preponderance of cairns located on podzols and podzolic complexes. Despite 36.3% of the land surface of Orkney being occupied by gleys, only 23.7% of the cairns are located on this type of land. Only two cairns are located on peat, and none have been found on any of the miscellaneous soils.

To test if this distribution could have occurred by chance, the chi-square one sample test was employed (Siegal, 1956: 47). The null hypothesis to be tested is that there is no association between the distribution of chambered cairns in Orkney and the distribution of soil groups. The significance level was set at 0.05. The contingency table for the test, compiled from the right-hand columns of Tables 12.6 and 12.7 is as follows:

Soil group	Expected frequency	Observed frequency
Podzols	21.7	37
Podzolic complexes	7.9	18
Gleys	27.5	18
Gleyic complexes	2.8	1
Peat	11.0	2
Miscellaneous	5.1	0
Totals	76.0	76

For this contingency table, $\chi^2 = 40.6$. From tables (Fisher and Yates, 1963: 47) $\chi^2 > 11.07$ for five degrees of freedom and level of significance 0.05. This figure of χ^2 would also be greater than the critical value had the level of significance been set at 0.001. Thus the null hypothesis can be rejected and it can be stated that there is a very high probability that the 76 known cairns are not situated randomly with respect to soil group.

The measurement of inexact classes, by its nature, should tend to confirm such a result, but to add further strength to the alternative hypothesis, the area of each soil group within one kilometre of each chambered cairn was measured. The results are summarised in Table 12.8. (Again, this tables does not sum to 7600 because surface water is excluded. It does not sum to exactly 4767, as in Table 12.3, due to measurement error compounded by two different map series at two different scales being used in the compilation of Tables 12.3 and 12.8).

A similar null hypothesis was tested, namely that there is no association between the distribution of chambered cairns by inexact classes and the distribution of soil groups. The significance level was again set at 0.05. The contingency table for the chi-square test, compiled from the right hand columns of Tables 12.6 and 12.8, is as follows:

Soil group	Expected frequency	Observed frequency
Podzols	1366.1	1574
Podzolic complexes	496.8	1059
Gleys	1733.8	1345
Gleyic complexes	178.9	236
Peat	690.5	447
Miscellaneous	317.9	123
Totals	4784.0	4784

For this contingency table $\chi^2 = 978.6$. From published summaries of the chi-square distribution (Fisher and Yates 1963: 47) $\chi^2 > 11.07$ for five degrees of freedom and level of significance 0.05. The χ^2 statistic for this contingency table is massively larger than the critical value for rejection of the null hypothesis at a significance level of 0.001. The null hypothesis is thus rejected conclusively and the alternative hypothesis accepted that there is a very high probability that the 76 known chambered cairns are not situated randomly with respect to soil type.

Again, it is of interest to learn whether this result applies for every chambered cairn or if certain groups of cairns are distributed according to soil type in different ways. Using the Friedman two-way analysis of variance by ranks test (Siegal, 1956: 166), the null hypothesis that there is no difference between clusters with respect to distribution of soil type was examined. This null hypothesis states that the samples represented by each cluster of chambered cairns were drawn from the same population. The ranked table for the test was compiled from Table 12.8 with scores standardised according to area of land within one kilometre of each site. The table is as follows:

	Cluster I	Cluster II	Cluster III	Clusters IV-VI
Podzols	4	2	3	1
Podzolic complexes	1	2	3	4
Gleys	4	1	2	3
Gleyic complexes	2	3	1	4
Peat	4	3	1	2
Miscellan-eous	2	3.5	1	3.5
Total	17	14.5	11	17.5

For this table, $\chi^2 = 2.65$. For a six-by-four table the sampling distribution of χ^2 approximates to that of the chi-square distribution with degrees of freedom one less than the number of columns in the table. For three degrees of freedom, the associated probability of a χ^2 statistic of 2.65 is about 0.4. The null hypothesis is thus accepted and it can be stated that there is no difference between typological clusters as far as distribution with respect to soil type is concerned.

These statistical correlations have arisen because the recognised chambered cairns are over-represented on podzols and podzolic complexes, and under-represented on gleys and peat.

As before, the under-representation of cairns on land that is covered by peat can be interpreted as being partly due to obscuration. There may be some chambered cairns which have not become known to archaeologists because they have been overwhelmed by peat. This is in agreement with the conclusions drawn from the study of geological types.

The remaining three observations are best interpreted as belonging to the realm of original locational processes - to be the result of the cairn-builders' decisions to locate the monuments in particular places. Immediately we are faced with the question of why certain soil types should be preferred over other soil types. Two possibilities present themselves. The first is that there is some quality intrinsic to soil which is necessary in the construction or use of a chambered cairn. The second is that the observed distribution with respect to soil is an attributed or transferred result due to chambered cairns being located on or near land which was deliberately chosen by the people of the cairns for a purpose unconnected, or not directly connected, with the cairns themselves.

The first possibility finds little support. There is no intrinsic quality of soil which would make it very much easier or quicker to build a chambered cairn on particular types of soil in Orkney. Only if it were necessary to remove a depth of soil, such as during the digging of a ditch, would the quality of that soil become important. However, there are very few chambered cairns in Orkney which have any part of their structure below the Neolithic ground surface (the exceptions being three surrounding ditches and two or three subterranean chambers). Also, by practical experiment, there is little difference in difficulty between digging an Orcadian podzol and an Orcadian gley soil.

The first possibility also allows for the quality of the soil to be of importance during the period of use of the monument. That is, there may be some function of a chambered cairn which requires it to be located on soil of a particular type. The only suggestion of this sort which has been contemplated in modern times is that of Ashbee (1978:81) who regards the long barrows of southern Britain as fana or "ritual edifices with foundation deposits dedicated to soil or animal fertility". Ashbee cites the many instances where occupation debris has been found in the chambers of megalithic tombs to support this suggestion. Occupation debris is not exactly the same as undisturbed soil, but the principle, that of a monument to fertility manifested by proximity to a favoured type of soil material, is the same. However, in the lack of any evidence to support or confirm the idea of the chambered cairns of Orkney being monuments to fertility, consideration of this possibility will be deferred.

One more likely explanation is afforded by the second possibility mentioned above, that of the significant distribution of cairns with respect to soil type being a transferred result due to cairns being located on or near land chosen by the builders for a purpose not directly connected with the cairns. The most obvious such purpose is agriculture.

It has been established that the people of the cairns engaged in pastoral and arable agriculture. The scale of agrarianism is a matter for debate but it is probable that domesticated animals were relatively more important than domesticated plants and that agriculture was complemented by hunting and fishing. Little is known about the requirements of land used exclusively for grazing animals but necessarily associated with arable cultivation is some method of tilling the ground, and, as pointed out in Chapter 7, evidence of ploughing by ard has been found associated with at least one early prehistoric settlement site in Orkney (plate H). Fertility is a requisite for cultivation: a certain minimum level of fertility, perhaps sustainable by manuring or periodic abandonment, is required before soil can be used to grow crops. Thus it might be expected that Neolithic agriculture would take place on soils which are not intrinsically infertile and which are easy to till.

The most fertile soils of Orkney today are the gley soils, commonly developed on glacial till and commonly found on low-lying ground. There is no doubt, however, that these soils (chief among them being the Thurso, Mousland, Gessan and Olrig series) have only become usable to farmers in recent centuries with the introduction of effective means of drainage. Moisture supply, which has been the single most influential factor on pedogenesis in Orkney, almost certainly rendered the gley soils uncultivable to the people of the cairns because these soils would have been permanently water-logged and physically difficult to plough. The next most fertile soils of Orkney are the podzols and peaty podzols. Although such soils are now reckoned to be comparatively infertile for arable crops (Fitzpatrick, 1974: 114), they have shown themselves in the past to be perfectly capable of sustaining large numbers of people: the island of Egilsay is dominated by podzols of the Bilbster series and by the Ulbster complex, whose main component is also Bilbster podzols, but in 1791 the minister believed "the soil is very good, and fit for culture" and the island, in area less than six square kilometres, supported no less than 210 individuals (OSA, 1978:198). Despite being less fertile than the gley soils, the podzols and peaty podzols of Orkney are adequate for growing arable crops and are very capable of sustaining the grazing of domesticated animals.

The argument being developed here is that the Neolithic inhabitants of Orkney were farmers and that the most suitable soil for them to cultivate, representing a compromise between ease of tillage and inherent fertility, would be the peaty podzols and podzols - the freely drained soils of the hydrologic sequence discussed in Chapter 2. Poorly drained soils, primarily gleys, were avoided.

The distribution of chambered cairns with respect to soils now takes on a greater significance. It has been noted that, in the vicinity of chambered cairns, podzols and podzolic complexes are over-represented while gleys are under-represented. One way of linking these observations with the previous argument is to conclude that chambered cairns were preferentially located on or near the cultivated fields (be they enclosed or unenclosed) of the cairn-builders.

As a conclusion, this statement might be challenged. The primary objection could come from our inexact knowledge of the relationship between arable farming and pastoral farming. It is suspected that the growing of crops was of less importance than the pasturing of animals in the economic cycle of the cairn-builders (Clarke, 1976), and yet the evidence seems to suggest a correlation between soils suitable for arable cultivation and chambered cairns. It is possible that land favourable to the growth of crops might also be best for grazing animals and thus the conclusion might be that chambered cairns were located on or near the farming land of the cairn-builders. This does not seem an unreasonable extrapolation but it would be strengthened by a more exact knowledge of the qualities of soil and hence the particular soil-types which would be favoured by Neolithic pastoralists.

The implications of chambered cairns being preferentially located in the midst of the contemporary farm lands are two-fold. Firstly it argues for each cairn being associated with a <u>particular</u> patch of farming land and perhaps also for each patch of farming land to be associated with a chambered cairn. Secondly, it argues for some symbolic link between the monument and the land: the behaviour of the cairn-builders showed that they were able to classify land and they desired to commemorate their classification by erecting a permanent building on favoured land.

The ramifications of these two implications are wide-ranging and require more discussion: they will be considered fully in a later chapter. The more descriptive conclusions of this section may be summarised as follows:

1. where there is a mantle of peat, there may be some chambered cairns which have been obscured.
2. the farmers of Neolithic Orkney preferred soils which were easy to work and freely drained: peaty podzols and podzols were favoured over gley soils.
3. given this last conclusion, there is a very high probability that chambered cairns were preferentially located on or near the farming land of the cairn-builders.
4. the first and third conclusions here apply irrespective of the structural design of the chambered cairn.

12.2.3. LAND USE CAPABILITY

A modern measure of the quality of land is provided by the Soil Survey's classification of Land Use Capability. This is an areal classification of land, largely based on a close examination of the soils, which attempts to define the maximum potential usefulness of land to agriculture. It is fully described in Bibby and Mackney (1977). For the purposes of this work, it is important that the Land Use Capability classification is assessed on the potential of land and not necessarily on its present, modern use. The grading depends on physical limitations which restrict the choice of crops or demand extra management. These limitations are intended to be invariable with respect to agricultural system (for instance, the degree of mechanised assistance available should not affect grading) and to economic system (for instance, the availability of modern transport and nearby markets should not affect the grading). The principal physical limitations on land use encountered in Orkney are wetness, soil limitations (described as shallowness, stoniness, texture and structure, and fertility), gradient, liability to erosion, and climatic limitations. Of these, only limitations of gradient are couched in explicitly modern terms, with various degrees of limitation being expressed by Bibby and Mackney (1977:6) in terms of the difficulty experienced by wheeled farm vehicles.

The Land Use Capability maps of Orkney were published late in 1981. Of the seven classes of land recognised in Britain, classes 1 and 2, the most favoured classes for agricultural potential, do not occur in the north of Scotland. The remaining classes, all found in Orkney, form a continuum of land with progressively more serious limitations. The classes are described as follows (1977: 3-4):

Class 3: land with moderate limitations that restrict the choice of crops and/or demand careful management.

Class 4: land with moderately severe limitations that restrict the choice of crops and/or demand careful management.

Class 5: land with severe limitations that restrict its use to pasture, forestry, and recreation.

Class 6: land with very severe limitations that restrict use to rough grazing, forestry, and recreation.

Class 7: land with extremely severe limitations that cannot be rectified.

Figure 12.9 illustrates the distribution of the five land use capability classes in Orkney. As can be seen, the land of classes 3 and 4 is largely restricted to lowland basins and coastal plains, while land of classes 5 and 6 is more likely to be found in upland areas. Table 12.10 displays the area of each land type to be found in each island groups. Of the 963 sq km in Orkney, one third is occupied by class 4 land with class 6 and class 3 land each occupying a further quarter of the land surface. The Mainland and Stronsay are the two islands potentially most useful to agriculture and Hoy contains the most area of land with very severe limitations.

Table 12.11 shows the distribution with respect to underlying land use class by cluster. Classes 4 and 5 predominate together accounting for 49 chambered cairns. Only 11 are located on class 3 land and 16 on class 6 land. To test if this distribution could have occurred with no design, the chi-square one sample test (Siegal, 1956: 47) was employed. The null hypothesis is that there is no association between the distribution of chambered cairns in Orkney and the distribution of land of different Land Use Capability classes. The significance level was set at 0.05.

The contingency table for the test, compiled from the right hand columns of Tables 12.10 and 12.11 is:

Class	Expected frequency	Observed frequency
Class 3	17.7	11
Class 4	25.2	25
Class 5	11.4	24
Class 6	18.7	16
Class 7	1.9	0
N.I.	1.1	0
Totals	76.0	76

For this contingency table, $\chi^2 = 17.3$. From tables (Fisher and Yates, 1963: 47) $\chi^2 > 11.07$ for five degrees of freedom and level of significance 0.05. In fact, there is less than one chance in a hundred that the observed distribution could have occurred had the cairns been located at random. Thus the null hypothesis is rejected and it can be stated that there is a high probability that the 76 known chambered cairns are not situated randomly with respect to Land Use Capability.

To see if the same result was obtained from the measurement of inexact classes, the total area of each Land Use Capability class within one kilometre of each chambered cairn was measured. The results are summarised in Table 12.12. A similar null hypothesis was tested, namely that there is no association between the distribution of chambered cairns by inexact classes and the distribution of land use classes.

The significance level was again set at 0.05. The contingency table for the chi-square test, compiled from the right hand columns of Tables 12.10 and 12.12 is as follows:

Class	Expected frequency	Observed frequency
Class 3	1113	842
Class 4	1580	1529
Class 5	720	1170
Class 6	1177	1220
Class 7	119	23
N.I.	75	0
Totals	4784	4784

For this contingency table, $\chi^2 = 503.0$. From tables (Fisher and Yates, 1963: 47) $\chi^2 > 11.07$ for five degrees of freedom and level of significance 0.05. The null hypothesis is massively rejected and it can be stated, in support of the previous conclusion, that there is a very high probability that the 76 chambered cairns are not situated randomly with respect to Land Use Capability.

One further test remains before these results can be interpreted - the analysis of variance by ranks (Siegal, 1956: 166) to determine if the two conclusions above apply equally to every typological cluster. The null hypothesis is that the samples represented by the different clusters were drawn from the same population or that there is no difference between clusters as far as their distribution with respect to Land Use Capability is concerned. The level of significance was set at 0.05. The ranked table for the test, compiled from Table 12.12 with scores standardised with respect to area of land within one kilometre of the members of each cluster, is as follows:

Class	Cluster I	Cluster II	Cluster III	Clusters IV-VI
Class 3	4	3	2	1
Class 4	1	2	4	3
Class 5	3	2	4	1
Class 6	2	3	1	4
Class 7	3.5	2	1	3.5
Totals	13.5	12	12	12.5

(Note that the class "no information" has been excluded from the test since it scores zero for every cluster, ranks equally for each cluster, and has no effect on the χ^2 statistic).

For this table, $\chi^2 = 0.18$. For three degrees of freedom and level of significance 0.05, the critical value for the rejection of the null hypothesis is 7.82 (Fisher and Yates, 1963: 47). The null hypothesis is thus accepted, and it can be stated that there is no difference between typological classes as far as distribution with respect to Land Use Capability is concerned.

The observations leading to the statistical correlations noted above are an under-representation of chambered cairns on land of class 3 and an over-representation of cairns on land of class 5. Immediately the close connection between the soil maps and the Land Use Capability maps is apparent: land of class 3 is commonly associated with gley soils and land of class 5 is commonly associated with podzolic soils and so these observations mirror the conclusions already cited with respect to soil. But those conclusions are not just confirmed: they are complemented by further examination of the meaning of the Land Use Capability classification.

Class 3 land is described as having "moderate limitations that restrict the choice of crops and/or demand careful management" (Bibby and Mackney, 1977: 3). In Orkney by far the most common of these limitations is wetness. The soils of class 3 land are only slowly permeable and the resultant water-logging leads to slow germination of plants, restricts the depth of rooting and results in poorly-developed and slow-growing crops. It is only by the installation and maintenance of drainage (such as has taken place on a large scale since the eighteenth century in Orkney) that such land becomes highly productive. It is interesting to speculate whether the third millennium bc inhabitants of Orkney were aware of the benefits of drainage and it is not impossible that some areas of gley soil were improved early in prehistory. But evidence of such improvement will be very difficult to recognise for two reasons. Firstly, the area of land so treated will certainly be small, and it is unlikely to be found by accident but only by a specific research project designed to locate Neolithic land improvement. Secondly, field drainage as a structural feature is particularly undateable: slab-built drains at Skara Brae are indistinguishable from field drains still in use today. Until positive evidence to the contrary is forthcoming the conclusion must be that the people of the cairns did not utilise class 3 land because such land has wetness limitations to cultivation and they did not take advantage of the improvements afforded by drainage.

Class 5 land is described as having "severe limitations that restrict its use to pasture, forestry, and recreation". (1977:4). The two most common limitations shown on class 5 land are limitations of soil and gradient. In Orkney soil limitations tend to be shallowness and inherent fertility: the podzolic soils are not deeply developed and are less fertile, due to leaching of minerals, than other soils. As has been demonstrated, this does not imply that all manner of crops have not been grown on Orcadian podzols, but rather that there are soils in the island-group which are inherently more fertile.

Limitations of gradient on class 5 land have likewise been unable to hinder the growth of a wide range of crops in the historic past. Land is not admitted to class 5 unless it has gradients largely below 20° (1977: 10). Before the age of mechanical ploughing, this range of gradient would not have seriously affected the ease with which cultivation could have been carried out: a foot-plough or animal-drawn plough is not hindered by a slope of 20°. It must also be borne in mind that the Land Use Capability map is published at a scale of 1:50000 and that gradient limitations are generalised: within every area of class 5 land there will certainly be small patches of relatively level ground large enough to support intensively cultivated fields.

This section on Land Use Capability has supported a statement made by Gordon Childe in 1942 about 14 chambered cairns on the island of Rousay, and has shown it to be true for all 76 cairns in Orkney. That statement, in the original paper, was

> "All the cairns mentioned stand on land now or recently cultivated, or on the border between arable and heath".
>
> (Childe, 1942: 141)

but has been consistently interpreted as saying that the chambered cairns of Rousay stand on land that is marginal. The word "marginal" has, in addition to Childe's meaning of "close to", acquired the meaning of "barely sufficient to sustain cultivation". In this sense, class 5 land is certainly marginal according to the needs of modern agriculture: Childe, in his seminal paper, anticipated the important results of the present discussions on soil and land use.

To summarise the discussion of Land Use Capability, the following conclusions have been reached

1. from our knowledge of Neolithic agriculture, it is probable that the people of the cairns preferred not to farm land whose major limitation is wetness: in Orkney this means they would avoid class 3 land in favour of land of classes 5 and 6, where the major

limitations tend to be of soil and gradient.

2. given the first conclusion, there is a very high probability that chambered cairns were located on or near the farming land of the cairn-builders.
3. the last conclusion applies irrespective of the structural design of the chambered cairn.

12.2.4. TOPOGRAPHY

The topographic configuration of a place is the shape of the land surrounding the place. As a locational factor for human activity it is rarely important in its own right, but the topography of a place frequently determines other attributes of the land surface which can be important in the spatial patterning of human activity, such as defensibility, visibility, and drainage.

As with all other attributes of location, topography is scale-specific; on the global scale all the chambered cairns of Orkney are located on the European continental fringe. Here the interest is in discerning differences and similarities of the topographic configuration of the land immediately around each cairn. This scale of interest might be designated "site-comparative" since the siting of each chambered cairn is to be compared with the siting of every other cairn.

The recording of topography is perhaps best achieved through the use of a contour map: the best sources are the appropriate 1:10000 Ordnance Survey maps referenced in Appendix A. During the course of field-work, it became apparent that the topographic information inherent in this map series was too specialised to make use of, and it was necessary to reduce the amount of information - to generalise topographic detail - before the location of the cairns could be discussed.

Accordingly, the site of each chambered cairn was assigned to a topographic unit. The units were chosen and named in the course of field-work as the landscape of Orkney became more familiar to the writer and each cairn was assigned to a topographic unit either retrospectively (with the aid of photographs, field-notes, and maps) or while in the field. There is a large element of subjectivity in landscape appreciation - this is one experiment which would not yield exactly the same results when carried out by another field-worker. The topographic units recognised were:

1. Valley bottom
2. Coastal plain
3. Terrace edge
4. Small island/peninsula
5. Hill slope
6. Hill top
7. Ridge top
8. Promontory end.

Only two of these units require explanation. In Orkney, and particularly in the islands of Rousay, Westray, and Hoy, the underlying geological structure has resulted in stepped hill-slopes, consisting of a series of terraces (plate M). These terraces may be level or may slope into the hill-side but between successive terraces there is invariably a steep, sometimes craggy, incline. Such terraces (the Norse-derived modern Orcadian word for the feature being "hamar") are a distinctive part of the Orkney landscape). Several chambered cairns, examples being Bigland Round (ORK 2) and Fitty Hill (ORK T5), are located on the edge of these terraces, close to the steep incline and frequently appearing on a sky-line when viewed from below.

Location on a small island was classified together with location on a peninsula using economic grounds. The criteria used were the size and agricultural viability of the land unit: if the small island or peninsula could not support a number of pre-Enclosure farms then there is a possibility that the people of the cairns travelled to the island or peninsula from their settlement elsewhere. Thus the three cairns on Holm of Papa Westray (ORK 21, 22, and T9), and Maesry (ORK 38) on the tidal peninsula of Start Point fall into this category, but the chambered cairns on Swona (ORK T14) and Fara (ORK 17) do not since both islands supported substantial populations into the present century. The largest and most productive land units included in this category are the peninsula of Els Ness (with the cairn of Quoyness (ORK 44)) and the island of Calf of Eday (with three cairns (ORK 8, 9, and 10)).

The results of this exercise are displayed in Table 12.13. This shows that the most common situation for the chambered cairns of Orkney is on a coastal plain, followed in descending order of frequency by hill slope, small island or peninsula, valley bottom and terrace edge. Perhaps the most significant conclusion to be drawn from this table is variety: chambered cairns were positioned in many different topographic units. When the empirical data is plotted on a map of Orkney, the only strong pattern to emerge is the lack of pattern. In some restricted areas, cairns in close proximity are located on different topographic units. For example, in the north of Eday, there are five cairns located on a coastal plain, a hill slope, and a hill top with two examples in a valley bottom. The south coast of Rousay is equally heterogeneous, with two cairns on the coastal plain, four on terrace edges, and one each on a promontory end and a hill slope.

Table 12.13 also shows the distribution by cluster of the eight topographic units. The data are insufficient to attempt analysis of variance but the two groups with a comparatively large number of cairns are not discernibly different from the distribution of all the cairns taken as a group. Clusters I, II, and IV-VI do not contain many cairns, but again the impression is of variety. The only observation which might tentatively be made is that the cairns of clusters IV-VI were not sited on coastal plains or terrace edges. The latter might conceivably be due to the limited spatial extent of terraces; they are more common in islands where there are no cairns belonging to clusters IV-VI. The absence of such cairns on coastal plains is perhaps more significant and is accentuated by their preponderance on high ground. It might also be noted that the two cairns of these clusters situated on a small island or peninsula (Holm of Papa Westray South (ORK 22) and Quoyness (ORK 44)) are associated with two islands, Papa Westray and

Sanday respectively, notable for their low-lying terrain and absence of high ground. Thus it is possible that cairns of clusters IV-VI (the Maes Howe type cairns) were preferentially located in certain singular positions. Because of the small number of such cairns, this conclusion will not be stated firmly, but it may be considered in the context of later discussions.

Therefore, only one statement may be drawn from this examination of topographic configuration:

1. the chambered cairns of Orkney were located in a variety of topographic positions.

12.2.5. VEGETATION

The land of Orkney has been fashioned by the hand of humanity; this is particularly so in the case of vegetation. As outlined in Chapter 2, it is likely that Orkney's vegetation experienced profound change at the coming of pastoralism, and has since then been constrained by the activities of farming.

Although statistics for individual crops do exist, there has been no general survey of the farming regime of Orkney since the Land Utilisation Survey of Britain published its report on the islands over 40 years ago (O'Dell, 1939). Their summary map is reproduced here as Figure 12.14 and shows the terrain divided into arable land; permanent grass; and heathland, moorland, and rough pasture. The distribution of arable land and grassland is largely conditioned by altitude, with little being found over 250' (76 m). Figure

12.3 is included to show that the farming land of the present century has a peripheral location except in the western Mainland where the central basin is also low-lying and in some of the north isles where the entire island is given over to agriculture.

The Land Utilisation Survey was not used in the present study because it is particular to the land use of the 1930s and makes no attempt to assess inherent land potential, unlike the Land Use Capability classification. However, an attempt was made to assess the modern vegetation in the immediate vicinity of each chambered cairn. A simple four-part classification was devised based on visible indicators of present-day land use, and the land around each chambered cairn was placed into one of these categories according to the vegetation at the time of inspection in the summers of 1980 and 1981. The four categories are:

Heathland: sparsely vegetated *Calluna* heath, commonly associated with high and exposed ground.

Unimproved pasture: land whose major plant species are grasses but showing no signs of enclosure, drainage, or ploughing.

Improved pasture: enclosed land with visible signs of improvement in the form of drainage or recent ploughing, currently under cultivated grass.

Arable: enclosed, improved, land currently under an arable crop.

Because cereal and root crops are grown in rotation in Orkney, the last two categories are not distinct: a field may be under grass one year and under an arable crop in the next. The agricultural economy of Orkney is largely based on the production of beef cattle and thus the area of land under an arable crop in any year is small in proportion to the area of improved pasture.

The distribution of the 76 chambered cairns in relation to these four categories of modern vegetation is shown in Table 12.15. The majority are located on unimproved and improved pasture. Only 16 cairns are located on heathland and only three on arable land. The heathland cairns include Kierfea Hill (ORK 26) and Bigland Round (ORK 2) on the island of Rousay, and Head of Work (ORK 18) and Wideford Hill (ORK 54) on the Mainland. The three cairns on arable land were the site of Burray (ORK 7), Ring of Bookan (ORK 45) and Wart of Kirbister (ORK T11). There appears to be no distinctive feature common to the heathland cairns or to the cairns on arable land. With no certain knowledge of the area covered by each vegetation type, it is not possible to comment with certainty on the number of cairns on each type, but the general impression is that there is little correlation between the distribution of chambered cairns and the vegetation of the present century.

When the cairns are considered according to cluster, little further information can be discerned. Table 12.15 shows that in each cluster the majority of cairns are situated on pasture land, and that no vegetation type has a greater number of cairns than the number on improved pasture.

Therefore, the only firm conclusion to be drawn from this examination of vegetation type is:

1. the distribution of present-day vegetation does not appear to be correlated with the distribution of recognised chambered cairns.

12.2.6. <u>ALTITUDE</u>

The land of Orkney rises from sea level to a maximum altitude of 479 m at the summit of Ward Hill in Hoy. The highest point on the Mainland is 268 m at the Ward Hill of Orphir. In the north isles, Blotchnie Fiold on Rousay rises to 250 m but most of the islands are relatively low-lying with Stronsay, Sanday and North Ronaldsay between them having no point higher than 50 m above sea level. Table 12.16 displays the distribution of land by height classes, the classes having a vertical interval of 45 or 46 m (150 feet) and the measurement of areas being based on the Ordnance Survey 1:50000 First Series. This table shows that 598 sq km (62.1%) of the land of Orkney is below the 46 m contour, and that 873 sq km (90.4%) is below the 137 m contour. This information is also displayed in the first histogram of Figure 12.17.

The height above sea level of every chambered cairn was noted using the Ordnance Survey 1:10000 or 1: 10560 map series. There are no less than 14 cases where cairns are situated at an altitude of 5 m, which, given the accuracy of measurement possible, may be taken to mean that the cairns are at or very near to the altitude attained by the highest tides. The majority of cairns lie below the 46 m contour and there are only six examples of cairns above the 91 m contour, four of them on the island of Rousay. The highest cairn is Kierfea Hill (ORK 26) at an altitude of 180 m. The second histogram of Figure 12.17 shows this information visually and comparison with the histogram of areas within each height class suggests that the chambered cairns appear to be situated randomly with respect to altitude.

To test this last hypothesis, a statistical test, the Kolmogorov-Smirnov one-sample test (Siegal, 1956: 47) was selected. This test is more powerful than the chi-square test but was not used before because it requires continuous ranked data. The data obtained from ranking of altitude classes is ideally suited for such a test. The null hypothesis under examination is that the known chambered cairns of Orkney are located randomly with respect to absolute altitude above sea level. The level of rejection was set at 0.05. Using the information behind the construction of Figure 12.17 the data for the Kolmogorov-Smirnov test is as follows:

Altitude X	Area (%) under X	Expected cumulative frequency E(X)	Observed cumulative frequency O(X)	|E(X) - O(X)|
46	62.1	0.621	0.671	0.050
91	81.8	0.818	0.921	0.103
137	90.4	0.904	0.987	0.083
183	95.1	0.951	1.000	0.049
479	100.0	1.000	1.000	0.000

The test statistic for such a table is D = max $|E(X)-O(X)|$. In this case D = 0.103. For a sample of 76 the critical value at a significance level of 0.05 is 0.156 (Siegal, 1956: 251). The null hypothesis is thus accepted, and the conclusion is that, taking the 76 cairns as a group, that absolute height above sea level was not a significant locational factor.

Before considering a second measure of altitude, the differences between clusters might be noted. The first section of Table 12.18 demonstrates that cairns of cluster III are altitudinally distributed in a similar manner to the 76 cairns as a group. It also demonstrates that cairns of clusters I and II are located at a low altitude, with their mean heights above sea-level being respectively 25.0 m and 18.3 m (compared with 37.6 m for all 76 cairns). Finally, the cairns of clusters IV-VI are generally located at a high altitude, with a mean height above sea-level of 50.9 m.

Absolute altitude, as considered above, is not a completely satisfactory measure of altitude since it does not take into account differences in topography: the analysis above included Hoy, an island with an altitude range of 479 m, and Stronsay, an island with a range of 46 m. Another measure of altitude, one of relative altitude, is needed to minimise this difficulty.

The solution adopted was to express the height of each cairn in relation to the height of the ground in a circle around the cairn. The radius of the circle was set at one kilometre, this distance representing a compromise between a macro-scale approach (of which the analysis of absolute altitude is one extreme) and a micro-scale approach (of studying the ground within a few metres of the cairns, in which case there is seen to be no differentiation between sites). Thus the analysis of relative altitude is a meso-scale study linking the cairn to the neighbourhood within a few minutes walk. As such, it is not strictly comparable to the other analyses contained in this chapter.

The operational procedure was to note the extreme high point (H) and the extreme low point (L) within one kilometre of the cairn. The absolute altitude of the cairn (A) was then expressed as a percentage of the range between extremes. Thus the relative altitude (R) of a cairn is calculated:

$$R = \left(\frac{A - L}{H - L}\right) \times 100$$

The index R has a potential range from 0 (where the cairn is situated on the lowest ground for a kilometre around - often approached in coastal locations) to 100 (where the cairn is on the summit of a hill which is the highest ground within one kilometre).

Results are displayed in Figure 12.5. The potential range of R is largely exploited with extremes of 3 and 100. The cairns with the lowest relative altitudes are near neighbours: Knowe of Rowiegar (ORK 31) and Midhowe (ORK 37) with relative altitudes of 3 and 6 respectively. There are 11 cairns with relative altitudes of 100, and a full range of absolute altitudes are represented among them. Two cairns are situated on the summits of prominent hills: the eponymous Knucker Hill (ORK 33) in Westray and the Wart (ORK T17) on Hoxa Hill in South Ronaldsay. A number of cairns are situated on the highest points of low-lying small islands or peninsulas: these include Maesry (ORK 38) and Tres Ness (ORK 50) in Sanday, and the eponymous Holm of Huip (ORK 20) and Head of Work (ORK 18).

The histogram of Figure 12.19 has two prominent peaks. One is between 20 and 40 and the other is between 90 and 100. These could be interpreted as indicating a preference on the part of the cairn-builders for sites that were situated either at low relative altitudes or at very high relative altitudes. This impression is further elucidated if the relative altitudes are analysed by cluster. The second section of Table 12.18 shows considerable differences between clusters. The 76 cairns as a whole have a mean relative altitude of 50.5, close to the centre of the potential range. Compared with this, cairns of cluster I have a mean of 15.6, indicating a very low relative altitude, and cairns of clusters IV-VI have a mean of 61.1, indicating a high relative altitude. The cairns of clusters II and III appear to have low relative altitudes, but the highly skewed distribution of the statistics for cluster II show that in this, as in other respects, cluster II is a heterogeneous grouping.

When the results for both absolute and relative altitude are considered together, the following conclusions might be made:

1. Chambered cairns were located over the full range of absolute altitude and, taking the 76 cairns as a group, absolute height above sea-level was not a significant locational factor.
2. Cairns were located over the full range of relative altitude, but within this range, preference was given to positions of low or very high relative altitude.
3. The cairns of cluster I were located at very low relative altitudes; these locations are necessarily at low absolute altitudes.
4. The cairns of cluster II were located at low absolute and relative altitudes, but the pattern of distribution for these cairns is not consistent.
5. Altitude was not a significant locational factor in the positioning of the cairns of cluster III.
6. The cairns of clusters IV-VI were located at high relative altitudes.

The meaning of these results, as will be seen, may be linked to two conflicting objectives on the part of the cairn-builders. The first objective is two-fold: the desire to build the cairn in a place where building stone was readily accessible, and the desire to position the monument where it could easily be reached during its period of use. Both of these could result in the cairn being located at a low relative and absolute altitude, within easy reach of stone from the rocky shore (plate L) and on an accessible coastal plain. The second objective is the desire to build the cairn in a visually impressive location, either to ensure the monument is immediately apparent from all around, or to ensure the view from the monument is spectacular and all-encompassing. This second desire will obviously be better examined by studying the lines of sight around each cairn but it will simply be noted here that high absolute and relative altitudes will generally ensure a high degree of visual impact on the landscape.

12.2.7. VISIBILITY

The view from different points in the Orcadian landscape can vary considerably. From the highest point of an off-shore holm it may be possible to see for many kilometres in every direction. From the top of Wideford Hill, given good conditions, it is possible to see both Shetland and Scotland. Conversely, there are secluded valleys and deep geos where visibility is restricted to a few metres in every direction.

For a permanent monument, an intuitive impression might be that visibility from the site should be restricted as little as possible. To check this impression for the chambered cairns of Orkney a measure was taken at each location of the extent of visibility. (These measures were also used in the discussion of symbolic orientation in Chapter 15). The procedure adopted was to assign each sector of the compass to one of three visibility classes defined by the distance away of the most distant visible point. The three classes were designated as follows:

1. distant = visibility exceeding five kilometres
2. intermediate = visibility between five kilometres and five hundred metres

3. restricted: visibility less than five hundred metres.

These classes were chosen by experiment during field-work in Caithness and Orkney and were designed to partition the visible horizon into sections which are distinctive from each other and consistently recognisable throughout Orkney.

At this stage, the conclusion reached by pollen analysts about the absence of tall vegetation in the Orkney of five thousand years ago must be repeated: visibility readings taken today are a good approximation to conditions at the time of the cairns.

The operational procedure carried out in the field was to stand on the ground surface near to the entrance passage of each cairn (or on the cairn itself if the mound material obscured the view) and scan the horizon with a prismatic compass. The imaginary circle centred on the cairn was divided in plan into sectors of distant, intermediate, and restricted visibility. The number of these sectors varied from one to nine. For the purposes of this discussion, all sectors of distant visibility were added together to arrive at a sum total of degrees of distant visibility for each cairn. Likewise, sum totals of degrees of intermediate visibility and degrees of restricted visibility were computed for each cairn. Naturally, for every individual cairn, the three sum totals add up to 360 degrees. The raw data for these computations are contained in Appendix A.

The results are displayed in Figure 12.20 where, for instance, 10 of the 76 cairns have between 160 and 179 degrees of distant visibility (or slightly less than half the horizon is greater than five kilometres distant).

For distant and intermediate visibility, the distribution of sum totals extends throughout the potential range, from 0 to 360 degrees. There are four cairns which have no sectors of distant visibility: Bookan (ORK 4), Maes Howe (ORK 36), Stones of Via (ORK 48) and Unstan (ORK 51). These four are all located in the central basin of the west Mainland. At the other extreme, a few cairns have distant visibility in almost every direction: these include the cairns on the summits of Knucker Hill (ORK 33) and Vinquoy Hill (ORK 53). Seven cairns have no sectors of intermediate visibility including two on the terraces of south Rousay but only Maes Howe and Unstan have 360 degrees of intermediate visibility. The histogram for distant visibility in Figure 12.20 shows no distinctive pattern but the histogram for intermediate visibility exhibits a peak centred on 150 degrees indicating the inclusion of an extensive sector of intermediate visibility (between a third and a quarter of the horizontal panorama) in the view from a large number of chambered cairns.

The distribution of degrees of restricted visibility is markedly different. The range is smaller varying from 0 to 199 degrees. No less than 23 cairns have no sector of restricted visibility. Table 12.21 shows the mean number of degrees of restricted visibility is 89, compared with 137 and 132 respectively for distant and intermediate visibility.

The conclusion may be that locations with restricted visibility were less desirable to the cairn-builders.

Table 12.21 also displays relevant statistics for the cairns divided into clusters. The only point to note here is that the low absolute altitude of the cairns in cluster I is associated with a low mean of distant visibility. The remaining panorama from these cairns is not equally distributed, but rather contains large sectors of intermediate visibility such that the mean number of degrees of intermediate visibility from cluster I cairns is 217. Again this emphasises that locations with much restricted visibility were less favoured.

Two conclusions might be made from this section:

1. the chambered cairns of Orkney were not located in places with extensive sectors of restricted visibility.
2. cairns were located in places with extensive areas of intermediate visibility.

The interpretation of these conclusions leads to one positive statement, one tentative statement, and an ambiguity. The positive statement is that the cairn-builders favoured visually impressive places - singular positions - and avoided places with unimpressive views or panoramas. The tentative statement is that the cairn-builders made an association between each cairn and extensive areas of land less than five kilometres distant. That is, there was some close connection between each cairn and its immediate hinterland. The obvious connection is that the cairn-builders lived on, or used, the land within easy walking distance of the cairn. This supports statements made above about chambered cairns being located on or close to the farming land of the cairn-builders.

The ambiguity arises because of the unformed nature of the concept "visibility" as used here. There are two facets contained in the concept, facets which might be described as "visibility from" and "visibility to". The technique used here has described "visibility from" each cairn to the surrounding landscape and might be justified as a locational factor worthy of study because of the possibility of activities at the cairn requiring a wider back-cloth. Such activities might include observation of the sky or contemplation of the landscape. The same technique is an inadequate measure of "visibility to" the cairn from the surrounding landscape because it assumes complete reprocity of vision (if A is visible from B then B is visible from A). Criticism has already been made in Chapter 5 of Davidson and Renfrew's attempt to measure "visibility to" by taking readings at the cairn - the focus of "visibility to" - but no better method is suggested here which would not involve an inordinate amount of labour. Nevertheless, "visibility to" is clearly a proper avenue of enquiry because of the possibility that it was necessary to view the cairn from a defined and limited area of land. All that can be salvaged from this ambiguity is the opinion of the writer that the method used to measure "visibility from" is, although not completely satisfactory, at least a surrogate measure of "visibility to".

12.2.8. DRAINAGE

The results of locational enquiry into soil and land use capability have already strongly suggested that cairns were located in close proximity to freely drained land. To test if this correlation can equally be applied to the actual sites of chambered cairns, an attempt was made to assess the drainage conditions in the immediate vicinity of each site. "Immediate vicinity" is interpreted as within one hundred metres of the cairn: this is a micro-scale analysis of cairn location.

Three qualitative categories were propounded:

1. Good drainage: location on a concave, moderate, slope with no indication of inundation in the past or present.
2. Fair drainage: location on a moderate slope or level ground with some indication of potential inundation. Sites close to the shore in danger of being swept by the waves or spray were also included in this category.
3. Poor drainage: location on level ground with high potential of inundation.

The results of this analysis are outlined in Table 12.22. This table clearly indicates that a large majority of cairns are sited on areas of good drainage. Only 12 cairns are sited on areas of fair drainage and half of these fall into this category because of proximity to the sea-coast. Six sites, including Maes Howe (ORK 36), are on areas of flat ground now used for intensive agriculture.

Only one cairn is sited in an area of poor drainage and there are some signs that the drainage régime of this area has been altered in modern times. This single cairn is Huntersquoy (ORK 23) in the central valley of northern Eday. The cairn stands in an area of marshy peat vegetation and at the time of excavation in 1937 (Calder, 1938: 198) and also at the time of two visits in June 1980 and May 1981, the lower chamber of Huntersquoy was flooded. It is unreasonable to suppose that the chamber was constantly flooded during its prehistoric use, and examination of the surrounding terrain (part of which is described as "Eday North" in Chapter 11) suggests that the subsurface water table has been artificially altered in the modern past. Specifically, a dam has been constructed to the west of Carrick House 850 m to the north-north-west of Huntersquoy, presumably to drive a corn-mill. This would have had the effect of raising the local water-table, perhaps enough to permanently flood the subterranean chamber. Thus the single instance of an Orcadian chambered cairn in an area of poor drainage is seen to be the result of landscape change since the time of the cairns.

Differences between clusters are not great. The only point worthy of note in Table 12.22 is that three of the five cairns in cluster I are sited on areas of fair drainage. Although this observation is not significant enough on its own to merit a positive conclusion, it is clearly associated with the low relative altitude of these cairns and confirms that their location does not conform to the same pattern as the cairns of other clusters.

In summary, only one conclusion can be drawn from this discussion of drainage in the immediate vicinity of chambered cairns:

1. the cairns of Orkney were preferentially located in areas of good drainage.

12.2.9. APPROACHES

Although it has never been suggested that chambered cairns are located in positions which are difficult to approach on foot, the existence of two or perhaps three sites with signs of external earth-works (Maes Howe (ORK 36), Ring of Bookan (ORK 45) and the Wart, Hoxa Hill (ORK T17)) is enough to test for the possibility that some cairns may have been built in positions which were deliberately inaccessible. Conceptually, two meanings could be attributed to such locations: the desire to attain a strong defensive position against physical attack, or the desire to reach the cairn only after completing an àrduous journey.

As each cairn was visited, the approaches to each site from several hundred metres in every direction were assessed and placed into one of three categories:

1. easy: the approach from every point of the compass involves no physical exertion - it is a comfortable walk to reach the cairn from every direction.
2. restricted: although the approaches are generally easy, there is one direction where some

physical exertion is required - barriers which restrict access are generally steep slopes or rocky outcrops.

3. difficult: the approach from all points of the compass is restricted and some physical exertion is a necessity in order to reach the cairn.

The results of this exercise for the 76 cairns are shown in Table 12.23. Very clearly, cairns are preferentially located in positions which have easy approaches. There are no examples of monuments which are difficult to approach and only nine examples with restricted approaches. The majority of cairns, 67 of the 76, are located in positions which are easy to approach.

The nine monuments with restricted approaches all fall into one of three topographic situations. Five cairns - Bigland Round (ORK 2), Blackhammer (ORK 3), Iphs (ORK 24), Knowe of Ramsay (ORK 30), and Knowe of Yarso (ORK 32) - are sited on terrace edges with a precipitous slope within a few metres. Two cairns - Knucker Hill (ORK 33) and Withebeir (ORK 55) - are sited on hill tops, and two - Cuween Hill (ORK 12) and Kierfea Hill (ORK 26) - are sited on steep hill slopes. In none of these examples, except possibly the two on hill tops, are the cairns in locations which could be termed "strong" in the conventional defensive sense.

Table 12.23 also shows the distribution of types of approaches according to cluster. No difference is discernible between clusters and the two cairns with restricted approaches on hill tops do not fall into the same cluster.

In summary, one conclusion can be drawn from this analysis of approaches:

1. the chambered cairns of Orkney were generally located in positions which are easy to approach.

12.2.10. COASTS

To be an Orcadian is to live in close communion with the sea and the coast, and this communion may have bearing, even today, on any activity. Accordingly, the relationship between the location of the 76 chambered cairns and their neighbouring coast-lines was examined. The distance in a straight line to the nearest shore was measured, and the nature of that shore was described. These observations are made applicable to Neolithic Orkney by the conclusion of Chapter 2 that only local changes in land and sea relationships have taken place since the third millennium bc.

The first observation to be discussed is the distance in a straight line to the nearest shore. These measurements were made to the nearest ten metres from the Ordnance Survey 1:10560 and 1:10000 map series. (The large inland lochs of Stenness and Harray were regarded as being equivalent to sea areas for this purpose). Slightly less than half of the cairns (34 out of the 76) are situated within 200 m of the nearest shore and only five cairns are more than 1200 m from the shore. The complete range is from 0 m (in the case of three cairns which are actively eroding into the sea) to 2220 m (in the case of Holy Kirk (ORK T2) in the parish of Sandwick). This distribution is highly coastal, an observation supported by use of Fojut's "curve of littorality" (Fojut, 1980: volume 2, 39 and 50-51).

A curve of littorality was constructed for Orkney by taking a 200-point randomly stratified sample of locations within the island-group and measuring the distance from each location to the coast. Figure 12.24 shows this curve of littorality with the number of points standardised to 76. By plotting the data on log-normal paper, the curve approximates to a straight line. Figure 12.7 also shows the distribution of the 76 chambered cairns with respect to distance to the nearest coast. Visual inspection shows that the modular gradient of the straight line of best fit through the random points is less than the modular gradient of the straight line of best fit through the points representing chambered cairns. Thus chambered cairns have a more coastal distribution than would be expected were they randomly distributed over Orkney.

The interpretation of this result is not profound. In any island-group, the shore is a focus of activity for almost every human pursuit. Almost certainly, the same result would have been obtained for the distribution of any human artefact in Orkney, from fields to telephone boxes. Inland locations are avoided because they tend to be high, barren, and inaccessible in comparison to the coastal fringe.

Thus the coastal location of chambered cairns is simply a reflection of the coastal location of human activity, and suggests that the cairns were involved in every-day life.

Table 12.25 shows the statistics for distance to nearest coast broken down by cluster. The only observation of note from this table is that the cairns of clusters IV-VI are, on average, located further away from the coast than other cairns, with a mean distance of 684 m compared with 465 m. This observation is undoubtedly associated with the high values of absolute and relative altitude for these cairns.

The second attribute of the coast to be discussed here is the nature of the nearest shore to each chambered cairn. Mather, Ritchie, and Smith (1975), in an article based on the work of the Beach Survey of Orkney, identified three distinct elements in the coastline:

1. high cliffs: coastlines with cliffs in excess of 15 m, accounting for 142 km or 18% of the Orkney littoral.
2. beaches: sand or shingle coastlines, accounting for 90 km or 11% of the shore.
3. low rock shores: low cliffs or cliffless rocky coastlines, being by far the most common coastal type with 561 km or 71% of the littoral.

The distribution of these three types is shown in Figure 12.26. It is apparent that high cliff coastlines are concentrated on the western sea-board of Orkney and that the north isles, and in particular Sanday and Stronsay, have a concentration of beach coastlines.

The nature of the nearest coast to each of the 76 chambered cairns was noted (Figure 12.27). Only one cairn, Onziebist (ORK T3) in Egilsay, is nearest to a beach. High cliffs are the second most common nearest coastal type with 22 examples but the great majority of cairns are located closest to low rock coasts. To explore the possibility that one of the three coastal types was preferred by the cairn-builders, a chi-square one sample test was employed. The null hypothesis is that there is no association between the distribution of chambered cairns in Orkney and the distribution of coastal types. The significance level was set at 0.05. The contingency table for the test is:

Coast	Length (%)	Expected	Observed
High cliff	18	13.6	22
Beach	11	8.4	1
Low rock	71	54.0	53
Totals	100	76.0	76

For this table, $\chi^2 = 11.73$. From tables (Fisher and Yates, 1963: 47) $\chi^2 > 5.99$ for two degrees of freedom and level of significance 0.05. In fact, the null hypothesis could be rejected even at the 0.01 level of significance. Thus it is stated that there is a high probability that the known chambered cairns of Orkney are not distributed randomly with respect to nearest coastal type. Furthermore, examination of the contingency table reveals that high cliff locations are over-represented, and beach locations are under-represented. This latter observation does not support Davidson's conclusion that it was important for the cairns of Rousay to have access to a beach (Renfrew, 1979: 18), but a comparison of his map of coastal types (Figure 2.5) with that of the Beach Survey (Figure 12.26) reveals a different definition of "beach". Davidson's "beaches" all fall in the Beach Survey's class of "low rock" shores. The "beaches" of the Beach Survey are major, large-scale, beach systems: the present conclusion must be altered to say that chambered cairns are not located in positions where the nearest coast-line is a major beach system.

A possible explanation as to the nature of the nearest coast being of importance to the cairn-builders is that access by sea to each cairn was considered during the location decision. That is, if easy access by sea was desirable, then the nearest coast would be one on which a landing by small sea craft could be easily effected. Conversely, if it was desirable to make access by sea difficult, then the nearest coast might be a difficult landing place. In Orkney, it became apparent by practical experience during the course of field-work, that there are few places where it is impossible to land a small boat, and that the order of difficulty is more often decided by the state of tide and current than by nature of coast. The only places where access to the land from the sea might be difficult are those designated by the Beach Survey as having cliffs in excess of 15 m. As noted above, there are 22 chambered cairns with high cliffs as their nearest coastal type and this number is larger than would be expected by chance. It is thus conceivable that the cairn-builders preferentially located their monuments so as to ensure that access by sea would be difficult.

This result allows for no simple interpretation and is entered here with no explanation. As always it should be borne in mind that any statistical correlation between variables allows for other explanations than a causal connection between the variates.

Table 12.27 also shows the distribution by cluster of the nature of the nearest coast to each cairn. This demonstrates that, for every cluster, the distribution is similar with low rock being the most common nearest coast, followed by high cliff and beach coasts.

In summary, the following conclusions can be made concerning the location of chambered cairns with respect to the coast:

1. As a group, the cairns of Orkney have a pronounced tendency to be close to the coast: this is seen as a reflection of the coastal location of the human activity in in island-group.
2. High cliff coastlines were preferred over major beach systems as the nearest coastal type.
3. These conclusions apply irrespective of the structural design of the chambered cairn.

12.3. A MULTIVARIATE APPROACH

12.3.1. INTRODUCTION

Human decisions are rarely made on the basis of a single factor: we arrive at decisions through the ordering of many acknowledged, and unacknowledged, influences. We impose order on a complex net of connected ideas, beliefs, and structures. To attempt, then, to isolate single factors is to invent single factors. This is the weakness of the univariate approach.

As practised above, a univariate analysis has isolated several factors of location each of which has been interpreted without reference to any other. Such multiple interpretations are a useful way of encompassing vast amounts of information but can never pretend to be a copy of the interpretation placed on the landscape by the cairn-builders. One way to approach this interpretation - to reconstruct the actions of the cairn-builders in their landscape - is to consider all the isolated factors of location together and to reduce their complexity into a very few composite factors.

Factor analysis is one method of doing this. This technique is a numerical procedure for transforming a very large amount of data into a small amount of data while retaining most of the information contained in the original data. Computationally it is very complicated and is usually performed using a machine, but conceptually it is simple and elegant.

In reality, there are a number of techniques, known by the generic name of "factor analysis", of which Principal

Components Analysis is one example. It was chosen for use here because it is essentially a hypothesis-seeking method - in the initial stages it includes all the variance in each variable and does not discard some variance for the sake of greater clarity according to some immediately apparent pattern. Since we have imperfect knowledge of the composition of the data in this problem (in common with most historical problems), Principal Components Analysis was thought to be the most appropriate form of factor analysis.

Certain formal assumptions must be satisfied before the Principal Components Analysis can proceed. The first of these is that the population distribution of each variable must not be very different from a statistically normal distribution. In the case of location, some variables (such as absolute altitude and distance to coast) are skewed, but there are no theoretical reasons why the underlying population of each variable should be excessively skewed, multi-modal, or truncated. A more important assumption is the linearity of the correlation between any two variables. The applicability of the general linear model is a complex issue and one which has profound implications in the philosophy and ideology of explanation (Johnston, 1978). Rather than becoming excessively involved in this issue, it is here assumed that Principal Components Analysis is applicable to the given archaeological data. In the sequel it will be shown that the use of the procedure aids our understanding of the location of chambered cairns: this is perhaps significant justification in itself for using Principal Components Analysis.

A brief description of Principal Components Analysis will inevitably be incomplete and inaccurate, but before discussing the results of such analyses, it is essential to outline the mechanics of computation so that the results are not regarded as a deus ex machina. This outline is best couched in geometric terms.

We begin with a data matrix containing n variables and m observations. The variables are considered as vectors (directed line segments) in n-dimensional space. These vectors are arranged so that the correlation between every two variables equals the cosine of the angle between the equivalent vectors. By a variety of computational devices, the vectors are replaced by another set of n vectors, called factors, which contain all the information contained in the original vectors. The factors are all perpendicular to each other which means that they are all independent of each other (since cos $90^{\circ} = 0$). This geometric representation is understood to have a n x n data matrix behind it, with each variable having a loading for each factor. The sum of the n squared loadings for each variable is the communality of that variable and states the amount of variance in the variable contained in the factor solution. This is always equal to 1.0 for a Principal Components Analysis because no information has been discarded. The sum of the n squared loadings for each factor is the eigenvalue of that factor and states the amount of variance in the original data containe(

in the factor. Thus any factor with an eigenvalue greater than 1.0 contains more of the problem variance than any single one of the original variables. It is these factors we are interested in, and other factors are not considered further. Thus the original n variables are reduced to a very few factors which contain a large proportion of the information contained in those original variables. The important factors are then translated into verbal statements by means of the loadings of each variable.

It is important to realise that Principal Components Analysis is only a mechanical ordering device, and it should not be used without an understanding of the derivation of the original data matrix. To be explicit, archaeological knowledge and experience are needed in three stages of the procedure:

1. the selection of observations (choosing the 76 chambered cairns)
2. the selection of variables (choosing variables of location)
3. the interpretation of factors (writing about the results).

12.3.2. PRINCIPAL COMPONENTS ANALYSIS: PRELIMINARIES

The objective is to look for common patterns in the location of the chambered cairns of Orkney. The choice of sites to consider has been comprehensively discussed: the number of chambered cairns is 76. The variables of location to be used will be the same variables discussed in the univariate analysis with the single constraint that they must be measured in continuous rather than categoric form. This constraint can be largely mitigated by the construction of dummy variables, for which measurement by inexact classes (Appendix E), is ideally suited. Twenty-two variables were entered into the analysis. They are here tabulated with their five-letter labels and short descriptions (in every case "area" is understood to mean "the percentage area within a radius of one square kilometre of the cairn"):

1. WATER (Water area): the area of sea and lochs
2. GEOSS (Geology - sandstone): the area of Old Red Sandstone not covered by superficia deposits
3. GEOPT (Geology - peat): the area of peat as defined by the published geological maps
4. GEOBC (Geology - boulder clay): the area of boulder clay
5. GEOMI (Geology - miscellaneous): the area of miscellaneous geological deposits
6. SOIPZ (Soil - podzols): the area of podzols
7. SOIPC (Soil - podzolic complexes): the area of podzolic complexes
8. SOIGL (Soil - gleys): the area of gley soils
9. SOIGC (Soil - gleyic complexes): the area of gleyic complexes
10. SOIPT (Soil - peat): the area of peat as defined by the published soil maps
11. SOIMI (Soil - miscellaneous): the area of miscellaneous soil deposits
12. LUCC3 (Land Use Capability Class 3): the area of class 3 land

13. LUCC4 (Land Use Capability Class 4): the area of class 4 land

14. LUCC5 (Land Use Capability Class 5): the area of class 5 land

15. LUCC6 (Land Use Capability Class 6): the area of class 6 land

16. LUCC7 (Land Use Capability Class 7): the area of class 7 land

17. ALTAB (Altitude - absolute): the absolute height above sea level of the cairn

18. ALTRE (Altitude - relative): the relative altitude of the cairn

19. COAST (Distance to coast): the distance from the cairn to the nearest coast

20. VISID (Visibility - distant): the number of degrees of distant visibility from the cairn

21. VISII (Visibility - intermediate): the number of degrees of intermediate visibility from the cairn.

22. VISIR (Visibility - restricted): the number of degrees of restricted visibility from the cairn

Of the 22 variables, four are concerned with geology, six with soil, five with land use capability, two with altitude, three with visibility and aspect, and two (WATER and COAST) with relationships to water.

In the final data matrix, there were no missing values.

Of the 1672 entries, only three - the visibility figures for the unvisited site of Onziebist (ORK T3) - were estimated.

The Principal Components Analysis was performed at the University of Glasgow on an ICL 2976 using the program package SPSS, Version 4.2 (IBM Release 8.1). This suite of programs is documented in Nie et al. (1975) and Hull and Nie (1979).

12.3.3. PRINCIPAL COMPONENTS ANALYSIS: RESULTS

The means and standard deviations of each of the 22 variables are displayed in Table 12.28. Many of these have been discussed during the course of the univariate analysis.

The procedure begins with the production of a table of correlation coefficients showing the degree of association between each pair of variables. This table was checked for high correlations. Of the 231 pair-wise correlations, only three were numerically greater than 0.70, and these three associations are readily explained. The correlation between GEOPT and SOIPT is 0.82: both variables are measuring area of peat and any difference is due to the different definitions of peat used by the Geological Survey in the 1880s and by the Soil Survey in the 1970s. These definitions are very similar and it is to be expected that the two peat variables should be highly correlated. The correlation between WATER and COAST is -0.77 indicating that area of open water within one kilometre of the cairns decreases as distance from the shore increases. Again, this is an expected result. Finally, the correlation between WATER and GEOSS is

-0.75 indicating that the area of open water and the area of sandstone with no overlying deposits within one kilometre of the cairns vary in inverse proportion. Since sandstone is by far the most common geological type (as indicated in Table 12.28), this result is not a surprise.

Twenty-two orthogonal factors were imposed on the matrix of correlation coefficients and its inverse, with the communality of each variable assumed to be unity. Thus no information is discarded at this stage of the procedure. The eigenvalues and the amount of variance "explained" (in the statistical sense) by each factor are displayed in Table 12.29. Eigenvalues range from 5.16 downwards but only seven of the 22 factors have eigenvalues in excess of 1.00. These seven factors, each explaining more of the variance in the data than any single one of the variables, together account for 78.2% of the total variance. Thus by considering just these seven factors, the complexity of the problem has been reduced by two-thirds while only discarding one-fifth of the variance. Table 12.30 shows exactly which variance has been discarded: variable LUCC7, a very minor variable, has lost half its variance, but every other variable has retained greater than 60% of its original variance.

Table 12.31, the loadings matrix for the seven factors, is the crux of this analysis. Each factor will be interpreted separately. Note that the eigenvalues for each factor are a measure of that factor's relative importance.

Factor I (Eigenvalue 5.16): This factor has a very high negative loading on WATER and very high positive loadings on COAST, ALTAB, and GEOSS. It also has high positive loadings on LUCC5, LUCC6, and VISIR. In descriptive terms, the single most important combination of variables which determines the location of the known chambered cairns of Orkney is: small area of water within one kilometre; high distance from the coast; high absolute altitude; large area of sandstone lacking superficial deposits within one kilometre; large areas of class 5 and class 6 land within one kilometre; and restricted visibility. Thus a typical chambered cairn might be situated some distance from the shore, near the top of a hill but with the slope blocking an all-round panorama, with building stone easily accessible, and on or very close to, land not now considered suitable for agriculture. Many of these characteristics were included in Gordon Childe's model of chambered cairn location for the island of Rousay published in 1942. The first factor adds to this model the importance of restricted visibility and accessible building stone and extends its validity from a single island to the island-group in its entirety. Should validation of the use of factor analysis be needed, the loadings on this primary factor are adequate proof that the technique is as powerful (and indeed much more powerful since we still have six factors to interpret) as methods which have been used in the past.

Factor II (Eigenvalue 3.07): This factor has very high positive loadings on GEOBC and LUCC3, and high positive loadings on LUCC4, SOIPZ, and VISII. In descriptive terms, the second most important combination of location variables is: large areas of boulder clay within one kilometre; large areas of class 3 and class 4 land; large areas of podzols; and extensive sectors of intermediate visibility. Thus another typical situation for an Orcadian chambered cairn might be on good farming land of the present day with podzolic soils developed on glacial till, and extensive views of land within five kilometres. This is a formulation which contrasts in some ways with the Childean model, but many cairns (the most obvious being Maes Howe and Quanterness) are indeed in this kind of situation: the formulation is intuitively satisfactory.

Factor III (Eigenvalue 2.33): Two very high negative loadings contribute to the high eigenvalue of this factor and both, on the variables SOIPT and GEOPT, are measures of peat cover. This indicates that an important part of the variance noted in the location of the 76 chambered cairns recognised by this thesis is accounted for by low areas of peat cover within range of the cairn: a typical location is away from the peat areas of Orkney. As discussed in the univariate analysis, this is most reasonably attributed to the obscuration of chambered cairns by the growth of peat in later prehistoric times. The singularity of this obscuration element is emphasised by Factor III which has very high loadings on both peat variables, and on no other variable.

Factor IV (Eigenvalue 1.97): The fourth most important factor has high positive loadings on ALTRE and VISID: in descriptive terms, it emphasises the desirability of high relative altitude and large sectors of distant visibility. Thus another element of the location of the cairns of Orkney is to favour high positions with distant panoramas.

Factor V (Eigenvalue 1.77): This factor has a very high positive loading on SOIMI and a high positive loading on GEOMI with a high negative loading on SOIPC, indicating large areas of miscellaneous soils and geological types within one kilometre of the cairn, associated with small areas of podzolic complexes. The single most common terrain type which falls into the miscellaneous categories is blown sand with skeletal machair soils, and factor V is perhaps best interpreted as indicating a preference for cairns to be situated close to the rich pasture of these machair areas.

Factor VI (Eigenvalue 1.65): Only one variable, SOIGC, has a significant loading on this factor, and that loading is negative. This confirms that cairns were preferentially located away from gleyic complexes.

Factor VII (Eigenvalue 1.24): Like factor VI, this factor has a high negative loading on just one variable, VISIR. This implies a general preference for location in positions where there are no extensive sectors of restricted visibility.

12.3.4. PRINCIPAL COMPONENTS ANALYSIS: CLUSTER THREE

Having performed a factor analysis on the complete data matrix, the next most obvious step is to follow the same procedure for the smaller data matrices representing each cluster of cairns. Unfortunately, the small number of observations contained in cluster I means that the appropriate data matrix would contain five observations by 22 variables. A computer will perform a factor analysis on a matrix of these dimensions but it is conceptually unsound to perform an R-mode analysis of this type when the number of variables exceeds the number of observations (Johnston, 1978: 181). Thus, Principal Components Analysis is precluded for the cairns of cluster I, and also for the cairns of cluster II and clusters IV-VI. In any case, because certain variables score zero for every member of some clusters (for example, the value of LUCC7 for all five cairns of cluster I is zero), the correlation matrix cannot be inverted and the factor analysis will not be completed. Such variables could be omitted from the analysis, but the results would not be strictly comparable between clusters. Cluster III, with 25 observations by 22 well-formed variables, is the only cluster on which a Principal Components Analysis is a valid operation.

Twenty-two orthogonal factors were imposed on the data with the results outlined in Table 12.32. Six factors have eigenvalues in excess of 1.00, together accounting for 81.7% of the original variance. Table 12.33 shows that the six-factor solution accounts for only 52% of the variance of GEOMI and 65% of that of ALTRE, but for greater than 70% of the variance contained in every other variable.

Table 12.34 is the matrix of factor loadings for the six-factor solution. As the following interpretations show, there is a high degree of similarity between the factors present in the location of all cairns and in the location of the cairns of cluster III. However, the relative importance of the factors reveal a critical difference between the cairns of cluster III and other cairns. The interpretations of the factors shown in Table 12.34 is as follows:

Factor I (Eigenvalue 6.17): This factor has a very high negative loading on WATER, very high positive loadings on GEOSS, COAST, ALTAB, LUCC6, LUCC7, and SOIPC, and a high positive loading on LUCC5. Certainly, this corresponds to Factor I of the all-cairn solution and shows that the major thrust of location among the cluster III cairns, accounting for over a quarter of the total variance, is towards the Childean model.

Factor II (Eigenvalue 3.14): With very high negative loadings on SOIPT and GEOPT, this factor corresponds to factor III of the all-cairn solution, and may be attributed to obscuration of chambered cairns by peat growth.

Factor III (Eigenvalue 2.91): This factor has a very high positive loading on GEOBC and high positive loadings on SOIPZ and LUCC5. Inasmuch as any of the cluster III factors correspond to factor II of the all-cairn solution, then this factor should be regarded as such. The factor is, however, more diffuse, with many variable loadings contributing to its high eigenvalue.

Factor IV (Eigenvalue 2.40): Corresponding to factor V of the all-cairn solution, this factor has high positive loadings on SOIMI and GEOMI, and may be due to a preference for location close to machair land.

Factor V and Factor VI contain no high loadings which allow of reasonable explanation and are here left with no interpretation.

12.3.5. SUMMARY

The multivariate approach has revealed certain patterns and associations in the collected data on location which were not readily apparent using a univariate approach. The most significant pattern is the identification of two different types of location. The first two conclusions from this section are thus:

1. Some of the chambered cairns of Orkney, and the trend is particularly strong among the small round cairns with simple chambers of cluster III, were preferentially located some distance from the shore on a hillslope, on land now considered marginal for agriculture, and close to stone suitable for building. This is the classic Childean model, with some embellishment, and extended beyond the bounds of a single island.

2. Some of the chambered cairns of Orkney, and the trend is weak among the cairns of cluster III, suggesting that it is particularly strong among cairns of other sizes and shape, were preferentially located on land now reckoned to be good for agriculture with podzolic soils developed on glacial till, and with extensive views of the land within five kilometres.

In addition to these two major elements, the principal components analysis has revealed three other conclusions about the location of the Orcadian cairns:

3. The cairns of which we have knowledge are generally located away from areas of peat: it is suggested that this pattern is due to peat growth since the Neolithic period obscuring cairns from the view of the modern archaeologist.
4. Many cairns are preferentially located in high positions with distant panoramas.
5. Many cairns are preferentially located close to the rich pasture-land of machair.

PART FOUR

THE PEOPLE

CHAPTER THIRTEEN: THE BURIAL EVIDENCE

13.1. POSSIBILITIES OF THE EVIDENCE

When studying the people of Orkney in the third and second millennia bc, the first point of attack must be the physical remains of those people. Any argument concerning their extra-somatic activities or the nature of their society will be strengthened if it is supported by the evidence of their bones.

The archaeology of death has received much attention in the archaeological literature over the last two decades. The latest manifestation is the publication of an edited volume entitled The Archaeology of Death (Chapman et al., 1981). Many advances have been made in the two decades, especially in the fields of physical examination and interpretation of funerary remains, and in the reconstruction of social structure in death and life. It is not the purpose here to review advances in these fields, a task very adequately handled by Chapman and Randsborg (1981) in the introductory chapter to the above volume. Rather, it is the aim of this section to examine the possibilities which have been suggested by the recent research and to discuss their application to the evidence available from Neolithic Orkney.

The study of mortuary practices largely owes its recent expression to the work of Benford (1971) and to an unpublished dissertation by Saxe. These two recognised several "dimensions" of mortuary practice, or several ways in which the physical remains of dead people could be used to describe or explain the society of their living days. Most of these dimensions could be explored using evidence which has been gathered concerning Neolithic Orkney, and the rationale behind each dimension will be explored here.

Perhaps the most obvious dimension of mortuary practice is the number of people who are placed in the houses of the dead. Raw numbers can only ever suggest a minimum number of individuals who were placed in an area excavated by archaeologists, and that area is inevitably a very small part of the potential area in which a social group may have placed their dead. Nevertheless, if it is possible to make assumptions about the meaning of an archaeological site to the past society (and we shall see later that these kinds of assumptions have been made by Renfrew and others) then it may be possible to make statements about that society on the basis of raw numbers. The techniques for making an estimate of the minimum number of individuals in any context are well established: for example, the number of individuals cannot be less than the number of examples of a specific bone, such as the mandible, found in the context.

The second dimension is age. Physical anthropologists have long been able to determine the age at death of humans from study of their skeletons. An early paper by Genovès (1963b) set out four anatomical methods of determining biological age:

1. by dental eruption (the age at which teeth emerge)

2. by synostosis of the bones (the age at which complete union of the bones of pelvis, sacrum and skull takes place)
3. by epiphysial union of the bones (the age at which ossification of certain neighbouring bones takes place)
4. by changes at the articular surface of the pubic symphysis (the age at which certain characteristics of the pelvis become apparent).

A related dimension is <u>sex</u>. This, as with age, is relatively well understood by anatomists, and Genovès (1963a) again was one of the first to disseminate the relevant techniques to archaeology. Sex determination cannot be based on a single observation or measurement, but a combination of observations on more than one bone may be sufficient to determine if the individual was male or female. The significant bones suggested by Genovès are the pelvis, the skull and face, and the articular surfaces of the long bones.

A note of warning must be sounded about age and sex determination. All such observations are necessarily based on comparison with the anatomical details of known (and usually modern) populations. Genovès, in both of the articles cited above, points out that there is wide variation in anatomical characteristics within populations (two individuals of the same group may display different characteristics) and between populations (the average characteristics of one group may be different from those of another group). When we are dealing with a population about which we have no knowledge, such as a prehistoric group, then our assumptions about anatomical determinants of age and sex may not be appropriate.

A fourth dimension is pathology, or in the case of prehistoric populations, palaeopathology. By this is meant the study of disease or abnormalities which leave their physical traces in the bones of the dead. In some cases, such as trauma of the skull, the cause of death may be discerned. M.S. Goldstein (1963) lists some of the conditions which have been noted in ancient skeletons: these include congenital malformations and dislocations, scoliosis, mongolism, osteomyelitis, arthritis, tuberculosis of bone, syphilis, leprosy, and tumours of bone. A large literature also exists on the palaeopathology of teeth and jaws.

The fifth and sixth dimensions of mortuary practice to be discussed here relate to the condition and arrangement of human bone. The condition of bone deposited in burial places may be set out in a series of oppositions:

1. burnt/unburnt
2. bleached/unbleached
3. broken/unbroken
4. articulated/disarticulated.

The arrangement of human bone can vary in two ways. There may be spatial differentiation within an archaeological site, such as a horizontal cemetery or chambered tomb, which leads to certain areas being preferred over others for the deposition of remains. There may be spatial differentiation between archaeological sites of the same period. These two spatial differentiations may be expressed, not simply in numbers, but also in age and sex differentiation. Thus, for example, female infants may be placed in a specific compartment while aged males may be excluded from internment altogether. One further spatial differentiation is possible: the bones belonging to one individual may be deposited in different places according to some scheme. An example of this intra-somatic differentiation would be the dexter bones being separated from the sinister bones.

The condition and arrangement of human bone may enable the archaeologists to make certain statements about the society of which the bones are a material legacy. Firstly, and most immediately, it may be possible to infer some of the details of funeral activity. That is, it may be possible to detail the successive stages of physical condition that a body is subject to during the transition from death to final disposal. This in turn might enable statements to be made about the way in which the relatives and friends of the deceased regarded that transition, and hence about their ideas on the relationship between life and death. Secondly, the condition and arrangement of deposited bone may in some cases enable inferences to be made about social organisation. For instance, the social position of an individual in a hierarchical society may be reflected in the effort expended in his or her disposal. Again, it may be possible to make some deductions about the social affiliations of individuals and infer their membership of families, kinship groups or clans.

These, and other, possibilities are discussed in detail with reference to actual examples from five thousand years of pre- and proto- history in The Archaeology of Death and its precursors. Just one example of particular relevance to the Orcadian evidence will be discussed here: Chesterman's (1977) article in Man on the burial rites in a Cotswold long barrow.

Ascott-under-Wychwood is a trapezoidal long barrow about 50 m in length located between Oxford and Cheltenham in southern England (Figure 13.1). Its construction appears to date from the beginning of the third millennium bc. The area of human burial consists of two laterally-entered chambers, each with three compartments, about 15 m from the western or narrow end of the barrow. Recovered from the excavation by Benson were fragments of 4311 bones and 236 teeth. Chesterman was able to discern a minimum total number of 49 individuals with some details of age and sex as laid out in Table 13.2. Roughly equal numbers of males and females were found; many more adults were found than teenagers, children or infants.

The bone report on Ascott-under-Wychwood is of especial interest because Chesterman was able to suggest a sequence of burial rites associated with the deposition of human skeletal material in the long barrow. He postulates a sequence of four transformations undergone by the bone before the final sealing of the long barrow. These four transformations are:

1. excarnation. The body was deliberately laid aside and allowed to reduce by the natural processes of dissolution and decay until no flesh remained. The excarnation site was physically unconnected with the long barrow.

2. exposure to sunlight. The excarnated bones were exposed to direct sunlight for some months. The effect was to bleach the bones.
3. fragmentation. Almost all the long, flat, and irregular bones were broken, frequently into more than two fragments. By the absence of splinters and very small fragments within the barrow, this probably did not occur inside the chambers.
4. collection and transfer. Some, but not necessarily all, of the bones from each body were gathered together and finally laid to rest within the chambers of the long barrow.

Many questions are raised by the report on Ascott-under-Wychwood, not least of which is the possibility that megalithic tombs may not have been the primary focus of Neolithic burial ritual. This brief review of the site has disguised much complexity and it is only fair to point out that the excavator of the barrow disagrees strongly with Chesterman on points of detail and interpretation. In a reply to the article Benson and Clegg argue that Chesterman's archaeological interpretation of the site is far from accurate and that he "moved outside his normal area of competence" (1978: 137) as an anatomist. In particular, Benson believes that there was ample evidence of articulated bone within the chambers, a belief in conflict with Chesterman's sequence of burial rites.

Benson and Clegg's criticism of a particular example of conclusions drawn from a study of human remains can be extended to become a criticism of the entire theory of mortuary practices. The general argument is that it is impossible to make inferences from burial ritual about the nature of society because there is too much variation in the burial ritual of known societies. Ucko (1969) gave many examples of inter-society and intra-society variation in funeral practices, mostly drawn from ethnographic parallels. Two important conclusions emerged:

1. the practice of burial rites does not necessarily imply the existence of religious beliefs
2. there is not necessarily a correlation between effort expended in burial and achieved social status.

This argument, and its variants, are not uncommon in certain empiricist and historicist schools of archaeology. Briefly, and _in extremis_, these schools would deny the possibility of making meaningful statements about the nature of any society which is known only by its material remains. They would regard the proper study of archaeology as being material remains _in vacuuo_. Such an argument is pessimistic and stultifying, and is rejected here. Thus, while all possible caveats and objections should be heeded, every opportunity should be taken to make social inferences from burial evidence. In the words of Edmund Leach (one of the protagonists who has reacted against some of the recent work in mortuary practices, and the way it is expressed) speculation should be encouraged

> "...in the hope that an archaeologist might somewhere have an inspiration and say: 'Why yes, I had never thought of that; that <u>is</u> a possibility'. If that happens even once, my effort will have been worthwhile".
>
> (Leach, 1977: 170)

13.2. THE EARLY EXCAVATIONS

Human bone has been found at 21 of the 76 chambered cairns in Orkney. (That only 28% of these monuments have produced human remains is as good a reason as any for preferring the term "chambered cairn" to "chambered tomb"). These 21 sites will be treated in two groups: this section will consider the nineteen early excavations while the next section will consider the evidence from Quanterness (ORK 43) and Isbister (ORK 25), two cairns excavated during the last ten years.

The minimum number of individuals found at each cairn is tabulated in Table 13.3. There is no pattern in these results; for the 19 early excavations the number ranges from 60 to 70 in the case of Korkquoy (ORK 34) down to a single individual in three cases. Some excavations report an unspecified amount of human bone, and the majority of excavators reported no human bone at all.

Table 13.3 also shows the limited information available on the ratio between males and females. At Blackhammer (ORK 3) both individuals were male (Callander and Grant, 1937: 303) and at Cuween Hill (ORK 12), two of the eight internments were positively identified as male (Charleson, 1902: 737). At the Knowe of Ramsay (ORK 30), two of the three individuals were identified as male (Callander and Grant, 1936: 414). The only probable female identification in the literature is at Taversoe Tuick (ORK 49) where one of the skeletons in the lower chamber was female (Turner, 1903: 80). This means that only seven out of over 180 individuals identified in the early excavations have been sexed.

Similarly, there is little information available on the distribution of ages among the skeletal remains of the 19 early excavations. In Table 13.4, the seven cairns for which some information can be culled from the excavation reports are shown. Every cairn contained at least one adult; those cairns which contained a number of adults also tended to contain smaller numbers of adolescents and children. The significance of this table is somewhat diminished by there being no standardisation of terms: the number of "adults", "adolescents" and "children" are interpretations from the terminology adopted by several different excavators and their specialists.

The condition of the excavated human bone is tabulated in Table 13.5 according to three of the four oppositions suggested above. Again, a certain amount of interpretation was necessary: for instance, bones from Blackhammer (ORK 3) described as "fragmentary" by the anatomist (Callander and Grant, 1937: 308) are here interpreted as being broken. The only conclusions which may be drawn from this table are that a variety of bone conditions was observed by the excavators. This variety was noted within the same cairn (both burnt and unburnt bone was found in Taversoe Tuick (ORK 49) and Unstan

(ORK 51), and both articulated and scattered bone was found at the former site and Midhowe (ORK 37)). Variety was also noted between cairns (burnt and unburnt bone, broken and unbroken bone, and articulated and unarticulated bone have all been found).

It is not easy to describe systematically the arrangement of bone in the chambers of the early excavations. Where less than ten individuals were found, there is no discernible pattern in any of the tombs. Five cairns of the early excavations contained more than ten individuals: Burray (ORK 7), Knowe of Yarso (ORK 32), Korkquoy (ORK 34), Midhowe (ORK 37), and Quoyness (ORK 44). At Burray the individuals were evenly distributed with at least ten in the side cell or passage and two in each of the six divisions of the chamber (Henshall, 1963: 188). At Knowe of Yarso, there are four stalled compartments, but the passage and outer two compartments contained only four of the 29 internments. Figure 13.6 shows that the majority of the skulls observed by Callander and Grant (1935: 333) were lined up against the walls of the two innermost compartments. Moreover, not one of the skulls retained its lower jaw, a strong indication that they were placed in that position when no flesh remained. The evidence from Korkquoy is not strong, since the only record we have for the 60 or 70 skeletons found there is from a second-hand account summarised in a notebook of George Petrie (Henshall, 1963: 218). There, it appears that complete skeletons were stacked in tiers six high, with alternate tiers lying in opposite directions.

The evidence from Midhowe is more secure. According to Callander and Grant (1934: 330-34) the 25 individuals found in the tomb were, with only one exception, deposited on or below a low shelf that runs along the north-west wall of the chamber. This markedly peculiar distribution is portrayed in Figure 13.7. The diagram also shows that only the eight innermost compartments contained skeletal material. There appears to have been no pattern in the deposits according to age or sex.

One more cairn produced more than ten individuals, but unfortunately not in excavations this century. At Quoyness about 15 individuals were found by Farrer in 1867 (Orkney Herald, 6 August 1867: 3). Several skulls were lying in the passage. Four of the six side cells contained some evidence of human bone, as did a corner cist in the central compartment.

Is it possible to draw any conclusions about this great variety of evidence from the early excavations? There are two possibilities: that the excavation reports examined above contain a true representation of the skeletal material deposited in the cairns, and this implies that many monuments contained no burials; or that different standards of excavation from the middle of the nineteenth century onwards resulted in uneven reporting of the burial evidence. Several factors strongly suggest that the latter possibility is more plausible. For instance, reports of the early excavations are often unclear as to the stratigraphical context of the human remains: at least two of the burials of Taversoe Tuick are almost certainly secondary internments in cists, possibly of a later prehistoric period (Turner, 1903: 79). Again, the early excavators certainly did not collect every piece of bone but concentrated on skulls and long bones. Farrer at Quoyness wrote:

> "A stratum of decayed bones was cut through, but very few of them were in a sufficiently sound state to bear lifting".
>
> (Orkney Herald, 6 August 1867: 3)

This, and many other examples of the same untutored attitude to excavation (as seen through the eyes of modern archaeology), lead to the conclusion that the burial evidence from the early excavations should be treated with great caution.

Nevertheless, a few statements can still be attempted. The first two apply to all of the chambered cairns of Orkney, and the last, stemming from the work of Callander and Grant, applies only to the rectangular (stalled) chambers of Rousay.

1. individuals of all ages, from infants to mature adults have been deposited in chambered cairns.
2. there is great variety in the condition of human bone, implying a similar variety in the transformations undergone by the body between death and deposition.
3. in the rectangular chambers with many compartments, depositions of bone tend to be restricted to the innermost compartments, with one side of the chamber being favoured above the other side and the central space.

13.3. QUANTERNESS AND ISBISTER

Quanterness (ORK 43) and Isbister (ORK 25) are two chambered cairns which have had excavations conducted on them in the last ten years. Moreover, the human bone material from both sites has been examined by Chesterman, whose work at Ascott-under-Wychwood was discussed above. These two sites are treated separately because the minimum number of individuals discerned at each monument was 157 and 341 respectively - and neither site was completely excavated.

The human bone report from Quanterness has been published in Investigations in Orkney (Renfrew, 1979: 97-111 and 162-172) and the information below comes from that report. The bone report from Isbister is as yet unpublished but forms part of the complete excavation report (Hedges, forthcoming). The writer is indebted to John W. Hedges who has kindly allowed access to, and has discussed in detail, the contents of the report.

At Quanterness the excavation of about 80% of the central chamber and one of the six side cells recovered 12600 pieces of bone and 891 erupted teeth. In all, a minimum total number of individuals of 157 was estimated. The age of these individuals varied from eight months to about 50 years and is tabulated in Table 13.8. The same information is displayed in Figure 13.9. Four points may be made from these data:

1. no infants under eight months in age were deposited in the tomb

2. both sexes were present in roughly equal amounts
3. "the Quanterness burials may plausibly be accepted as representing the dead of an entire human community"
4. "by modern standards, and even by prehistoric standards, they died young" (Renfrew, 1979: 165)

At Isbister, excavation of the main chamber and all three side cells recovered about 16000 bones and fragments. Chesterman estimates that this represents at least 341 individuals. The age and sex structure are tabulated in Table 13.10 and displayed graphically in Figures 13.11 and 13.12. Salient points may be abstracted from these data thus:

1. infant mortality, as indicated by deposition, was high
2. individuals of both sexes were buried in the tomb
3. the burials could represent all the dead of an entire community
4. the average age at death was low.

So it can be seen that the evidence from Isbister is in general agreement with the evidence from Quanterness. That is, the dead people buried at Quanterness and Isbister had an age and sex structure resembling a complete community with children, teenagers and adults, both male and female, being deposited in the cairn. The individuals of such a community were not long-lived, and to reach the age of thirty years was a respectable allotment.

Two questions have arisen from this brief review. The first concerns the treatment of dead infants. Different societies observed by anthropologists appear to have admitted infants to full membership of society at different ages. The Ainu did not regard a child as a complete and autonomous member of society until twelve days after birth (van Gennep, 1960: 53). Many societies, including the Netsilik Eskimo, regard the killing of infants as being socially acceptable before the infant receives a name (Balikci, 1970: 148). With increasing public opinion against human abortion, our own society appears to be moving towards acceptance of a foetus nine months before birth as a full member of society with the same rights as every other human. Thus a possible explanation for the exclusion of infants less than eight months old from Quanterness cairn is that such infants were not regarded as fully belonging to the societal group whose members were laid to rest in the cairn. This may have been because such bodies were disposed of without elaborate preparations or ritual, or it may be that such bodies were heir to a burial rite of equal complexity and forethought as that demonstrated in Isbister chambered cairn, but one that was located in another place and has left no recognised traces. Both possibilities - casual disposal and ritual disposal of another character - are testable by archaeological means. The former would be established by the finding of human infant remains in the occupation debris of contemporary settlements. The latter would be established by the finding of infant deposition associated with another system of burial.

The second question arising from the Quanterness and Isbister burials is the nature of the groups which were buried there. Renfrew, on the basis of the age-sex structure at

Quanterness which resembles that of a complete community, assumed that all the dead people of a complete community were therefore deposited in the cairn. This is a possibility, but another possible explanation is that only a section of a complete community, a section whose demographic characteristics mirror those of the community but which is nevertheless only a part of the population, were deposited in the tomb. There are many subgroups of people in a human population which would exhibit similar demographic characteristics to the population as a whole. Examples are the members of a single family or kinship group (such as an aristocratic lineage) or the members of a particular social order (such as the household slaves) or even the members of a hereditary profession (such as the transmitters of oral records). These suggestions are unprovable using the evidence now available, but they are distinct possibilities and deserve as much consideration as the possibility epoused and further developed (as outlined below in Chapter 16) by Renfrew in <u>Investigations in Orkney.</u>

With the exception of some details of palaeopathology, there is no available information on the condition and arrangement of the human bones at Isbister. This is not the case for Quanterness and Chesterman, in discussing the skeletal evidence, made a remarkable series of observations. There was great variability in the condition of the bones. Most of the bones were broken, and the mechanism of breaking was not constant. All of the broken bones were bleached, and most showed evidence of burning. Bones belonging to single individuals were scattered laterally and vertically throughout the main chamber or the excavated cell, but were not mixed between cell and chamber. These, and other observations, permitted Chesterman to reconstruct the burial rites associated with the deposition of bone at Quanterness. In Renfrew's words:

> "The body after appropriate ceremonies, was taken to a spot, no doubt specially designated, for exposure (or conceivably for primary burial). After a suitable lapse of time the remains were gathered up, care being taken to include the hands and feet, and perhaps wrapped in a skin, fixed sometimes perhaps with a bone pin. They would then be taken, with appropriate ceremony and placed either in a side chamber or in the main chamber of the tomb. At this time, or on some subsequent occasion determined by convention, the mourners would light a fire within the main chamber, using heather and brushwood for fuel, and food would be prepared".
>
> (Renfrew, 1979: 168)

In its essentials, this burial rite is very similar to that described by Chesterman as having taken place at Ascott-under-Wychwood - a coincidence which may have as much to do with the expectations of modern scientists as the social practices of Neolithic humanity. Certainly the description given above does not apply to all the deposits at Quanterness: as plate XI in Renfrew (1979) clearly shows, there was an element of articulation in some of the burials there. Nevertheless, it is a remarkably graphic description and may be a true representation of some of the ritual activities which took place in Orkney in the Neolithic period.

One more class of information remains to be discussed about the burials at Quanterness and Isbister - the palaeopathology. Chesterman was able to identify a large number of pathological conditions among the remains, including osteoarthritis, raised blood pressure, healed fractures and ruptured spinal discs. These conditions are fully described in the respective reports but three general points may be emphasised:

1. at both sites, Chesterman demonstrates the existence of a rare skeletal congenital abnormality on more than one individual and implies that these individuals were related to each other
2. at both sites, evidence was found of osteoarthritis of the costo-transverse rib joints. This was also noted at Ascott-under-Wychwood, and Lanhill long barrow (Keillar and Piggott, 1938) and is attributed by Chesterman to the carrying of a weight on the back by means of a rope sling.
3. at neither site is there indication of any individual dying a violent death.

Finally, one short concluding remark must be made about the burial evidence from Quanterness and Isbister. Despite the similar nature of the two monuments and their apparent internal homogeneity, the two published reports emphasise the variability of funeral practice adopted by the users of just two chambered cairns in Orkney. If such variability is also to be found at the other 70 chambered cairns, then it is not realistic to write or talk about <u>the</u> Neolithic burial practice in Orkney.

13.4. EVIDENCE FROM SITES OTHER THAN CHAMBERED CAIRNS

Human remains have not only been found in chambered cairns. At Skara Brae, Gordon Childe recorded "with extreme regret the failure to locate the cemetery" (1931a: 139) but nevertheless reported the discovery of three, or perhaps four, skeletons dating to the millennium of the settlement.

In the sand filling house I (Figure 7.2) Petrie (1868: 210) describes the finding of a contracted skeleton. Childe attributes the remains to his re-occupation period on the strength of some stratified deer antler above them, but until the date of extinction of red deer in Orkney is known securely there must be a possibility that these remains are a later intrusion. Other human bones, but not a complete skeleton, were found in passage A.

Two burials which indisputably date to the building, or before the building, of Skara Brae and hence can be firmly attributed to the floruit of the chambered cairns, were found in a stone-built cist directly beneath the west wall of house 7 (Childe, 1931a: 140). A comprehensive bone report by Bryce (1931a: 185-197) revealed that both skeletons were those of aged women, somewhat over five feet in height and showing signs of osteoarthritis. The unusual position of these two skeletons was attributed by Childe to the practice of foundation burial - "the wide-spread, very ancient and very persistent belief that a wall will not stand unless there be a spirit, provided by a corpse interred beneath it, to keep it up". (1931a: 142). While this suggestion is not unreasonable, it can only remain a suggestion until other possibilities which could explain the burials have been considered.

One other site of the third or second millennium bc in Orkney has produced human bone. In the west ditch-terminal of the Stones of Stenness, Clutton-Brock identified a fragment of a femur and a finger-bone (J.N.G. Ritchie, 1976: 36).

By themselves, these chance finds of human bone are difficult to interpret and no attempt will be made here to associate them in detail with the burials found elsewhere in Orkney. Their existence is important, however, because it confirms the conclusion of the previous section that burial practices in the island-group do not fall into a single pattern. Dead people were disposed of in a variety of ways. This variety makes it all the more likely that other methods of burial will come to light in the archaeological record. Indeed, the recent publication by Hedges and Parry (1980) of the bizarre and intriguing discovery of 18 excarnated individuals in a subterranean cist dating to 4395 bp $\pm$ 55 (GU-1075) in Sumburgh, Shetland is an exciting reminder that chambered tombs were only one alternative way of disposing of the dead.

CHAPTER FOURTEEN: THE MEASUREMENT OF LABOUR

14.1. PROBLEMS IN THE MEASUREMENT OF LABOUR

The importance of an activity or an artefact to a society is proportional to the amount of time and effort invested in it by that society. The nature of that importance, whether it be based in economics, religion, or politics, is always a matter of further interpretation. Nevertheless, the basic premise, that the importance of an object or place is proportional to the social effort invested in it, is widely held to be true, and forms the basis of this chapter.

The most commonly used measure of social investment is worker-hours, or man-hours - the total length of time it would take one person to complete a given task. The British Neolithic has acquired something of a monopoly in the archaeological world for the calculation of labour requirements of this type, and Table 14.1 shows some of the monuments for which such estimates have been made. A few general points about all estimates of this type, and their applications, will be considered here:

1. All such estimates are commonly based on modern data about quarrying and construction. Allowances are made for less sophisticated technologies, but no allowance can be made for the "capricious and irrational social conventions" (Piggott, 1973: 10) which may have governed the construction of prehistoric monuments.
2. A figure of (say) 1000 worker-hours is not invariable according to the number of people engaged on the task:

as an extreme example, it might take one person 1000 hours to write a book, but a similar book could not be written by 1000 people in one hour. Again, certain parts of a task (such as lifting a heavy stone) may require a minimum number of workers before they can be achieved.

3. As a corollary of the last point, labour estimates can only give an idea of worker requirements, and cannot help in the discussion of worker <u>availability</u> (Ralston, in Ritchie, 1976: 50). Thus they are of little utility in reconstructing demographic patterns.
4. There are so many imponderables involved in the calculation of labour investment that comparison between different monuments is very difficult. To some extent, comparison of two or more labour estimates is made more exact by only comparing estimates which have been arrived at using the same criteria - for instance, Atkinson's formula for the effort involved in digging a chalk ditch (Wainwright with Longworth, 1971: 197). Again, comparisons will be more exact when examples of the same class of monument are involved.

The problem to be explored in this chapter is the amount of social investment in permanent monuments by the people of Neolithic Orkney. As before we are restricted to looking at 76 chambered cairns, four settlements and two henges. Worker-hour estimates already exist for the henges and for the chambered cairn of Quanterness (ORK 43) (Table 14.1). The settlements are excluded from this analysis for three reasons:

1. The number of known settlements is too small, and, intuitively, represents a far smaller fraction of the original total number of sites than either of the other two classes of monuments.
2. More so than the cairns and henges, the settlements have been shown by excavation to have been constructed over a period of time. This is not to imply that some of the cairns were not multi-period constructions, but in their final stages at least, the cairns were designed as a unitary conception. The settlements grew and evolved: they were never envisaged as the embodiment of a single concept.
3. Settlements have an obvious function. Shelter is a fundamental human need and every society invests effort in the building of some kind of shelter. Cairns and henges have no such obvious function and so the effort expended on their construction is much more of a key to the <u>distinct</u> nature of Neolithic society than that expended on settlements.

For these reasons, this chapter will concentrate on the chambered cairns and the effort invested in their construction.

14.2. CAIRNS: VOLUMES AND WORKER-HOURS

It would be impossible to examine every chambered cairn individually to assess the effort involved in construction without a massive programme of excavation. And yet, it would be desirable to be able to compare a great number of cairns within the relatively small area of Orkney. A middle road is to establish a procedure for estimating effort expended which can be applied to every cairn (or as many as possible) using the limited information which can be garnered from study in the field. Inevitably, this compromise will result in a decrease in accuracy in return for the increase in universal application. The result for any particular chambered cairn may not bear close scrutiny and may be disproven upon excavation. This negative effect will be balanced by the possibility of making general statements about the social investment in all the <u>known</u> chambered cairns of Orkney and, by extension, about the effort invested in chambered cairns of Orkney considered as a group.

The stages involved in the construction of Quanterness (ORK 43) may be taken as being typical of the construction of chambered tombs in northern Scotland (Renfrew 1979: 66). With the aid of Daykin, Renfrew identified the following stages:

1. the ground surface was cleared
2. the ground plan of chamber and passage was laid out
3. the chamber and innermost revetment were built up to a height of about one metre, with the intervening space filled in
4. the ground plan of the second circular revetment was laid out
5. each successive revetment was constructed so that its immediate neighbour to the centre was never more than a metre or so higher, thus reducing the maximum single lift for each building stone.

This is a plausible scheme in that the element of lifting, in which most energy is expended, is reduced to a series of manageable steps. The possibility that a half-completed chamber would collapse if surrounded by a weight of cairn material could be guarded against by shoring the interior of the chamber with timber or earth.

The processes outlined above are but part of the labour required to build a chambered cairn. According to Renfrew again (1979: 213), the actions described above of setting, building, and adding the body of the cairn must be preceded by the quarrying of stone and the shifting of that stone to the location of the planned cairn. Quarrying and shifting could account for about half the total labour required, and substantially more if the building stone was difficult to quarry or if the nearest source was far away from the building site. That is, it is possible that more labour could have been expended in preparing and transporting the necessary materials than in the actual construction of the cairn.

Before the building operation itself, the action of planning the construction of a chambered cairn must surely have required some investment of effort on the part of the designers. From the moment that a monument is first contemplated in the mind of a single individual (be that individual a native or outlander) to the time when the necessity for the monument is agreed by enough members of society (either a consensus of opinion or perhaps a few powerful members) to make the construction an actuality, a period of discussion, debate, and persuasion must take place among the cairn-builders. To this period must be added an allowance for physical planning:

the designing of the cairn (which may have involved journeys to view cairns already constructed) and the decision to locate the cairn in a particular place (which certainly required a deep experiential knowledge of the landscape). Finally, there there may have been considerable time and effort involved in the organisation of labour itself - in ensuring that the right number of workers were available when required.

All these social operations involved in the construction of a chambered cairn are more difficult to discuss than the purely physical operation of building, and they have been ignored in any published worker-hour estimates. Because they are so difficult to quantify, it seems reasonable to follow the customary practice and deal with the purely physical task of constructing the monuments themselves.

To return to Renfrew's five physical operations of quarrying, shifting, setting, building and adding the cairn, the single critical factor which determines the labour involved in these operations is volume. That is, the larger the volume of the completed cairn, the larger the effort required during each operation. More stone has to be quarried and more stone has to be transported to the cairn site. The larger the cairn, the more work will be expended in setting and building the external revetment, internal walls, and chamber. And, most obviously, the larger the volume of the cairn, the more effort is required to add the stones comprising the body of the cairn. All in all, the one variable which, above all others, determines the number of worker-hours required in the construction of a stone-built monument is the volume of that monument. Thus the volume of a chambered cairn will be used below as a surrogate measure of social investment.

The task is now reduced to estimating the volume of each chambered cairn in Orkney. Two difficulties immediately present themselves. The first is that we cannot be sure of the relationship between the volume of a cairn today and its volume on the day it was constructed. The second is that no cairn has been surveyed in enough detail (ideally with large scale plans and sections through the body of the cairn) to enable the present volume to be calculated with ease. Even Renfrew's (1979: 213) estimate of the volume of Quanterness is based on very little empirical measurement: at different places in Investigations in Orkney, the mound is reported to be 3.20 m high (1979: 45), 3.4 m high and originally a metre taller (1979: 64), 9.3 m high (*sic*) (1979: Figure 32) and c. 3.5 m high (1979: 213). Without explanation, he arrives at a figure of 840 cu m for the volume of Quaterness. Even although this is most recently published chambered cairn from Orkney, it seems that the excavation evidence will be of little use in determining volumes.

Accordingly, some other method of measuring volumes must be found. The method to be used here is strictly an *a priori* argument. Chambered cairns are assumed to have a standard template in three dimensions. The third spatial dimension of the template (height) is related, by a linear equation, to the measurements of the first and second dimensions (length and breadth). That is, given the ground plan of a cairn, the volume of the cairn can be calculated. The linear equation was arrived at by superimposing at the same scale the best available section drawings of the only three Orcadian cairns for which such drawings exist - Quanterness (ORK 43), Quoyness (ORK 44), and Maes Howe (ORK 36). A curve was drawn by eye through these sections to represent the best compromise between the three: the equation is simply an algebraic representation of this curve.

Two standard shapes were recognised: Type I, consisting of cairns with circular or nearly circular plans, and Type II, consisting of cairns with oval or rectangular plans. (The terms "circular", "oval", and "rectangular" are explained in Chapter 6, and Appendix A describes the category into which each cairn falls. The cairns of "complex" shape, including the cairns with horns, are excluded from this analysis because their shapes cannot be fitted to any simple standard template).

Type I cairns are reduced to the template shown in Figure 14.2. This consists of a solid with a circular base of radius R. The outer surface of the solid is defined as that surface described by the revolution through 2π radians of a curve with the form:

$$h = 1.70 + 2.37 \log_{10} r \qquad \text{........ (1)}$$

where r is the distance in metres of a point in a straight line from the outer perimeter of the base to the centre of the base, and h is the height of the curve directly above that point.

The volume, V, of a solid with circular plan is given by the integration

$$V = \int_{h=0}^{h=H} \pi r^2 \, dh \qquad \ldots\ldots\ldots \quad (2)$$

Combining equation (1) with equation (2) gives

$$V = \int_{h=0}^{h=H} \pi \left(10^{\frac{h-1.70}{2.37}}\right) dh \qquad \ldots\ldots\ldots \quad (3)$$

which simplifies to

$$V = 0.037\pi \int_{h=0}^{h=H} 10^{0.84h} \, dh \qquad \ldots\ldots\ldots \quad (4)$$

Using equation (4), and data on diameters of round chambered cairns from Appendix A, it was possible to calculate volumes for 41 cairns in Orkney. These are tabulated in Table 14.3, and displayed as a histogram in Figure 14.4. The range of volumes runs from 57 cu m in the case of Calf of Eday North-West (ORK 9) to 1160 cu m in the case of Maes Howe (ORK 36), a difference in magnitude of over twenty. The frequency distribution of volumes for these type I cairns is positively skewed, with a median of 214 cu m and a mode in the class 200 to 249 cu m.

Type II cairns are reduced to the second template in Figure 14.2. This consists of a solid with a rectangular base of length L and width 2R. The outer surface of the solid is described by the transformation from an arbitrary origin to L of two curves of the form of equation (1) where r is R minus the distance in metres of a point from the longitudinal axis of symmetry of the rectangular base, and h is the height of both curves directly above that point. Notice that the transverse profile of an oval or rectangular cairn is assumed to be the same as that of a circular cairn. This is a necessary expedient: there are no published profiles of type II cairns which do not appear to have been massively truncated.

The volume, V, of a solid with rectangular plan is given by the integration

$$V = \int_{h=0}^{h=H} 2RL \quad dh \qquad \ldots\ldots\ldots (5)$$

Combining equation (1) with equation (5) gives

$$V = \int_{h=0}^{h=H} (10^{\frac{h-1.70}{2.37}})L \; dh \qquad \ldots\ldots\ldots (6)$$

which simplifies to

$$V = 0.19L \int_{h=0}^{h=H} 10^{h/2.37} \; dh \ldots\ldots\ldots (7)$$

Using equation (7), and metrical data from oval and rectangular chamber cairns from Appendix A, it was possible to calculate volumes for 18 cairns in Orkney. These are tabulated in Table 14.5 and displayed as a histogram in Figure 14.4. The range of volumes is from 125 cu m in the case of Holm of Papa

Westray North (ORK 21) to 809 cu m in the case of Rethie Taing (ORK T18). As was noted for type I cairns, the frequency distribution of volumes for these type II cairns is positively skewed with a median of 259 cu m.

When the results for type I and type II cairns are amalgamated, the resultant histogram of volumes is as shown in Figure 14.6. As would be expected this frequency distribution is also positively skewed with a mean of 282 cu m and a median of 202 cu m. That is, there are many cairns with volumes between 150 and 250 cu m and comparatively fewer cairns of larger volume.

An interesting exercise is to plot the spatial distribution of the largest cairns. There are nine or ten cairns which have volumes over 400 cu m: they are shown on Figure 14.7. Immediately it is seen that these cairns have a dispersed distribution and that two large cairns are never found in close proximity. Indeed, it is possible to go further than this and to note that each large cairn is associated with a single group of islands or with a tract of land which makes a natural topographic unit. Holm of Papa Westray South (ORK 22) is the only large cairn in the modern parish of Westray and Papa Westray. Maesry (ORK 38) is the only cairn over 400 cu m in the modern parish of Lady, and Rethie Taing (ORK T18) holds a similar uniqueness in Cross and Burness parish (these two parishes together comprising the islands of Sanday and North Ronaldsay). The four island groups which have Rousay, Eday, Stronsay, and Shapinsay as their main members each possess one, and only one, cairn over 400 cu m: these cairns are, respectively, Midhowe (ORK 37), Braeside (ORK 5), Cutter's Tooer (ORK T21) and Helliar Holm (ORK 19). The only large cairn in the West Mainland is Maes Howe (ORK 36), and its counterpart in the East Mainland is Quanterness (ORK 43). Finally, the Isbister report (Hedges, forthcoming) makes it clear that the cairn associated with the chamber at Isbister (ORK 25) in South Ronaldsay is very large and certainly over 400 cu m in volume. The possible social implications of this singular distribution will be discussed in Chapter 17.

Having calculated the volume of 59 chambered cairns in Orkney, we are now faced with the problem of translating those volumes into worker-hours. (The only reason for wanting to do this is to compare the effort invested in the cairns with the effort invested in other monuments of similar age). The simplest way of effecting this translation is to take Renfrew's worker-hour figure for Quanterness and to make a similar linear adjustment of all the volumes. The volume of Quanterness expressed as a type I cairn is 850 cu m and Renfrew suggests the monument was constructed in 10000 worker-hours. Thus to transform cubic metres to worker-hours requires a multiplicative factor of 11.76.

The result of applying this transformation to worker-hours is shown in Tables 14.3 and 14.5, and in the alternative horizontal scale in Figure 14.6. These show that the majority of chambered cairns in Orkney (or, strictly, the majority of the cairns considered here) were constructed in less than

3000 worker-hours and that only ten cairns required more than 4700 worker-hours. The largest chambered cairn, Maes Howe, was built in about 13650 hours.

Table 14.1 shows the estimates from published sources for the two henges in Orkney: 50000 worker-hours for the Stones of Stenness and 80000 worker-hours for the Ring of Brogar. Even if the estimate for Maes Howe given above is doubled to allow for the inherent uncertainties of the method employed in arriving at the estimate and to allow for the superior building skill evident at Maes Howe, it is clear that the two henges represent a level of social investment which is of a quite different order from that displayed in any chambered cairn. The most common size of chambered cairn, around 200 cu m, required less than one-twentieth of the effort required to construct the smaller of the two henges.

14.3. SUMMARY

Because of the speculative nature of this chapter, the restrictions which should be placed on any results must be reiterated:

1. It is assumed that the importance of a monument is proportional to the effort invested in its construction.
2. It is assumed that the effort invested in the construction of a chambered cairn is proportional to the volume of that cairn, including its interior chambers.
3. The published worker-hour estimates for Quanterness, Brogar and Stenness are here accepted for use in comparisons.

4. A low level of reliability for individual monuments has been accepted here in return for a high level of applicability to a large number of monuments.
5. No allowance has been made here for the non-physical effort - the politics and planning of the builders - involved in cairn construction.

Bearing these restrictions in mind, it is possible to enumerate certain conclusions which have emerged from the present chapter:

1. There is a large range of cairns from those requiring less than 600 worker-hours to a few requiring over 5000 worker-hours in their construction.
2. The majority of cairns required between 1750 and 3000 worker-hours for their construction.
3. The very largest chambered cairns have a dispersed distribution, with each one being located in a naturally-defined part of Orkney.
4. Even the largest cairns involved a level of physical labour which is dwarfed by that required to construct the two henges.

CHAPTER FIFTEEN: SKY, SPACE, AND SPIRALS: THE SYMBOLS OF NEOLITHIC ORKNEY

15.1. INTRODUCTION

The study of symbol has a long and honoured history in archaeology and anthropology, and the word has acquired several specialist meanings. Here, a reductionist view will be taken and a "symbol" will mean a concrete indication of abstract values. A symbol is something readily recognised by the initiated which is representative of something not readily recognised by the uninitiated. By explaining the concrete symbol we attempt to understand the abstract belief: by understanding the abstract belief we attempt to explain the concrete symbol. This sounds like a circular process but sometimes the view from one part of a circle is more interesting than from another.

The specific object of looking at the symbols of Neolithic Orkney is to examine the relationships of manipulation in the society of the cairn-builders. In Bourdieu's framework, symbols are seen as fulfilling three roles in the structuring of society:

> "comme <u>structures structurantes</u>
>
> Instruments de connaissance et de construction du monde objectif
>
> comme <u>structures structurées</u>
>
> Moyens de communication (langue ou culture vs discours ou comportement)
>
> comme <u>instruments de domination</u>
>
> Pouvoir
> Division du travail (classes sociales)
> Division du travail idéologique (manuel/intellectuel
> Fonction de domination"
>
> (Bourdieu 1977: 406)

Thus symbols are conceived of as instruments of manipulation through which we learn about the objective world; use as a means of communication; and use to express relationships of power and domination. The manipulation of symbols is one of the major definers of a society: that which is distinct about the social organisation of Neolithic Orkney may emerge through an examination of its symbols.

Already in chapters dealing with the material culture and the human bone evidence from Neolithic Orkney, the present work has considered some aspects of symbolism. This chapter will deal with particular symbols which are, more so than other archaeological data, partial and incoherent. In one section symbolism connected with the sky will be discussed - the orientation of the chambered cairns with respect to the surrounding land and the visible sky. In another section the intervisibility of cairns will be examined. A third section will deal with the demarcation of space within and around chambered cairns. A fourth section will consider some of the animal and bird bones found in the cairns and comment on the variation between cairns of this material. Finally, the decorations, including spiral decoration, found on sculpted stones and pottery will be discussed.

In a sense this chapter denies its own existence. Symbols are an integral part of human existence and the artificial separation of signifier and signified in the five examples just listed is an admission of a failure to completely understand their role in the society of Neolithic Orkney. It is to be hoped that recognition of that failure is a first step in its mitigation.

15.2. ORIENTATION

15.2.1. ORIENTATION OF CAIRN, CHAMBER, AND PASSAGE

The orientation of chambered cairns with respect to due north has been noted by archaeologists in many studies and frequently common patterns have been observed. Just two of the many examples are the long barrows of Cranbourne Chase commonly aligned north-west/south-east with the larger end at the south-east (Ashbee, 1970: 162-3) and the Clyde cairns of Scotland where a north-easterly orientation is favoured for the forecourt of the long axis of the cairn (Henshall, 1972: 99). Henshall has also commented on the orientation of the cairns of northern Scotland: she notes that only 12 of 114 cairns in her Orkney-Cromarty group face the west half of the compass, the normal orientation being between north-east and south-east (Henshall, 1963: 104) and that an easterly direction also seems to have been preferred, although not universally, by the builders of Maes Howe type cairns (1963: 130).

The study of orientation has in recent years become confused with the study of archaeo-astronomy. All that follows here is not necessarily directed at such study: it should be regarded as a first look at the orientation of Orcadian chambered cairns from which directions of enquiry concerning astronomy may emerge. At the same time, the possibility that there may be other explanations for preferred orientation should not be forgotten.

There are two difficulties in measuring the orientation of chambered cairns themselves. The first is the theoretical problem of deciding exactly what to measure and the second is the practical problem of obtaining the measurements.

The first problem was explored by examining all the straight lines which could be reasonably compared from chambered cairn to chambered cairn. The most apparent straight line in a passage grave is the line of the passage pointing outwards and this is the orientation accepted by archaeo-astronomers as an adequate backsight (Burl, _in lit._, 28 October 80). The opposite orientation, the line of the passage pointing inwards to the chamber should also be considered: Scott (1969: 233) has suggested one reason why this could be of interest to the builders. Another double-ended straight line worthy of consideration is the orientation of an elongated chamber and, Orkney, with its plethora of such chambers, would seem to be one place to look for common patterns in this orientation. Finally, the straight line which forms the major axis of an elongated cairn provides two more directions which can be measured for a number of monuments.

The practical problem of obtaining the measurements resolves into two related difficulties. In the first place it is difficult, and sometimes impossible, to obtain readings in the field because the monuments are dilapidated, back-filled, or reconstructed. Therefore orientation measurements were taken from the best available published or unpublished plans. In the second place, accuracy of measurement patently depends on the instrumentation available at time of survey:

the most accurate method of determining the orientation of a monument is to use a theodolite as an instrument for solar observation to indicate the direction of true north (Ruggles, pers. comm.). None of the plans of Orcadian chambered cairns were surveyed with any instrument of greater accuracy than a prismatic magnetic compass measuring to the nearest degree. These two difficulties combine so that none of the orientations cited here are accurate to more than a few degrees. This means they are useless for the testing of any archaeo-astronomical hypothesis. The degree of accuracy achieved is, however, sufficient to support the conclusions suggested in the course of this section.

In all cases, orientations were converted to degrees relative to true north (000^{o}). In Orkney in 1981, true north was about nine degrees east of magnetic north.

The orientation of elongated cairns could be measured in 22 cases (corresponding to those cairns with a cairn ratio of less than 0.70 - Figure 6.13). In most of these cairns, the two ends of the structure are equally prominent and are only distinguished by some feature unconnected with the mound itself, such as the passage entrance: for this reason the results are displayed in Figure 15.1 as double-ended. Thus the circular figure is bilaterally symmetric through any diameter if one semi-circle is mirror-reversed: any half of Figure 15.1 contains all the information of the complete diagram.

If any trend can be observed it is of concentration in the north-west and south-east quadrants at the expense of the north-east and south-west quadrants. There are 14 cairns in the former pair and 5 in the latter pair with two cairns aligned due east/west and one aligned due north/south. This discrepancy between quadrants is consistent at the 0.05 level of significance with the hypothesis that the orientations are not evenly distributed between quadrants.

There are three exceptions to the double-ended orientation of cairns, where a distinction can be made between the ends of elongated cairns. These are the Earl's Knoll (ORK 14), Head of Work (ORK 18) and Knowe of Lairo (ORK 28), each having one end higher and more massive than the other. In all three cases, the more prominent end is towards the east, with orientations of 090°, 116°, and 114° respectively.

The orientation of chambers could be measured for 42 cairns (roughly corresponding to those with a chamber ratio of less than 0.70 - Figure 6.27). Again there is commonly no distinction between the ends of these elongated chambers which is a feature of the chamber itself, and so the results are displayed in Figure 15.2 as double-ended. The visual impression given by this figure is that orientations are spread evenly around the points of the compass and this is confirmed by a count of orientations in each quadrant: there are 17 in the north-east and south-west quadrants compared with 25 in the north-west and south-east quadrants. These counts are statistically compatible with the hypothesis that the orientations are evenly distributed between quadrants.

Finally, the orientation of passages was considered. In this case it was felt possible to distinguish one end of every passage from the other: the passage leads from inside the chambered cairn to outside the chambered cairn. Figures 15.3 and 15.4 therefore show single-ended orientations and are not symmetric in any way. Here the results will be discussed as if looking from the chamber along the passage, but the other view could be taken by turning Figures 15.3 and 15.4 upside down.

In all, the orientation of 29 passages at 26 monuments was considered: three sites have two separate passages. The visual impression of Figure 15.3 is that orientations in the south-east quadrant are favoured. This was tested using the null hypothesis that the 29 orientations are evenly distributed among the four quadrants, with the confidence level set at 0.05. The contingency table for the test is:

Quadrant	Expected number of orientations	Observed number of orientations
000-089	7.25	4
090-179	7.25	17
180-269	7.25	5
270-359	7.25	3
	29.00	29

For this table, $\chi^2 = 17.76$. From tables (Fisher and Yates 1963: 47), the associated probability of such a statistic under the null hypothesis with three degrees of freedom is less than one in a thousand. Therefore there is a very high probability that the passages of these chambered cairns were preferentially orientated between south and east.

It is of interest to examine the anomalies in Figure 15.3. Three passages point slightly to the south of south-west: they belong to Calf of Eday North-West (ORK 9), Calf of Eday South-East (ORK 10), and Maes Howe (ORK 36). The first of these orientations could be attributed to the lie of the land (the Calf of Eday cairns look across a narrow channel to the main island of Eday) but there is no such topographical explanation for Maes Howe. The passage at this monument has been said to be aligned to catch the last rays of the setting sun at midwinter (Burl, 1981). A comparison with Newgrange, where the rising midwinter sun illuminates the chamber through a gap above the lintel of the passage entrance (Patrick, 1974), might be drawn, but until such an occurrence is positively demonstrated at Maes Howe the possibility remains unproven.

Only four cairns have passages which are orientated clockwise between south-west and north-east. Two of these examples are the upper passage at Huntersquoy (ORK 23) and the upper passage at Taversoe Tuick (ORK 49): both of these cairns have lower chambers whose passage points towards the south and east. The third passage of this type is at Wideford Hill (ORK 54) where the cairn is set in a west-facing hill-slope and might be explained as a desire for maximum visibility from the chamber entrance. The fourth example is not explained by a second passage or by topography: Holm of Papa Westray North (ORK 21) appears to have a passage which leads to the north-west. Despite Petrie's (1857: 62) description of walling connected with this passage, there must be a possibility that the entrance to the chamber is in the south-east.

Figure 15.4 shows the information contained in the previous figure partitioned into clusters. The four diagrams show that the conclusion of preference for the south and east may well hold for all the clusters, but the number of examples of each type precludes any more definite statement.

In summary, the following statements may be made:

1. among those chambered cairns of Orkney which have elongated cairns, there seems to be a preference for orientation in the north-west and south-east quadrants
2. there is no pattern of orientation among the elongated chambers
3. as a group, the known chambered cairns of Orkney have passages which are preferentially orientated outwards from the chamber to the south and east.

15.2.2. ORIENTATION OF VISIBILITY

Another element of orientation is concerned with the orientation of visibility. We have already seen in Chapter 12 that cairns were not located in places with extensive sectors of restricted visibility but were located in places with extensive sectors of intermediate visibility. This section is not concerned with the relative proportions of distant, intermediate, and restricted visibility, but rather with the orientation of the different types.

The data used are the same as that used before, collected with a prismatic compass at the site of each cairn. Magnetic compass bearings have been converted to degrees true. There are no missing values in the data: with one exception, where visibility was estimated, readings were taken at all sites.

The visible horizon was divided into 36 ten-degree sectors and the visibility readings for each cairn generalised into 36 sectors of distant, intermediate, or restricted visibility. Thus if the visibility readings for a site were:

000° - 186°	Restricted
186° - 271°	Distant
271° - 000°	Intermediate

then the site would be accorded the following sectors of visibility:

000° - 190°	Restricted (19 sectors)
190° - 270°	Distant (8 sectors)
270° - 000°	Intermediate (9 sectors)

The results for all 76 cairns were than amalgamated in a series of diagrams (Figures 15.5 to 15.9) showing the number of cairns with restricted, intermediate, and distant visibility by ten-degree sector.

Figure 15.5 shows the orientation of restricted visibility. The range of this histogram is small, with 25 cairns having a restricted window of visibility between 050° and 060°, and only 13 cairns having a restricted window between 180°

and 200°. Thus, if there is any pattern of preference for such visibility it is in favour of restricted visibility between the north and east and against restricted visibility in the south.

Figure 15.6 shows the orientation of intermediate visibility. This distribution is bimodal, with peaks of 38 cairns between 010° and 020°, and 190° and 200°. There is one major trough, with only 14 cairns having a window of intermediate visibility between 130° and 140°. The pattern of preference which emerges here is thus in favour of intermediate visibility to the north and to the south, and against intermediate visibility between the south and east.

Figure 15.7 shows the orientation of distant visibility. This diagram has the greatest range of the three with 43 cairns having windows of distant visibility between 130° and 140° and only 18 having such windows between 010° and 020°. Moreover, the diagram is distinctly bimodal with a major peak around 140° and a minor peak around 270°. One major trough is evident around 000°. This pattern is more pronounced than the patterns for either restricted or intermediate visibility, and so a statistical test was conducted to establish if such a pattern could have occurred by chance. There are 1019 ten-degree sectors of distant visibility for all the cairns and, taking advantage of the ordering inherent in the relationship between sectors, a Kolmogorov-Smirnov test was employed, with a confidence level set at 0.05, to examine the null hypothesis that these 1019 sectors are distributed evenly around all points of the compass. The data for the test is as follows:

Sector (degrees)	Expected number of cases	Observed number of cases	Expected cumulative frequency E(X)	Observed cumulative frequency O(X)	|E(X) - O(X)|
000-010	28.31	19	0.0277	0.0186	0.0091
010-020	28.31	18	0.0554	0.0363	0.0191
020-030	28.31	21	0.0831	0.0569	0.0262
030-040	28.31	21	0.1108	0.0775	0.0333
040-050	28.31	21	0.1385	0.0981	0.0404
050-060	28.31	22	0.1662	0.1197	0.0465
060-070	28.31	25	0.1939	0.1442	0.0497
070-080	28.31	24	0.2216	0.1678	0.0538
080-090	28.31	30	0.2493	0.1973	0.0520
090-100	28.31	31	0.2777	0.2277	0.0500
100-110	28.31	33	0.3047	0.2600	0.0447
110-120	28.31	36	0.3324	0.2954	0.0370
120-130	28.31	39	0.3601	0.3337	0.0264
130-140	28.31	43	0.3878	0.3759	0.0119
140-150	28.31	41	0.4155	0.4161	0.0006
150-160	28.31	40	0.4432	0.4553	0.0121
160-170	28.31	38	0.4709	0.4926	0.0217
170-180	28.31	37	0.5986	0.5289	0.0303
180-190	28.31	28	0.5263	0.5564	0.0301
190-200	28.31	25	0.5540	0.5810	0.0270
200-210	28.31	26	0.5817	0.6065	0.0248
210-220	28.31	27	0.6094	0.6330	0.0236
220-230	28.31	29	0.6371	0.6614	0.0243
230-240	28.31	27	0.6648	0.6879	0.0231
240-250	28.31	30	0.6925	0.7174	0.0249
250-260	28.31	28	0.7202	0.7448	0.0246
260-270	28.31	32	0.7479	0.7762	0.0283
270-280	28.31	31	0.7756	0.8067	0.0311
280-290	28.31	30	0.8033	0.8361	0.0328
290-300	28.31	28	0.8310	0.8636	0.0326
300-310	28.31	25	0.8587	0.8881	0.0294
310-320	28.31	25	0.8864	0.9127	0.0263
320-330	28.31	23	0.9141	0.9352	0.0211
330-340	28.31	25	0.9418	0.9598	0.0180
340-350	28.31	20	0.9695	0.9793	0.0098
350-000	28.31	21	1.0000	1.0000	0.0000

The test statistic for such a table is the largest figure in the last column. In this example, D = 0.0538. The associated probability of such a statistic occurring with a sample size of 1019 is less than 0.01 (Siegal, 1956: 251). The null hypothesis is thus rejected and it is stated that the probability is less than one in a hundred that the observed pattern of orientation of distant visibility occurred by chance.

To check if there is any difference in the orientation of distant visibility between clusters, Figure 15.7 was partitioned into clusters and the result displayed in Figure 15.8. Just as the diagram for all cairns is distinctly bimodal, the equivalent diagrams for clusters I, II, and III are also bimodal. Moreover, the position of the modes are approximately equal: there is a major mode of cluster I around 170°, of cluster II around 155°, and of cluster III around 145° (comparing with the major mode for all cairns at 140°) and there is a minor mode of cluster I around 305°, of cluster II around 270°, and of cluster III around 230° (comparing with the minor mode for all cairns at 270°). Clusters IV-VI do not fit into this pattern. Therefore, even although the sample sizes are very small, it is possible to make the tentative suggestion that all the known cairns of clusters I, II, and III are preferentially located in places with distant visibility between east and south, and to the west.

One more diagram was constructed. Figure 15.9 is a graphic amalgamation of Figures 15.5, 15.6, and 15.7 and shows clearly the bimodal distribution of the orientation of distant visibility. It also demonstrates that the patterns noted above for intermediate and restricted visibility should be seen as a reflection of the primary desire for preferred orientations of distant visibility, a reflection which is necessary because the three variables of restricted, intermediate, and distant visibility are dependent upon each other and sum to 360° for each cairn, or to 2736 (36 x 76) ten-degree sectors of visibility for all the cairns.

To summarise, the following conclusions may be made:

1. there is a very high probability that the known chambered cairns of Orkney were preferentially located to ensure distant visibility towards two points of the compass: a point between east and south, and a point in the west.
2. it may be the case that this previous conclusion holds true for every design of cairn in Orkney except for those of clusters IV-VI.

What is there of interest about particular points of the compass that requires distant visibility? The obvious answer, but one largely conditioned by a recent fashion in archaeological writing, is the rising and setting of sun, moon and stars. For such imprecise orientations as have been established above, there are many astronomical events which could be regarded as significant. The most apparent of these are solar events:

at Orkney's latitude of 59^{o} north, mid-winter sunrise occurs today at an azimuth of 139.4^{o} and the equinoctial sunsets occur at 270^{o}. Lunar and stellar azimuths could be quoted in greater number. The nature of the data examined here is not of the form which could ever prove or refute any particular astronomical hypothesis but it does not seem an unreasonable conclusion that the cairn-builders were aware of the sky and the constant and regular movements of the bodies therein.

15.3. INTERVISIBILITY

A common power relationship is that of dominance and subservience. One way this might be expressed in relation to chambered cairns is for one cairn to be in a dominant location in relation to other cairns. The dominant location of cairn A over cairn B becomes a symbol of the dominance of the users of cairn A over the users of cairn B.

Intervisibility is a possible way of approaching the study of dominant locations. If one cairn can be seen from many other cairns then it is always present and can never be ignored by the users of those other cairns. If messages were passed between cairns by visual means (such as flags or beacons) then a highly intervisible cairn becomes an important link in the dissemination of information. It has been noted among the Bronze Age barrows of Dorset that individual barrows appear to be sited so as to ensure many intervisible links. Some barrow groups

> "appear to be deliberately sited so that a complex system of intervisibility is created. Clearly the height, and at times the narrow top, of the ridge make it inevitable that some barrows should be landmarks and intervisible. But many individual barrows and barrow groups are so sited in exactly

> the right place to achieve a striking effect, to appear on the sky-line when viewed from certain points, and to be seen easily from other barrows and barrow groups, that a considerable degree of control and deliberation must be postulated".
>
> (RCHME, 1970: 423)

Closer to Orkney, it has been noted that one chambered cairn in East Caithness whose location is an anomaly in more than one respect is also more intervisible than any other cairn (Fraser, 1980a: 302).

It must be observed that the identification of a cairn in a highly dominant location, whether expressed in terms of intervisibility or otherwise, is no certain indication of a relative chronology. It is possible that the dominant cairn was first to be constructed, and subsequent cairns conformed to its location by being constructed in subservient locations. Conversely, the subservient cairns may have been constructed first, and the dominance of a single cairn only asserted subsequently at the time of its construction.

Intervisibility was examined simply by standing at every chambered cairn and noting the other chambered cairns which could be seen. Where weather conditions were poor, the principle of reprocity of vision (if cairn Y can be seen from cairn Z, then cairn Z can be seen from cairn Y) was invoked. Results are tabulated in Appendix A, and displayed in Figure 15.10, a schematic network in which a point represents a chambered cairn and a line between two points indicates that the two cairns are intervisible. The network shows that intervisibility is not a simple reflection of proximity, and is influenced by subtle shapes in the landscape. For instance, Calf of Eday Long (ORK 8) is not visible from Calf of Eday South-East (ORK 10) although the two are only 120 m apart. Again, the cairn on Holm of Huip (ORK 20) is not close to any other, yet is a prominent landmark and is visible from many parts of Eday, Sanday, and Stronsay, and to any sailor of the inland sea. Some very long sight-lines are recorded in Figure 15.10, such as that from Kierfea Hill (ORK 26) to Helliar Holm (ORK 19), a distance of 17.5 km. Such sight-lines require previous knowledge of the existence of another chambered cairn unless the cairns are signified by some conspicuous marking such as a large fiery beacon. (At the time of Queen Elizabeth's Silver Jubilee celebrations in 1979, a beacon message was transmitted from Lochnagar to Morven, a distance of nearly 150 km).

For the 76 chambered cairns, three measures of inter-visibility were used, all being measures taken from the theory of graphs and its applied counterpart, network analysis. The <u>connectivity index</u> expresses the number of links in a network as a ratio of the maximum number of links possible (Hammond and McCullagh, 1974: 51). The <u>nodality</u> of a point is a measure of its accessibility (1974: 43). The <u>cutpoint index</u> of a point is a measure of the part played by that point in connecting together the network (Fraser, 1980a, and Appendix F).

For a network of 76 points, the maximum possible number of links is 2850, when every point is connected to every other point. In Figure 15.10, there are only 115 links, so that the connectivity index of the intervisibility network is 0.040. This is very low in one sense, in that intervisibility would seem to have had a low locational priority, but is high when compared with the only other available set of data on the intervisibility of a class of prehistoric monuments. Fojut's study of the brochs of Shetland included a map of intervisibility between 75 brochs (Fojut, 1980: Figure 2.ii.3). From this map, connectivity indices can be calculated for broch-base to broch-base intervisibility and for wallhead to wallhead intervisibility. These indices are, respectively, 0.007 and 0.017. Although the differences of terrain between Shetland and Orkney militate against comparisons, it does seem possible that intervisibility was a more desirable characteristic of location among the chambered cairns of Orkney than among the brochs of Shetland.

The nodality of each chambered cairn is simply the number of other cairns which may be seen from it. The distribution of nodality for the 76 cairns can be seen in the bottom diagram of Figure 15.11. This demonstrates that the range of nodality is from zero (in the case of 15 cairns, which are not intervisible from any other) to a maximum of 14 (where 14 cairns can be seen from a single location). The cairns with high nodalities fall into three groups. Four sites with nodalities of six or seven (Knowe of Ramsay (ORK 30), Quoys (ORK 56), Redland (ORK 57), and Redland South (ORK T20)) and several more with nodalities of five, are situated on the north and south shores of Eynhallow Sound.

In Figure 15.10, a small community of chambered cairns is readily apparent bridging the sea between the south coast of Rousay and the north coast of the Mainland. This observation should render any statements which treat the island of Rousay as a single entity unconnected to the rest of Orkney - statements such as those contained in Childe (1942) and Renfrew (1973a) - as worthy of further examination.

Three cairns with nodalities of five, six, and nine respectively, form another distinctive group. Tres Ness (ORK 50), the Earl's Knoll on Papa Stronsay (ORK 14), and Holm of Huip (ORK 20), are situated in coastal positions around the inland sea between Eday, Sanday, and Stronsay. Accordingly they are visible from several cairns on these three islands.

The last distinctive grouping also contains three cairns, with nodalities of six, ten, and fourteen respectively. These are Sandyhill Smithy (ORK 47), Withebeir (ORK 55), and Vinquoy Hill (ORK 53) and they have in common a location on high points down the hilly spine of Eday. The island of Eday lies at the centre of the north isles of Orkney and is surrounded by Rousay, Westray, Sanday, Stronsay, and Shapinsay. The summit of a hill in this island will necessarily command spectacular views of the island-group. Eday has a dense concentration of chambered cairns compared with the other north isles: the desire for intervisible locations may be a contributory reason.

Figure 15.11 and Table 15.12 display the distribution of nodalities by cluster. These show that cluster II and cluster III conform to the general distribution of nodalities for all 76 cairns (which has a mean nodality of 3.00) but also show that cluster I and clusters IV-VI have higher nodalities with means of 4.80 and 3.86 respectively. However, the histogram for clusters IV-VI (and the high standard deviation of this particular distribution) caution against making a general statement about these seven cairns.

The cutpoint index of a point is a measure of the disruption caused by the removal of that point from the network. The distribution of cutpoint indices for the 76 cairns is displayed in Figure 15.13 and tabulated by cluster in Table 15.12. The range varies from zero to three, but one is by far the most common index, accounting for 51 of the 76 sites. There are eight sites with an index of two, and three sites with an index of three. Most of these are located in elevated positions and have a high cutpoint index because they have a distant view of a single cairn on another island. Distant views of this type ensure that connected webs of intervisibility traverse across many kilometres. The best example is the single component of the network in Figure 15.10 which includes 44 chambered cairns on 14 different islands from the Mainland to Sanday. All eleven cairns with cutpoint indices of two or three are members of this component: examples include Kierfea Hill (ORK 26) from which it is possible to see cairns on Shapinsay, Helliar Holm, Egilsay, Rousay, and Eday; and Vinquoy Hill (ORK 53) from which it is possible to see cairns on Faray, Westray, Eday, Calf of Eday, Sanday, and Holm of Huip.

Figure 15.13 and Table 15.12 also demonstrate the distribution of cutpoint indices by cluster. Again, cluster II and cluster III conform to the pattern observed among the cairns in general, but cluster I and clusters IV-VI have mean cutpoint indices of 1.20 and 1.57 respectively. Furthermore, the histograms and standard deviations show that these distributions are not caused by a few aberrant sites. As with nodality, it is difficult to draw any strong conclusions about the intervisibility of cairns by cluster because of the small number of cairns in each cluster.

In summary, it is possible to make only two very tentative conclusions:

1. there may have been a preference for location in places which ensured a high degree of intervisibility between chambered cairns.
2. this preference may have been more pronounced among the cairns of cluster I and clusters IV-VI.

This analysis of intervisibility has not found strong evidence for the existence of power relationships expressed in terms of cairn location. Nevertheless, it has suggested that certain groups of cairns, which have been shown to be unusual in other ways, may be located, with purpose, in places which are relatively dominant.

15.4. THE DEMARCATION OF SPACE WITHIN CHAMBERED CAIRNS

As the excavation evidence from the prehistoric megalithic monuments of Europe has grown in quantity, it has become accepted that few sites are not internally divided in some way. In the archaeological literature, the significance of such internal division has been examined by the distribution of material remains - human bones, pottery and other artefacts, and manuports - found within each megalithic structure. Such an examination is attempted elsewhere for the chambered cairns of Orkney with some result. This section attempts to change the scale of the argument from the examination of intra-site variation (looking at the differences between the internal divisions of a single monument) to the examination of inter-site variation (looking at the different types of internal division found at a number of monuments).

One such approach is that of Kinnes (1975) who looked at the possible ways of amalgamating modules of space into a single unit. His classification, reproduced here as Figure 15.14, identified three basic divisions of internal space within megalithic monuments: linear combinations, agglomerated combinations, and dispersed combinations. Apart from demonstrating that such combinations need not be seen as a result of "sub-Darwinian principles of evolution and reversion" (1975: 20), Kinnes did not develop his argument to suggest any associated differences in monumental function.

The method of operation here was to reduce the ground plan of each chambered cairn to a simple tree graph (or network) in which an open circle represents an internal division of space and a closed circle represents the exterior of the cairn. A line between any two circles represents direct access between two demarcated spaces. Examples of these graphs can be found in Figures 15.17 and 15.16 and can be compared with the original ground plans in Appendix A. This method has been found useful for several reasons. Firstly, it ignores details of chamber architecture which may not be relevant to a discussion of conceptual space. Secondly, it ignores the relative size of monuments to concentrate on the arrangement of space within them. Thirdly, it ignores differences in methods of construction which could be a result of local adaptation. The intention is to study similarities and differences behind the idealisation of space, and not the mechanism whereby those similarities and differences are actualised. Thus an earthern barrow eight metres across in Wessex may have the same internal divisions of space as a Scottish megalithic horned chambered cairn 80 metres in length.

It is possible to discern the complete, or nearly-complete, ground-plans of 39 chambered cairns in Orkney. The graphs showing the demarcation of space within these cairns are displayed by cluster in Figures 15.15 and 15.16. A first impression is that, with the exception of cluster I, there is little uniformity within clusters. Cluster III has a site as simple as Vere Point (ORK 52) and one as complex as Taversoe Tuick (ORK 49), and in clusters IV-VI there is the simple site of Maes Howe (ORK 36) and the Hydra-like complexity of Holm of Papa Westray South (ORK 22). This impression must be modified once a categorisation using graphic criteria is imposed across clusters.

Figure 15.17 shows one classification of all 39 tree graphs. The major distinction in this classification is between those graphs which have only two endpoints (such as that representing Bigland Long (ORK 1)) and those having more than two endpoints (that representing Blackhammer (ORK 3) has three and that representing Quanterness (ORK 45) has seven). The first of these groups - here designated general type A - contains 23 members or nearly 60% of the total, while the second group may be further subdivided by other graphic criteria, and are here designated general types B, C, and D.

In detail, this classification of general types of space demarcation may be broken down as follows:

1. <u>Type A</u>. Containing those graphs with only two endpoints, this type has four sub-types:

   Ai: chambered cairns with only two internal divisions of space. This sub-type has two members, Burgar (ORK 6) and Vere Point (ORK 52), both belonging to cluster III.

   Aii: chambered cairns with three internal divisions of space. This is the classical tri-partite Camster type chamber of Henshall's O-C-H group but it is interesting to note there are only 14 sure examples in Orkney. With the exception of three unclustered sites, all belong to cluster III or cluster II.

Aiii: chambered cairns with four internal divisions of space. The two examples are Holm of Papa Westray North (ORK 21) and Knowe of Yarso (ORK 32), both belonging to cluster III.

Aiv: chambered cairns with ten or more internal divisions of space. This sub-type contains five examples and is uniquely identified with cluster I.

2. Type B. Graphs of type B are characterised by having one point which is a cutpoint partitioning the graph completely into a number of trivial components without links. In other words, these chambered cairns have a central space giving access to every other space, including the outside, and there is no connection between any other two spaces. There are three sub-types:

Bi: chambered cairns with four internal spaces. Wideford Hill (ORK 54) and Maes Howe (ORK 36), both belonging to clusters IV-VI, are the two members of this sub-type.

Bii: chambered cairns with five internal spaces. This is an interesting sub-type because it contains three members of cluster III and one member of clusters IV-VI. The former are all examples of Henshall's Bookan type chamber and are Bookan (ORK 4) itself, and the two small cairns on Calf of Eday (ORK 9 and ORK 10). The latter is Vinquoy Hill (ORK 53).

Biii: chambered cairns with seven internal spaces. This sub-type contains the two chambered cairns of Quanterness (ORK 43) and Quoyness (ORK 44), both belonging to clusters IV-VI.

3. Type C. Graphs of type C are characterised by two links emerging from the root of the graph or, in other words, represent chambered cairns which have two distinct and separate chambers entered by different passages. There are three members: Calf of Eday Long (ORK 8), Huntersquoy (ORK 23), and Taversoe Tuick (ORK 49). This type may not be a true grouping since it is not proven that any of these chambered cairns had two chambers in use at one time and hence the graphs may be a conflation of two monuments separated in time.

4. Type D. This type is a catch-all for graphs not belonging to the other three types. The five members are characterised only by complexity. They include Blackhammer (ORK 3), a seven-compartment

cairn, entered from the side, of cluster III, and the two monuments termed by Hedges (forthcoming) as "hybrids", namely Isbister (ORK 25) and Unstan (ORK 51). They also include two monuments of clusters IV-VI, Cuween Hill (ORK 12) and the large cairn on Holm of Papa Westray (ORK 22), an anomaly by any standards.

We are now faced with the problem of attributing meaning to these different demarcations of space. The problem may be approached by considering two different aspects: the number of demarcated spaces and the arrangement of those spaces.

The number of demarcated spaces varies from two upwards. In Chapter 13, while discussing the burial evidence from the chambered cairns of Orkney, it was noted that bone deposits in a tomb could be separated on the basis of sex, age, parts of the body, social position of the deceased, membership of a family group, and by other criteria. While the exact nature of the distinctions made by the living people among their dead must remain a matter for speculation the suggestion is here made that the number of demarcated spaces within a chambered cairn is related to the number of categories beyond death recognised by the cairn-users. That is there is a correlation between the layout of the interior of a chambered cairn and the categorisation of the world of the dead.

This immediately implies that the people of Neolithic Orkney did not all have the same conception of death. Some people were content to recognise only two divisions of the world of the dead: others may have recognised as many as 17. The most common number of divisions may have been three. Whatever the nature of these divisions, it is not unreasonable to state that the meaning of death to the tomb-builders was not constant throughout the time-span of the chambered cairns of Orkney.

A caveat must be inserted here. Although the last argument has been stated in terms of death and the world of the dead, it could equally well apply to any other facet of the use of the cairns. Death is a reasonable locus for the argument from number of demarcated spaces, since we know those spaces were used in some instances for the deposition of dead people, but a more general conclusion would be that the meaning of any specific activity associated with the interior of the monuments was not constant over time.

The arrangement of demarcated spaces is, as has been pointed out by Hedges (forthcoming) in his discussion of Isbister, inextricably linked with the means of access to those spaces. The first point to note is that there is only one path of access to every demarcated space in an Orcadian cairn. That is, there is only one way to reach every compartment or cell from the outside world (and only one way to reach the outside world from every compartment or cell). In graphical terms, every graph in Figures 15.15 and 15.16 is an arborescence, a connected graph without cycles that has a root (Berge, 1973: 33). The vast majority of enclosed megalithic structures in prehistoric Europe conform to this pattern.

A second point to note about paths of access is that identified by the distinction between chambered cairns of type A and those of every other type. If we imagine entering a chamber and taking stock of the number of alternative ways to proceed (in addition to staying still and retracing our steps), monuments of type A never present us with more than one choice, whereas monuments of other types may present us with a choice of two or more alternative paths.

Again, the meaning of these two observations is a matter for speculation. Nevertheless, if it is assumed that every demarcated space in a chambered cairn was designed for a specific purpose or activity, then it is possible to give an interpretation for the observations. The first, that there is only one path of access to every demarcated space from the outside, could be taken to mean that the activities carried out in each space stood in a simple and exactly defined relationship to the activities carried on outside the cairn. The lack of physical complexity in the path to each compartment is a mirror of the lack of conceptual complexity in the relationship between the day-to-day world and the special world of the cairn interior.

The second observation may be interpreted in a similar fashion. The existence of junctions within a chamber may be an indication that the special world of the chamber was regarded as possessing internal distinctions that were represented as physical distinctions in the layout of the chamber. That is, there were choices to be made in the conceptual fabric of the world associated with activities within the cairn, which were reflected in choices to be made in the physical fabric of the chamber. More importantly, a difference can be seen between the monuments of type A where no such choices are expressed, and the monuments of types B, C and D where such choices are implicitly expressed.

One further analysis was carried out on the demarcation of space within chambered cairns. Figure 15.18 is a distribution map of the 39 monuments classified by type. Some patterns are immediately obvious. There are concentrations of type A cairns in Rousay and on the Mainland coast across from that island. There are no type A cairns among the grouping of monuments across the central Mainland. The island of Eday has a diverse mixture of cairns of types A, B, and C. Three of the four monuments of type Bii are situated in close proximity to each other (and intervisible from each other) in north Eday and the Calf of Eday. Cairns of type B are absent from Rousay and Westray. These patterns may be difficult to put into the context of other findings of this thesis, but there is no doubt of their existence. A corollary is that the differences postulated above in the demarcation of internal space are also expressed in the spatial regionalisation of chambered cairns within Orkney. In short, there appear to have been regions of Orkney where the activities taking place within chambered cairns were thought of in a different way from other regions of Orkney. If the treatment of death and the after-life was one of these activities, then there was more than one dialect of the language of death.

To summarise, there are few conclusions from this section which are falsifiable. Those statements that can be made are:

1. there is great variety in the demarcation of space within chambered cairns
2. the majority of cairns (type A) have chambers which are simple linear combinations of from two to 14 compartments. There is only one path to each compartment or cell and there are no internal junctions in the chamber.
3. a significant minority of cairns (type B) have chambers with a single central compartment opening on to other compartments. This type includes monuments of Henshall's Bookan type and her Maes Howe type but they have in common the existence of only one path to each compartment or cell and the existence of internal junctions in the chamber.
4. there are regional patterns in the demarcation of internal space.

15.5. ANIMAL BONES AND TOTEMISM

In Chapter 8, tables were presented of the animal and bird remains from prehistoric contexts at excavated chambered cairns in Orkney. These are reproduced as Table 15.19 with certain qualities emphasised. The emphasis is designed to show that for some of the cairns there is a single animal or bird species which dominates the faunal assemblage. That is, one species is found in numbers a magnitude above the numbers of any other species and, in many cases, in numbers a magnitude above the numbers of every other species added together.

The quality of information lying behind Table 15.19 is very uneven. It ranges from a single line recording the discovery of seven dog skeletons at Burray (ORK 7) by the nineteenth century excavator (Henshall, 1963: 188) to the comprehensive faunal reports on the partial excavation of Quanterness (ORK 43) by Clutton-Brock, Corbet, Bramwell and Wheeler (Renfrew, 1979: 112-149). This unevenness is recognised but there is an argument to the effect that a consistent pattern emerging from uneven evidence is some sign that the pattern has some validity. In the absence of any certain post-depositional bias influencing the production of Figure 15.19, the results must be attributed to a real pattern of deposition.

The chambered cairns which contribute to this pattern are seven in number including, significantly, the two most recently excavated monuments. Two cairns exhibited a predominance of ovicaprid bones, namely Blackhammer (ORK 3), and Quanterness (ORK 43). Three exhibited a predominance of deer bones, namely Holm of Papa Westray North (ORK 21), Knowe of Ramsay (ORK 30) and Knowe of Yarso (ORK 32). Finally, there were many dog bones at Cuween Hill (ORK 12) and many eagle bones at Isbister (ORK 25). It is perhaps worthy of note that no monument has a predominance of cattle, the animal which provided most food for the pastoral inhabitants of Orkney.

This pattern shows no positive correlation with the cluster categorisation of chambered cairns. Deer and ovicaprids predominate at cairns of cluster III and ovicaprids and dog predominate at cairns of clusters IV-VI. Also, as is demonstrated by Figure 15.20, there is no apparent regional pattern of these faunal concentrations. Indeed, on Rousay three cairns which are within 1.5 km of each other do not have the same animal bone concentrations. These two observations combine to suggest that the pattern of faunal concentration under discussion here is one that overlies and is independent of many of the other patterns to be seen in Neolithic Orkney.

How did these concentrations of faunal material arise in prehistoric times? All of the bones recovered were found in the passage or chamber of the monuments and there is little doubt that they arrived there by human agency - it is not probable that 35 deer died in the Knowe of Yarso without the sanction of the cairn-users.

If animal bones were deposited, either accidentally or deliberately, by the cairn-users, then we must postulate mechanisms for that deposition. There are several possibilities: deposition in deliberate association with a human body; accidental deposition during the course of a burial rite, such as a funeral feast; accidental or deliberate deposition during the course of some other repeated rite; or deposition associated with a specific event in the life of the monument, such as building or blocking. The excavation evidence would tend to exclude the last possibility for Quanterness and

Isbister, but none can be excluded for all the cairns. It may not yet be possible to weigh these possibilities against each other, but we are left with the conclusion that, for whatever reasons, the bones of different animal species were deliberately taken inside chambered cairns and that in some cairns the bones of a single species were preferred over other species. In other words, there was a deliberate association of some cairns with a particular species of animal or bird. Blackhammer could be termed on the available evidence a "chambered cairn of the sheep"; Isbister is truly (as the name of a recent exhibition at Tankerness House Museum suggests) a "tomb of the eagles".

The argument can be advanced no further without introducing parallels from another time and place: the key word is "totemism". It is worth quoting a dictionary definition in full:

> "Totem
>
> 1. Among the American Indians: The hereditary mark, emblem, or badge of a tribe, clan, or group of Indians, consisting of a figure or representation of some animal, less commonly a plant or other natural object, after which the group is named; thus sometimes used to denote the tribe, clan, or division of a 'nation', having such a mark; also applied to the animal or natural object itself, sometimes considered to be ancestrally or fraternally related to the clan, being spoken of as a brother or sister, and treated as an object of friendly regard, or sometimes even as incarnating a guardian spirit who may be appealed to or worshipped".
>
> (OED, Compact Edition, 1971: 3359)

The use of the concept of totemism is by no means restricted to native North Americans: towns, football teams, political parties, and countries have all been associated with particular animals. Even today, the islands of Orkney are each associated with a particular creature, a traditional symbolism that is perpetuated by school-children. If the concept is applied to the observations above, then it is reasonable to postulate an association between each animal or bird and a group of Neolithic Orcadians. That is, associated with a"chambered cairn of the sheep", there may well be a "people of the sheep", who used the sheep as one of Bourdieu's structures structurantes and who defined themselves by a common allegiance to that animal. Also, the sheep may well have fulfilled the role of an instrument de domination as the people of the sheep could have appropriated for themselves the control of a particular resource.

Analogies from everyday life in the twentieth century abound: symbols conveying a wealth of meaning include the colour orange, the electronic resistor, the letter lambda, and the Union Jack. These analogies show the wide range of meaning attributed to symbols in general and indicate the difficulty in attributing meaning to the use of totemic symbols in Neolithic Orkney. Since the totems have been found in association with chambered cairns, it is tempting to suggest that they may have had some role in defining those people who were entitled to use the cairn (such as to be buried in it), but there is no reason to suppose that the observed totemism was limited to those activities carried out at the cairn. Indeed, two anomalous deposits from the continuing excavations at Links of Noltland are tentative signs that faunal totemism may not have been restricted to chambered cairns. A dozen complete deer skeletons were deposited beside a field wall in the west midden, and an eagle skeleton was found associated with the deliberate infilling of the structure at Grobust (Clarke, pers. comm.).

Even if the chambered cairn was not central to the group of people associated with each totem, it is instructive to consider some possible characteristics of these groups. Some which would not be alien to our knowledge of Neolithic Orkney include: a kinship group for rationalising and legitimising exogamous mating; a local residency group for controlling the use of restricted areas of land or other resources; a professional group possessing some learned skill or in possession of information who desired to restrict access to that skill or information; and a political group of self-appointed leaders who needed outward symbols of power to legitimise their control over the making of decisions. Each of these is a possibility: later it will be argued that the first can be best fitted into the other findings of this thesis.

Finally, the conclusions of this section on animal bones and totemism will be reiterated:

1. there are some chambered cairns in which the faunal assemblage from Neolithic contexts is largely dominated by the bones of a single species of animal or bird.
2. this observation appears not to conform with other categorisations of the chambered cairns.

3. it is suggested that these concentrations of fauna are connected with totemism in the social organisation of Neolithic Orkney.

15.6. DECORATED STONES

A small number of stones with designs picked out on a flat surface have been found associated with Neolithic sites in Orkney. A stone engraved with spirals and concentric circles, illustrated in Figure 15.21, was found by Hebden about 1860 at the site now known as Eday Manse (ORK 16). Figure 15.21 shows a stone with concentric circles found by Farrer built into the walling of a double-chambered mound near Kirkwall. This site, Pickaquoy, was formerly thought to be a chambered cairn but is now thought to be a burnt mound (Appendix B).

The stone is included here because of the similarity of the motif to those on the Eday Manse stone and the lack of firm dating evidence for burnt mounds in general and Pickaquoy in particular. Three more decorated stones come from a site excavated in 1981 at Pierowall, Westray (Sharples, 1981). One, the "Westray Stone", consists of a split flagstone on which are engraved linked spirals, concentric circles, and lozenges. It is illustrated in Figure 15.22. Two more smaller stones, found at the same site, have similar motifs but the quality of execution is inferior. All three stones are unstratified but there is circumstantial evidence that they were associated with the lowest levels at Pierowall, and the large decorated stone may have been a "massive lintel at the entrance to a fairly large chambered tomb probably of the Maes Howe (Quanterness/Quoyness) type" (1981: 12). Finally, Figure 15.24 illustrates some carvings on the stones of the chamber at the massive building of Holm of Papa Westray South.

The decorated stones of Orkney have recently been placed in their European context by Elizabeth Shee Twohig (1981). The motifs present in Orkney include examples of her circle motif; circle with central dot; U motif; spiral; zig-zag; lozenge; and cupmarks (1981: Table 13 and 113-116). As can be seen from Figure 15.25 these motifs are common in Ireland and Britain, and are distinct from the common motifs in Iberia and Brittany, the other two concentrations of passage grave art. None of the Orcadian motifs are immediately representational (in the sense that some Palaeolithic cave art clearly represents animals) and Twohig was unable to come to any firm conclusions about their place in society. In her words, much of the art of western Europe consists

> "of geometric motifs which cannot be interpreted. It is unlikely that these motifs were purely decorative for they are not particularly artistic and were placed on the stone without any attempt being made to achieve a pleasing result ..... It has also been suggested that the act of executing the designs was important but while this may be partly true it seems unlikely to have been the sole raison d'etre of the art. In general the geometric motifs seem likely to have had a specific meaning for those who carved them and possibly for those who saw them: these motifs should therefore be regarded as symbols".

(Twohig, 1981: 139-40)

Leaving aside the question of what should be regarded as "particularly artistic", these statements are hard to fault: such motifs as are illustrated in Figures 15.21 to 15.24 are certainly symbolic. Exactly what they are symbolic of is another field of enquiry. To take just one example, the spiral is a motif which is very common in Neolithic Europe. In the form of the double linked spiral, it is found in Orkney on stones at Pierowall and Eday Manse and in the form of single spirals on pottery at Skara Brae (Childe, 1931a: plate XLV, and Clarke, 1976: Figure 7). Again adopting the method of looking for parallels from other societies, Cooper's encyclopedia of symbols was consulted. (Cooper, 1978). The article therein on the spiral is too long to quote _in extenso_ but some of the symbolic uses of the motif from Palaeolithic times to the present, and from Europe to Oceania, include the sun and the moon; life and death; continuity; fertility; the male phallus and the female vulva; fire, air, and water; the Mother Goddess; and the whirlwind and labyrinth. In short, there are few areas of human physical or mental activity which have not been symbolised by the spiral. At the present state of knowledge, it does not seem possible to make positive statements about the meaning of the symbols on these few decorated stones in Orkney. All that can be said is that the very paucity of such stones, and the fact that none have been found associated with any cairns of clusters I, II and III, is an indication that their use was not widespread, and hence may not have been central to the lives of many Neolithic Orcadians.

CHAPTER SIXTEEN: SOCIAL ORGANISATION: SOME ALTERNATIVE RECONSTRUCTIONS

16.1. FARMERS AND MEGALITHIC MISSIONARIES

It is not the intention here to chart the progress of archaeologists' use of the concept "social organisation", interesting and revealing though that progress is. Rather, three recent reconstructions of the social organisation of Orkney at the time of the cairn-builders will be described against the background of contemporary archaeological theory. The first is due to Professor Gordon Childe and was used to support the theory of a unitary European society throughout prehistory in which all change was due to the diffusion of ideas and objects across the continent. The second and third have emerged in the last decade and have been proposed by Dr Euan MacKie, who seeks to establish that the people of Neolithic Britain were skilled in astronomy and mensuration, and Professor Colin Renfrew, who seeks to show the social organisation of prehistoric peoples may be discerned by the spatial organisation of their activities. Each of these scholars has used the large amount of information from Neolithic Orkney and has fashioned an internally coherent reconstruction of the relationships between people and groups of people in the island-group. Each reconstruction begins with the premise that the economy of Neolithic Orkney was largely one of mixed farming.

Childe, in The Prehistory of European Society, published after his death in 1958, compared the original settlement of

Rousay in Orkney with the settlement of the islands of the North Atlantic by Welsh and Irish saints of the early Christian church. Inspired by the desire to propagate a particular system of belief, "megalithic missionaries" or "apostles of the megalithic faith" would travel to the corners of the known world. In Childe's words,

> "...wherever a holy man set up as a hermit in a cave or shack, numbers of local peasants gathered round him eager to renounce their land and calling and enter a community of devout farmers. Collective tombs would ... be also shrines if their occupants were credited with peculiar spiritual powers. Are not the megalithic tombs of Britain the counterparts of the little chapels founded by Welsh and Irish saints in much the same parts of the British Isles? If so, their founders might be called megalithic saints and owe their authority and status to spiritual prestige rather than temporal power".
>
> (Childe, 1958: 128)

This formulation had the advantage of explaining the diffusion of the British Neolithic material cultures, including the tradition of building megalithic tombs, from the south and west to the islands of Orkney.

> "Like Celtic missionaries the megalithic saints would have sailed to the coasts of Scotland, Ireland, and the remoter isles inspired by equally unworldly motives but accompanied by neolithic English or Armorican peasants, eager no doubt to join a community of pious farmers, but also to go on farming and rear families. For that their saintly leaders chose locations best adapted to the primitive rural economy and rude equipment of their pious disciples..."
>
> (1958: 129)

The social organisation of Neolithic Orkney was thus conceived of by Childe as depicted in Figure 16.1(a). Farming communities, each containing a very few score individuals, were in control of a small patch of land from which they took their living. Each community was associated with a single holy individual, a saint, who was held in awe by the farmers on account of his closer connection to the ultimate forces responsible for life and death.

The problems of such a simple formulation now appear to be manifold. The mechanisms by which each farming group sustained and regenerated itself are unclear. The transactions of exchange and manipulation between farming groups are not described. The relationships between saints are not discussed in detail: there must have been some over-riding authority owed allegiance by every saint but Childe gives no indication as to the nature of this authority and whether it was vested in another individual, a caucus of saints, or merely an immaterial idea. The replacement of saints at death is not considered. In short, the social organisation depicted in Figure 16.1(a) fails on at least two counts: it defines only one relationship of control (between saint and farming group), leaving undiscussed every other relationship between individuals and groups; and it is a static system, unable to describe change over time and the mechanisms of regeneration.

16.2. FARMERS AND ASTRONOMER-PRIESTS

Largely inspired by the work of Alexander Thom, a number of archaeologists in recent years have espoused the view that prehistoric peoples in the Britain of four thousand years ago were skilled in the mensuration and design of stone structures and used some of these structures as sophisticated astronomical observations. One of the most respected of these is Dr Euan MacKie who has described, in two works (MacKie, 1977a and 1977b), the development of a stratified society in late Neolithic times, with a small élite of scientists holding power, in the form of restricted information, over the large mass of farming peasantry. The island-group of Orkney, and in particular the settlement of Skara Brae and the henge of Brogar, is one major focus for the exposition of this argument.

MacKie points to a number of connections between Orkney and the great henges of southern England, including Durrington Walls, Mount Pleasant, and Woodhenge. In both places the common pottery style is Grooved Ware, and radiocarbon dates demonstrate both groups of sites were in use at approximately the same time. These connections lead MacKie to a re-interpretation of Skara Brae (1977a: 192). He points to the quality of stone architecture and the very rareness of such Grooved Ware settlements (there are many fewer settlements known than chambered cairns or even Iron Age souterrains, a class of monument which might be comparably visible in the archaeological record). These suggest that places such as Skara Brae were not the normal dwelling places of Neolithic farmers. In support of this hypothesis, MacKie adduces the door-bar for locking house 7 from the outside, a feature which is not a normal domestic arrangement. Although these arguments seem not to be numerous or even very powerful, there may be some truth in the statement that:

> "there are as many, if not more, reasons for interpreting Skara Brae as the architecturally unusual residences of a specialist élite group supported by the agricultural population as there are for thinking of it as the stone version of a normal village of rural peasant herdsmen..."
>
> (MacKie, 1977a: 202)

An important element of this reconstruction of Orcadian society is the role of the Ring of Brogar. MacKie states that the geometry and size of this stone circle conforms to standards which were in common use throughout Neolithic Britain and refers to two articles by Thom and Thom (1973 and 1975) in which the possibility that the Ring and its associated small cairns were used as a lunar observatory is discussed. At least six significant celestial orientations to distant marks on the horizon are noted by the Thoms, and while these are not sufficient for MacKie to postulate a direct connection between the inhabitants of Skara Brae and astronomical activities at the Ring of Brogar, his clear implication is that the settlement stands in the same relationship to the henge as an Early Christian monastery to its neighbouring church or cathedral (MacKie, 1977a: 203).

The case for Orkney is perhaps not as strong as for the henges of the south, but the scheme envisaged is one of individuals responsible for astronomical, ceremonial, and magical rites - a convenient term could be astronomer-priests or astronomer-priestesses - living a life apart in a small number of special settlements and being economically supported by the people of farming communities scattered throughout

Orkney. Such a scheme is depicted in Figure 16.1(b) showing small groups of individuals living an economically and socially self-sufficient life. A number of these communities were each associated with a single settlement of astronomer-priests. Within the astronomer-priest community were, perhaps, other people including disciples undergoing instruction, ordinary farmers enjoying a temporary respite from everyday life, or the families of the priests. The astronomer-priests maintained their élite position by control of information: they were the ones who counted the seasons of the year, who determined the dates of festivals and ceremonies, and were in close communication with the movers of sun and moon.

MacKie's formulation of a two-tier stratified social organisation is not at variance with that of Childe. Indeed, a combination of their two reconstructions (an amalgamation of Figure 16.1(a) and (b)) would seem to be possible. Either there is a chronological difference, with Childe's megalithic saints gathering together into small groups over a period of decades or centuries until eventually all the saints of Orkney were living in a small number of dwelling places, revered by the common people and passing on their knowledge by word of mouth, or alternatively the two systems existed at the same time, with each farming community associated with single saints who may have spent some of their time at a settlement containing other visiting saints and individuals at a higher level of the religious hierarchy. This latter alternative certainly removes one major objection to the Childean reconstruction: the religious system would perpetuate itself by means of a few settlements where saints would be trained, initiated, and appointed to be overseers of distant farming communities.

Inevitably many objections have been raised to MacKie's reconstruction of Neolithic society as one inhabited by skilled, intelligent, observant, and devout people. Sadly, many of these objections have not focussed on the details of the reconstruction but have concentrated on the disruption caused to extant theories if the reconstruction is valid. Even more surprisingly, some writers have not even considered the reconstruction: Burgess' book <u>The Age of Stonehenge</u> published in 1980 does not mention MacKie's social reconstruction and dismisses the years of work by Thom and his associates in less than a page.

There are, indeed, many criticisms to be made of the farmer and astronomer-priest society. The date suggested on astronomical grounds for the Ring of Brogar (Thom and Thom, 1976: 113) is as much as a millennium adrift from radiocarbon estimates for the use of the Stones of Stenness and Skara Brae. Skara Brae is eight kilometres from the Ring of Brogar. Rinyo and Links of Noltland, the other two Grooved Ware settlements of Orkney, are each on islands without henges, and it seems unlikely that more major ritual and astronomical sites will be discovered. MacKie's use of dietary evidence to suggest that the inhabitants of Skara Brae ate more processed food than would be expected of an ordinary Orcadian depends on an analogy which may not be appropriate, and may not be supported by the recent excavations.

At another level of criticism, the actual mechanisms at work within the farmer and astronomer-priest society are not fully explored and the society requires further explanation in the same two areas as that outlined by Childe: only one relationship of control is defined and the forces of change over time are not discussed. For instance, the societal mechanisms at work within each farming community - the forces which maintain that community as a separate and recognisable entity - are not discussed by MacKie. The same comment can be made about the societal forces at work within the astronomer-priest community. By postulating country-wide standards of knowledge, it becomes equally necessary to postulate relationships of power and control between astronomer-priest communities: is it possible to define any such relationships between the high priests of Durrington Walls and those of Brogar? The answers are obviously not simple ones, and will be thought by many prehistorians as not worthy of consideration, but the fact they can be asked is a sign of progress.

16.3. FARMERS IN A SEGMENTARY SOCIETY

In a series of remarkable publications, Professor Colin Renfrew (1973a, 1976, 1977, 1979) put forward for consideration the possibility that Neolithic society, and in particular the early Neolithic society of Orkney, was not hierarchically structured, did not maintain stratified levels of power, and did not contain central places where infrequent and important activities took place. Such a society has been termed "segmentary"

> "which implies simply the repetition of equivalent groups. They are cellular and modular: cellular in that the groups are clearly defined and operate in many ways independently, and modular in that they are of approximately equal size. The segments are autonomous, economically and politically, and usually number between 50 and 500 persons".
>
> (Renfrew, 1976: 205)

It is Renfrew's contention that a segmentary society (and other types of society) can be recognised archaeologically by the spatial patterning of their material cultures, including the patterning of territories associated with settlement and ritual sites. The segmentary society should contain a pattern of dispersed sites of similar type, all of them in operation synchronously, and none of them being recognisably more important in any sense. A subsidiary argument is that such societies may use significant monuments as territorial markers, a central focus of a segment of society, associated with the people of that segment and legitimising their claim and right to the use of the land around the monument.

This contention has been put to the archaeological test by a research project, recounted in Investigations in Orkney (Renfrew, 1979). That work, centred around the excavation of Quanterness, arrived at a number of conclusions (placed in their European context in Renfrew (1981)), some of which may be cited here:

" 1. At the time of its early use, the cairn at Quanterness was not stratified in a hierarchy above or below monuments of different scale.

2. Quanterness was an equal access tomb .....

3. No prominent ranking is indicated among the tomb occupants ....

6. The size of the group using the cairn may have been of the order of twenty.

7. The labour required for the construction of the monument ... could without difficulty have been invested in the space of just a few years by such a group ....

8. Quanterness is just one of a number of similar Orcadian cairns of comparable scale.

9. The distribution of these cairns is fairly dispersed ...

10. A subsistence base of mixed farming is inferred .... with the exploitation of game (deer - not necessarily wild), birds, and fish".

(Renfrew, 1979: 218-9)

These conclusions are sufficient for Renfrew to claim that the social organisation of early Neolithic Orkney was indeed segmentary. He envisages small groups, of less than a hundred individuals, living on distinct areas of land and surviving by farming and hunting. Each distinct area, or territory, was marked by a chambered cairn which may have been replaced by another every few centuries. The cairn served as a deed of usership of the land and the bones of ancestors contained within it were physical reminders of the continuity of settlement and the lasting bonds between people and land. There were very few transactions, either social or economic, between groups: each community was an independent entity and required little support from the outside world.

Such a society could be depicted as in Figure 16.1(c). Each farming community is self-contained and isolated from every other community. There are no relationships of control between groups of individuals and there are no social groupings at any level which involve individuals from more than one farming community.

The segmentary society as an explanation of social organisation in Neolithic Orkney is open to several criticisms. Several of Renfrew's conclusions rest on the assumption that because a tomb contains the bones of an equal number of females and males, and a complete spread of ages at death, then that tomb contains the dead of a whole community. This assumption is also employed by Hedges (1982 - and forthcoming) to arrive at similar conclusions about the people of Isbister. It must be pointed out, however, that such a distribution of sexes and ages would also be apparent had burial at Quanterness or Isbister been restricted to a single aristocratic family of astronomer-priests, or, indeed, to many other distinctly defined sections of a complete community (Fraser, forthcoming).

Serious doubts must also be cast on the biological viability of a community of less than a hundred people. Hedges (1982) has tried to demonstrate that the demographic characteristics of the people buried at Isbister are such that they could sustain a constant population but there is no doubt that such a small population could not be stable over centuries: the effects of catastrophic events such as plague or famine are inevitably more serious on small communities. When the archaeological evidence of widespread material cultures is taken into account, the segmented unit with no connection with its neighbours is seen to be an extreme expression of a theoretical mode of existence. No society can exist in complete isolation and the segmented units of Neolithic Orkney must, even if only rarely, have engaged in transactions with other segmented units. It is hard to imagine such transactions (which surely included exogamy and the trading of valued artefacts) taking place without a formalised and socially recognised set of rules to govern them. Such rules are the first stages in the construction of a complex society: it is doubtful if the segmentary society has ever existed in a pure form.

The segmentary society also depends on there being no stratification or hierarchy apparent in the arrangement of monuments. Renfrew does not deny the existence in Orkney of a few chambered cairns which are of a different scale to the majority, nor the existence of the two massive henges. He attributes these monuments, not to the synchronous development of two levels of society throughout the Neolithic period, but rather to the development of "centralising tendencies" only in the last centuries of the period. He equates the construction of the Ring of Brogar, the Stones of Stenness and Maes Howe with the construction of the causewayed camps and henges of southern Britain and suggests that in both Orkney and Wessex, chiefdoms were developed based on groups of several thousand people. In Orkney a ceremonial centre developed around the meeting of the two lochs, Stenness and

Harray, right at the heart of the Mainland. This centre was a focal point for the entire population of that island, and perhaps also for Orkney as a whole.

The argument that three sites should be regarded as being part of a shift towards a stratification of society in the later Neolithic would obviously be strengthened if these sites could be shown to have reached their final massive forms after the majority of chambered cairns had been constructed. As Figure 9.21 shows, this is not apparent from the few radiocarbon dates we have available: Maes Howe and Stenness do not have appreciably late dates. Renfrew's argument for centralising tendencies in the Orcadian late Neolithic is thus seen to be purely circumstantial and dependent upon the validity of the reconstruction of the segmentary society explained above. In short, it was necessary to relegate certain monuments to the later Neolithic in order to produce a coherent reconstruction of Neolithic society.

Even allowing that a change from the segmentary society to a stratified society did occur, it must surely be necessary to postulate some mechanism which brought about this change: what was the nature of the change and how did society adapt itself to new conditions? This criticism is essentially the same as that levelled at Childe and MacKie: every reconstruction mentioned here has been static and involves the description of stable unchanging systems.

Likewise, Renfrew's reconstruction also ignores the relationships of power at the smallest scale of society. As did Childe and MacKie, no reference is made to the internal social organisation of the farming community.

This latter comment and several of the previous comments, have been prompted only by the exposition of the three alternative reconstructions. This is as it should be: there is no final, correct, explanation of Orcadian Neolithic society. Every time a new theory is advanced it will be found lacking in some respect, but this is no reason not to advance it. The most positive aspect of the reconstructions by Childe, MacKie, and Renfrew is that they form a foundation (one which is firm and solid by comparison with our reconstructions of the social organisations of many other times and places in prehistory) which can be used to refine future thoughts on the subject. In particular, three major themes have emerged which must be given serious consideration:

1. What were the relationships of power and how did society maintain itself at the lowest levels of social organisation? In other words how did a single farming community function from year to year?
2. Are the concepts of the segmentary society and the stratified society applicable to Neolithic Orkney and, if so, how can they be used to further our knowledge of the period?
3. Was the social organisation of Orkney in the third and second millennia bc a static, unchanging, system or can dynamic change be seen throughout the period?

These themes will be considered in conjunction with the accumulated evidence of the first four sections of this thesis in Chapter 17.

PART FIVE

SPECULATIONS

CHAPTER SEVENTEEN: SYNTHESIS AND SPECULATION

17.1. INTRODUCTION

There is a strong practical tradition in archaeology which maintains that the discipline has completed its task when it has listed and classified the material objects of its study. In opposition, there are a series of traditions, some older and more established than others, which maintain that the task of archaeology is never completed by the compilation of lists, but includes the analysis of those lists and the attempt to describe their non-material significance. This latter viewpoint should form part of the aspirations of every researcher: it is essential for archaeologists, however inadequate their data, to synthesise and speculate beyond the strict bounds of that data. It is only by advancing hypotheses to be tested by future researchers that an area of enquiry can progress beyond the bounds of present knowledge.

In the present chapter, some statements will be made for which there may not be strong positive evidence, but which are nevertheless satisfactory and reasonable statements according to one writer's perception, in 1982, of Neolithic Orkney. Many of these statements may be challenged, and some may be shown to be unfounded in the near future, but their very expression may lead to a greater understanding of the subject, an understanding which would not have been possible without speculation.

There are many ways of approaching the holistic understanding of a prehistoric culture. Renfrew (1977: 109) has identified five subsystems which could be useful in such an undertaking:

1. subsistence
2. technology
3. social organisation
4. cognitive basis
5. trade and communication

This work, being based on a study of the chambered cairns, has positive contributions to make to our knowledge of the society of Neolithic Orkney in just two of these fields: cognitive basis and social organisation.

17.2. THE COGNITIVE BASIS OF SOCIETY

The cognitive basis of a society is the set of cultural rules, often expressed by symbolic means, by which the members of the society understand and use the material world around them. It includes any method of defining relationships between people, whether individual or groups, and defining relationships involving people and inanimate or spiritual objects. In the context of Orcadian Neolithic society, this section will concentrate on the relationships of the members of that society to the land around them, the sky above them, and the time after their death. It will be seen that it is possible to weave a coherent and consistent system of belief from these three elements. It might not be possible to reconstruct with certainty the emotions and morality connected with that system of belief, but it is possible to explain some of the observed archaeological evidence in terms of such a system.

In the absence of any alternative explanation the system of belief to be postulated below will stand as a hypothesis to be confirmed or refuted by future work.

The importance of land to the cairn-builders can not be appreciated without knowledge of their subsistence economy. The archaeological evidence is agreed that the entire resources of the natural landscape of Orkney were exploited: hunting and collecting of the products of land, sea and air were carried out. In addition, there is little doubt that the cairn-builders introduced domesticated animals and plants to the island-group and were the first settled and permanent inhabitants (Chapter 3). Their domesticated animals survived only due to husbanding and herding by the people of Orkney. The evidence for domesticated plants is scanty, consisting solely of a few cereal grains and patches of ploughed soil, but it may be assumed that a variety of plants was grown. The ground under cultivation was probably heavily manured and protected from the free-ranging domesticated animals. At any one time, the area of cultivation may have been very small and consisted of only a few patches of field or garden. Whilst there is as yet no clear evidence of extensive Neolithic land boundaries in Orkney, the lynchets and walls at Scord of Brouster in Shetland (Whittle, 1980) suggest the existence of divided landscapes in the northern isles from early prehistory.

The agricultural part of this economy, and to a lesser extent the hunting and gathering part, would have required a belief in the ability of the natural environment to continue to provide the fruits of the sea and earth. In other societies at an equivalent level of technology the expression of this belief has taken many forms including the investing of elements of the natural environment with quasi-human spirits, and the deification of the earth itself. Perhaps the best clue to the way that a belief in the endurance of the earth and its products was symbolised by the cairn-builders lies in their choice of location for the cairns.

The cairns were self-evidently the most permanent and conspicuous objects in the Neolithic landscape. In Chapter 12 it was suggested that farmers of the period preferred soils which were easy to plough and freely drained and that the cairns are preferentially located on land of this type. That is, chambered cairns were situated on or near the farming land of the cairn-builders. We can imagine the landscape of Orkney at the turn of the third millennium bc as containing areas of land perceived as being good for farming, where the activities of arable agriculture and pastoralism were concentrated. Within these areas, the structures we now call chambered cairns may have been the focus of attention. They served as both symbolic and functional centres of the farming community: it is here suggested that chambered cairns were the community centres of Neolithic Orkney.

As a symbolic centre, the chambered cairn, by the hours of labour involved in its construction (Chapter 14) and by its massive permanence, was a constant reminder that humanity was inextricably involved with the land. Even more specifically, each group of people was now totally concerned with a particular small area of land, the boundaries of which may not have been demarcated, but which nevertheless were well defined by customary usage. That is, there may be some validity in the suggestion that chambered cairns were territorial markers, emphasising and legitimising the claim of the people connected with the cairn to the use of certain land. A chambered cairn was the concrete expression of that claim presented to outsiders, but it was also an expression of internal strength to the community of the cairn, uniting individuals by their allegiance to the same monument, and by extension their allegiance to the same land.

As a functional centre, the chambered cairn was in an ideal position to serve as a meeting place. Specialist and infrequent functions might include the rituals of death or sky-gazing, to be dealt with below, but the cairn would also have served as the locus of informal gatherings. Being located on land which was visited daily for farming purposes it is easy to envisage the monument becoming a convenient place to shelter from the wind, from where to watch over domesticated animals, and to hold all kinds of meetings and discussions which involved individuals who did not live in the same building. Chambered cairns were not wholly sacred and revered places: they were familiar and ordinary features of the landscape which only at times assumed a special importance.

Two extraordinary functions might be attributed to the cairns - functions of special significance occurring infrequently. The first of these has some connection with the sky. It is not suggested here that the cairns were part of a sophisticated astronomical observatory, but it is suggested that the cairn-builders and users were, like many prehistoric peoples, aware of the yearly cycle of the sun. Of the several significant points where the apparent motion of the sun intersects the horizon, the one of greatest significance to an early farming people might be that point marked by mid-winter sunrise. Throughout half the year, the sun rises progressively further and further south, and the length of day when it distributes light and heat becomes progressively shorter. The azimuth of mid-winter sunrise is that point on the horizon where the sun is at its most southerly apparent position: after mid-winter, it returns to the north. It is possible that this time of year could assume an importance to an early farming people as marking the end of the old year and the beginning of the new year, with dawn of mid-winter's day presaging the arrival of spring and the fertility of new life. If this were so, then it would be natural to hold a gathering or meeting to celebrate the arrival of the new year and to look forward to the promise of longer and warmer days.

Another important point in the farming year is the completion of the harvest when the crops have been safely gathered in and pastoral animals are nearing the end of the available food supply. This time of the year is universally celebrated by farming communities as the "harvest home" or "thanksgiving" for another year of survival, and occurs at about the time of the autumnal equinox when the sun sets directly in the west. It is not unreasonable to postulate that the people of the cairns held another gathering or meeting to celebrate this event.

We have here postulated two important events in the yearly cycle of the Neolithic inhabitants of Orkney. One is a celebration at the beginning of a new day and a new year at the time of mid-winter, and the second is a celebration and thanksgiving at the end of a harvest day and the end of the agricultural year about the time of the autumnal equinox. These events are associated with solar azimuths in the south-east and in the west respectively, and it is precisely these orientations that emerged as being of significance in the study of sectors of distant visibility from each chambered cairn, summarised in Figure 15.9. This diagram shows that the chambered cairns of Orkney were located so as to give distant views towards the south-east and the west. When this observation is added to the previous observation that chambered cairns are situated on or near farming land and combined with our postulation that two gatherings connected with farming were held at times when the sun was in the south-east and west, it does not seem unreasonable to conclude that the place of gathering was, indeed, the permanent monument of the chambered cairn. That is, one function of the chambered cairns of Orkney was to serve as the locus of events celebrating special times of the farming year.

Another extraordinary function that has commonly been attributed to the cairns is that of mortuary chamber, and there can be no doubt that the chambered cairns of Orkney were the final resting places of some of the Neolithic inhabitants of the islands. Nevertheless, the deposition of human remains inside the cairn was not a common event: no modern demographic reconstruction of the Neolithic population has suggested that such depositions would have taken place more than a few times a year, even if it is assumed that most individuals in Orkney were buried in a chambered cairn. Thus the burial function was truly an extraordinary function, ranking in magnitude of frequency with the celebrations of the farming year. Indeed, if (as has been suggested at Quanterness and Isbister), the final disposal of human remains was preceded by a period of excavation or some other treatment outside the cairn, then it is a possibility that the placing of the dead inside the cairn may have occurred infrequently at times governed by a solar calendar or a calendar of which we have no knowledge.

The symbolic meaning of disposal within a cairn has in the past been a target for much speculation. It has been suggested that the passage and chamber of a round cairn could be likened to the womb of a female deity of the earth and that death and burial were regarded as a figurative return to the body of the mother earth. The concept of the earth-mother goddess has been critically explored by Fleming (1969). It has also been suggested that the deposition of bones belonging to the forebears of people using land has the effect of substantiating the claim of the people to that usage their right to live on the land and to live off its products was justified by the bones of their ancestors residing in that land (Renfrew, 1976). These two suggestions can be further considered in the light of observations made here on the chambered cairns of Orkney.

The first suggestion involves two elements, life being dependent on the earth and final disposal inside a cairn, being symbolically linked by the intervention of the feminine principle. The former element is an axiom of existence and is surely apparent to every human of all times who has considered the processes of life. The latter element is a product of archaeological enquiry. The intervening symbolical link is neither axiomatic nor archaeologically shown in the society under study. This would seem to render the suggestion valueless except as an exploration of possibilities based on other societies. However, a closer examination of the information collected on Neolithic Orkney shows that it is unnecessary to postulate the intervening symbolic link. The people with whom we are concerned disposed of the remains of all, or some, of their dead in a collective tomb. This tomb was situated, with purpose, on land which was central to the farming economy of the living people, and may have been used as a meeting place for formal and informal activities associated with that economy. It seems very unlikely that there is no connection between these observations, and the most reasonable connection is that the remains of the dead, after suitable ceremonies to separate them completely from the world of the living, were returned to the place from which all life originally came - the body of the earth. This is not an unusual concept and is echoed in the symbolism of many mortuary practices which involve inhumation, including those of the Judaeo-Christian tradition. The close juxtaposition of the receptacle of the dead to the fields and pastures which sustained the living was a constant reminder of the intimate relationship between humanity and the land.

The second suggestion outlined above - that the right of a group of people to use a particular area of land was legitimised by the presence thereon of the remains of ancestors of that people - is now seen to be closely connected to the last argument. The decision to construct a chambered cairn to receive the bones of the dead, and the decision to locate that cairn on land used by the dead throughout their lives are two facets of the same world-view. A group of people regarded themselves as belonging to a particular patch of land. In order to mark the relationship permanently, they constructed a monument on that land and firmly established a connection between the monument and their group by making a positive and enduring gesture - the final deposition of the physical remains of group members. The group of people had then been plainly immersed in their land for many years, and conceivably for many generations. This knowledge would have been a source of comfort for the living members of the group, giving them a sense of belonging to their own special place, and would also have been a signal to be transmitted to outsiders, informing them they did not share in that sense of belonging.

This discussion of the cognitive basis of Neolithic society has centred on the nature of the relationship between the land and people of Orkney. Based primarily on a study of the location of the chambered cairns it has been inferred that each group of people had an allegiance to a particular area of land. This allegiance was manifested by the building of a monument which became a familiar object in the cultural landscape and was used as a meeting place for informal events, for holding celebrations to mark important times of the farming year, and as a repository for the remains of dead members of the group.

Two important issues have so far been avoided. The exact nature of the relationship between land and society has not been discussed. There are many possibilities: land may have been owned by a group of people or by an individual: the use of land, but not the land itself, may have been entrusted to a group or individual; or there may have been some intermediate relationship. The resolution of these questions may not yet be accessible to archaeological enquiry.

The second issue avoided throughout this section is the nature of the group associated with each chambered cairn. This question will be considered below in a discussion of the social organisation of the islands.

17.3. THE ORGANISATION OF SOCIETY

The social organisation of a group of people is the totality of the inter-personal relationships between members of the group. It is frequently described in terms of the internal categorisations - the sub-divisions of the group - recognised by the members, and a functioning society is described by the transactions taking place over time between sub-divisions. In the context of Neolithic Orkney, it is possible to approach the problem of social organisation by examining the artefactual evidence, including the evidence of the monuments, and by examining the organisation of space.

There is evidence of two archaeological cultures associated with the chambered cairns of Orkney. A distinctive assemblage of artefacts, the Grooved Ware assemblage, has been found at a small number of cairns, at three settlements, and at one of the henges. Elements of another distinctive collection, the Unstan ware assemblage, have been found at a similarly small number of cairns and at one or two settlements (Figure 8.17). Although there is no doubt of the existence of two separate cultural entities, there is a possibility that their distinctiveness may not be as sharp as formerly perceived. This assertion, based on examination of the pottery, may be subject to revision with the publication of excavation reports in the near future, but is supported by the absence of any spatial patterns of localisation and the absence of any strong chronological patterning of the two cultures.

The structural design of chambered cairns is another method of partitioning the society of Neolithic Orkney. At least three distinctive designs are apparent: the many-compartmented simple chambers within a long cairn, here termed cluster I monuments (Figure 6.46); the small simple chambers in round cairns of cluster III (Figures 6.48 and 6.49); and complex chambers in round cairns of clusters IV-VI (Figure 6.50). Both cluster I, which has a distribution restricted to Rousay and the adjacent Mainland, and clusters IV-VI, which have a concentration of sites in a band running across the Mainland, exhibit some signs of regional localisation, but the chambered cairns of cluster III have a widespread distribution. As regards the chronology of the clusters, Figure 9.21 demonstrates that there is not enough evidence from isotopic dating to support any relative chronological ordering, or the hypothesis that all types were contemporary.

Another aspect of structural design is the amount of labour invested in the construction of monuments. There are many cairns which could have been built in two to five thousand worker-hours (Tables 14.3 and 14.5) and about ten which would have required a building time in excess of this. Furthermore, the cairns with much labour investment have a markedly dispersed distribution, with units of land corresponding closely to modern parishes each containing a single large cairn (Figure 14.7).

One more aspect of the organisation of space which may help in discerning the organisation of society is the internal division of space within built structures. The demarcation of space within chambered cairns is varied but two separate dichotomies can be observed: there are some chambers which contain three or less internal spaces and some which contain many more; and there are some chambers which are complex, presenting the entering person with a choice of ways, and some which are serially arranged giving no choice of access (Figure 15.16). Further patterning of space within chambered cairns is shown by the selective placing of human remains and artefacts in different compartments (Figures 13.6 and 13.7). The rationale behind this patterning is imperfectly understood but there is no doubt of its existence.

The internal division of the three excavated settlements is basically uniform. At every phase of occupation discovered during excavation, each settlement has consisted of more than one demarcated space. These spaces are sufficiently familiar to deserve the term "house": each house contains the furniture and trappings to make it a reasonable supposition that each was the dwelling of a social unit which may have varied in size between three and ten. Houses were grouped together into "villages" (to use Childe's term). Knap of Howar consisted of two or more houses and Skara Brae of seven or more. If the demarcation of space is examined more closely, Skara Brae and Rinyo have more in common with each other than does Knap of Howar with either. The material culture of the settlements agrees with this last distinction such that Skara Brae, Rinyo, and Links of Noltland are termed Grooved Ware settlements while Knap of Howar is an Unstan ware settlement.

Finally, a locational distinction can be made between those chambered cairns which conform to the classical Childean model, in particular the cairns of cluster III, and those which conform to the other model discovered by factor analysis. (Tables 12.31 and 12.34). A typical example of the former is located in an area of good Neolithic farming land, in an elevated position away from the coast and in an area where building stone is easily accessible. A typical cairn conforming to the latter model is located in areas of boulder clay now considered good for agriculture with extensive sectors of intermediate visibility.

Archaeological enquiry has thus established a series of distinctions in the physical fabric left behind by the Neolithic inhabitants of Orkney. One interpretation of these distinctions is that each mirrors a similar distinction in the social fabric: another interpretation is that some represent a chronological change within the timespan of the period. This problem, of deciding whether a cultural distinction echoes a structural difference in society at one point in time or a temporal change from one period to another, will be a constant source of uncertainty and one which is not resolved by the large number of absolute dates from Neolithic Orkney (Figure 9.21). All that can be done here is to attempt a reasonable and satisfactory reconstruction of the organisation of society, pointing out in the process those areas where more than one interpretation of the evidence would be equally reasonable and satisfactory.

The smallest social unit above the individual may have been the group of people who shared a dwelling house. There are two possibilities concerning the relationship of these people to each other. Firstly, they may have been a family group of some kind containing more than one generation, with one or more mating alliance. Secondly, they may have lived in association because they formed some other kind of social unit - such as a group of astronomer-priests - which required close and constant communion. This second possibility is less appealing because it still requires the existence somewhere in Orkney of settlements devoted to the ordinary routine of family life. The first possibility is more plausible and, although the exact nature of the family groupings of Neolithic Orkney remains unclear, it is not unreasonable to suppose that each house was the home of a single family.

Houses were grouped together into farming villages each containing several family units. The village was the basic economic unit and it may have been the case that usage of natural resources, such as land, was held in common by the people of a village. There may have been systems of sub-division to decide the temporary apportioning of resources to families or individuals within the village, but the people of a village may have operated as an economic co-operative to provide food and shelter. Such a system would be echoed in the future by the Norse farmstead and the Scots clachan. Using these analogies, membership of a village group was decided simply by residence: if an individual lived in one of the houses of a village, he or she would be entitled to full participation in the resources used by the village.

The tracts of land associated with each village would certainly be situated at no great distance from the village: this would allow for easy access and daily working at certain times of the year. On or near that land, and conceivably very close to the village, was situated a chambered cairn, the meeting place and conceptual centre of the people of the village. That is, at any one time, each domestic settlement was associated with a single local chambered cairn.

Two questions present themselves. Firstly, how did the population of a single village sustain and regenerate itself over centuries? Secondly, how was the right to participate in the functions of the cairn decided? These questions may be partly illuminated by a single conjecture.

Despite the attempt by Hedges (1982) to show that a population of less than one hundred could be self-perpetuating, it is extremely doubtful that the community of a village would be biologically or socially viable without cross-fertilisation (in both the literal and metaphorical senses) with neighbouring and distant villages (Fraser, forthcoming). One way in which such transactions could take place would be exogamy enforced by social custom. That is, any young person reaching the age of marriage would be forced to look outside the immediate community for a mate. Such exogamous marriages could be patrilocal, matrilocal, or neither - the important suggestion is that the Neolithic communities of

Orkney were not socially self-contained but connected by an intricate web of mating alliances. An exogamous system of this type might tend to lead to the breakdown of the group identity of each village and to a consequent blurring of the right to utilise natural resources in particular places. In such circumstances, a mechanism that forever perpetuated the right of an individual to belong to a village group would develop. The archaeological evidence of totemism (Table 15.19) associated with burial within a chambered cairn may well be an example of such a mechanism. Thus the partner in an exogamous marriage who moved away from the village would retain membership of the village group and symbolise this membership by allegiance to an animal, bird, or some other totem. At the death of the individual, the village would reclaim its lost group member and, by final disposal in its chambered cairn, would confirm and perpetuate its own identity for another generation. The village group, the chambered cairn, and the totemic symbol would be one perpetual firmament which defined its members from birth to death and beyond, but which ensured its own continuance by demanding those members choose a mate from outwith its bounds.

To summarise this argument it is conjectured that, of the three possible ways of determining access on death to a chambered cairn suggested by Renfrew (1979: 215), kinship - the possession of common ancestors symbolised by common allegiance to a totem - is the one which conflicts least with the archaeological evidence.

Other observations actively support the conjecture. The practice of excarnation noted at Quanterness and Isbister, and the common occurrence of highly disarticulated and incomplete human skeletons, both suggest that some bodies may have remained unburied or exposed for long periods of time and perhaps been subject to long journeys before their final deposition in the chambered cairn of their ancestors.

This hypothesis, of dispersed villages with limited contact only in the form of kinship links, is schematised in Figure 17.1.

It should be repeated here that participation in other uses of a chambered cairn, such as the celebration of seasonal festivals, could well have been decided on different grounds, residence locality being one. However, other uses may well have been restricted to the exterior of the cairn: the interior chamber would form a sacred place from which non-members of the kinship group were excluded.

Within this system of small-scale village communities, several of the observed distinctions in the archaeological record could be accommodated. The Unstan assemblage of artefacts may have been used by several widespread villages bound to the same totemic symbol, or a related group of such symbols; likewise with the Grooved Ware assemblage. The variety of structural design of chambered cairns, and the arrangement of space within them, could also be attributed to variation between two or more groups of villages bound to different totemic symbols. Thus it is possible to envisage the land of Orkney divided into areas each containing a largely self-sufficient village community, but with some communities, not necessarily neighbouring communities, bound together in loose federations manifesting themselves today by common material cultures of artefacts and monument design. While there may be no immediate correlations, attention is drawn to Figure 8.17.

So far in this discussion, the evidence for a segmentary society in Neolithic Orkney has appeared stronger than the evidence for a stratified society, these terms being as defined in Chapter 16. The system of village communities outlined above is cellular, in that each community was clearly defined and had connections only in limited spheres with other communities, and modular, in that each village had about the same number of inhabitants. However, this pattern of segmentation is just one pattern: there exists another which could be attributed to a stratified society.

This second pattern depends for its identification on the amount of labour invested in the completion of communal enterprises. There are many problems involved in measuring such labour but there is little doubt that there is an order of magnitude difference between the labour required to build the smallest chambered cairns and that required for the largest (Figure 14.6). Furthermore, the ten largest cairns have a dispersed distribution suggesting that one and only one was located in each of ten large areal divisions of the island-group. (Figure 14.7). To this evidence, must be added that of the two henges, which may have required a level of labour investment considerably above that of the largest cairns (Table 14.1). The hierarchy of monuments seen here, from small cairn to large cairn to henge, is very close in form to the hierarchy of long barrow to causewayed camp to henge suggested by Renfrew (1973c) as existing in the Neolithic period of southern England. There is an order of magnitude difference between the levels, with small cairns taking about 10^3 worker-hours to build, large cairns taking about 10^4 hours, and the larger henge taking about 10^5 hours.

This pattern may represent a hierarchy of central places with sites at different levels in the hierarchy having different functions and serving, in some sense, distinct areas. Reconciling the concept of central places with the speculations already outlined above, the lowest level of the hierarchy would consist of small chambered cairns serving as the community centre for single villages. Each cairn would be built by, and used solely by, the people of one village. The cairn would figure large in the everyday activities of people and would be a familiar and constant part of their lives. The second level of the hierarchy, the large cairns with a dispersed distribution, would then serve as centres for the people of island-groups or a large part of the Mainland. Each large cairn would be built and used by the inhabitants of a local collection of communities. The monument would be visited, after a short journey, only on special occasions at infrequent intervals. At the top of the hierarchy, the henges would be centres for the entire population of Orkney. They would be built and maintained by representatives of every village in Orkney and would be the meeting place, at intervals of a year or more, of everybody who was capable of making the prolonged journey. It is conceivable that matters of law, politics, economics, or religion were settled at such gatherings. This spatial stratification is depicted in Figure 17.2.

This hypothesis is supported by a number of circumstantial details. The small cairns of cluster III, as shown by a factor analysis of their location (Table 12.34), were commonly located according to the Childean model, each being associated with a small area of land such as would support the people of a single village. Conversely, the larger cairns were commonly not located in such positions. To take just two examples, Holm of Papa Westray South (ORK 22) is on a small island which has probably never supported a permanent human population, and Maes Howe (ORK 36) is situated on a low-lying plain of heavy gley soils. The suggestion here is that many small cairns on the bottom level of the hierarchy were very close to the houses and fields of their users because they were an essential part of daily life, whereas the large cairns, being visited less frequently, were not subject to the same locational constraints. The henges of Brogar and Stenness are centrally situated in the western basin of the Mainland and hence are in the most accessible place in the islands.

Of course, the hypothesis of a hierarchy of central places leads immediately to consideration of the social organisation that could promote or sustain such a hierarchy. The possibilities are numerous since, for example, there have been many societies at all positions on the spectrum from egalitarian to élitist which have shown themselves capable of massive public works and have operated in some respects as a large composite social unit. There are few grounds for postulating a particular type of social organisation responsible for the large cairns and henges of Orkney. Where the discussion can be further advanced is in the study of relative chronology.

A major criticism of all the ideas put forward here about the cognitive basis and the social organisation of Neolithic Orkney is their lack of diachronism. Like the reconstructions of Childe, MacKie, and Renfrew, they are essentially static and make little allowance for change in society. Since no society can exist without continual re-assertion of the forces that bind it together, any reconstruction which describes structures at a single point in time is frail and inadequate. An understanding of the processes which link societal structures through time can lead to a greater understanding of the fundamental nature of society. In the case under discussion here, such processes are not readily apparent. Indeed, of the two options available which seek to give a temporal depth to all the phenomena of Neolithic Orkney, one is a completely static reconstruction, and the other is a reconstruction with only one element of change. These options were both presaged by MacKie (1977a) and Renfrew (1979), and both of these writers selected the first as the most likely alternative.

The first option requires that the segmentary pattern of dispersed villages and the stratified pattern of a hierarchy of central places be two extreme pictures of a transition from the first settlement of Orkney to the middle of the second millennium bc. The social organisation of the earliest Orcadians was segmentary but after about 2500 bc, a more centralised society developed, with the large cairns and henges as focal points - a society capable of mobilising large numbers of people on common projects.

The second option requires that all the evidence that archaeologists have gathered from Neolithic Orkney belongs to a single, largely contemporary, society. Chambered cairns, henges, and settlements are all artefacts of a social system that may have existed unchanged, perpetuating itself from generation to generation, for a thousand radiocarbon years from 2800 bc to 1800 bc. For centuries the system was in a state of dynamic equilibrium, with constant social interaction leading to the continuation of a stable and composed society.

There are several criticisms of the first option. The evidence from radiocarbon dating (Figure 9.21) does not support the suggestion that the society of Orkney was differently organised before and after 2500 bc: indeed, it gives minimal support to the existence of any society in Orkney before 2500 bc. On a more fundamental level, no adequate explanation of centralisation in the later Neolithic exists. That is, there has been no exploration of the mechanisms which would initiate spatial centralisation and social stratification in Orkney. Such mechanisms could include internal pressures for change in the form of increased population or reduced resources, or external influences in the form of physical or ideological diffusions, but no archaeologist has yet provided evidence to support such pressures or influences.

A major criticism of the second option is that there is no explanation of the beginning or end of the Orcadian Neolithic: the society springs fully formed from a seemingly unpopulated island-group, exists unchanged for more than a millennium, and disappears with no disturbance. In a way this is also a criticism of both options since our knowledge of the beginnings of human habitation in the islands is limited and no explanation of the transition into the second millennium bc has been postulated. There is no defence against this criticism without invoking the paucity of archaeological research that has been completed on these periods.

If a choice must be made between the options, then the second is the one which is most reasonable and requires less manipulation of the archaeological evidence as it now stands. The segmentary society postulated by Renfrew may well have existed in the earlier Neolithic period but until there is positive evidence to that effect, the dating of the few elements of the upper levels of a spatial hierarchy suggests that those elements were contemporary with a lower level of dispersed communities. Those communities were not isolated from each other but were linked by complex kinship bonds, by local allegiances to communal monuments, and by the common fact of belonging to the land of Orkney.

To summarise our knowledge of the social organisation of the Neolithic period in Orkney, it can be postulated that the first farmers were living in the island group sometime before 2800 bc. With only one excavated site - Knap of Howar - which could have been in use during this period, we have no knowledge of their social organisation. It is suggested that by about 2500 bc a society had evolved of which the fundamental unit was the village - a small group of houses with less than a hundred inhabitants in total. Each village was largely economically self-sufficient, and each had a system of socially recognised claims to natural resources, claims which were commemmorated by the physical monument of a chambered cairn. Villages were linked, however, by social transactions. Chief among these was the exchange of marriage partners which resulted in complex kinship links between every Orcadian village. Other sets of social transactions were conducted on the basis of local residence: certain chambered cairns were the communal meeting places of the people of several neighbouring villages. Finally, all the inhabitants of Orkney were partners in the construction and use of the great henges. We are unaware of the exact nature of authority in this stratified system but there is no evidence that power resided in the hands of a single individual. Finally, sometime after 1800 bc this system of social organisation ceased to function in the same way and was replaced by other social systems.

THE CHAMBERED CAIRNS OF ORKNEY:
LAND AND SOCIETY
IN THE THIRD AND SECOND MILLENNIA BC

VOLUME TWO

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VOLUME TWO

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(The majority of this volume is not paginated. Figures and Tables are numbered according to the chapter in Volume One to which they refer)

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Plate N — The situation of Bigland Round (ORK 2), Rousay, conforming to the classical Childean model. The cairn in the foreground is on the edge of a terrace and overlooks the settlement site of Rinyo, not visible in the plate but located at the edge of the fields of the modern farm of Bigland.

Plate O — Thomas' plan of the Ring of Bookan (ORK 45), made in the 1850s. (Reproduced with the kind permission of Ms Alison Fraser, Archivist, Tankerness House).

Plate P — The site of Holy Kirk (ORK T2), Sandwick.

Plate Q — Calf Sound looking from the west with Eday in the foreground, Sanday on the horizon, and Calf of Eday to the left. The site of Carrick House (ORK T8) is in the central foreground and there are three chambered cairns (ORK 8, 9 and 10) barely visible on the Calf of Eday.

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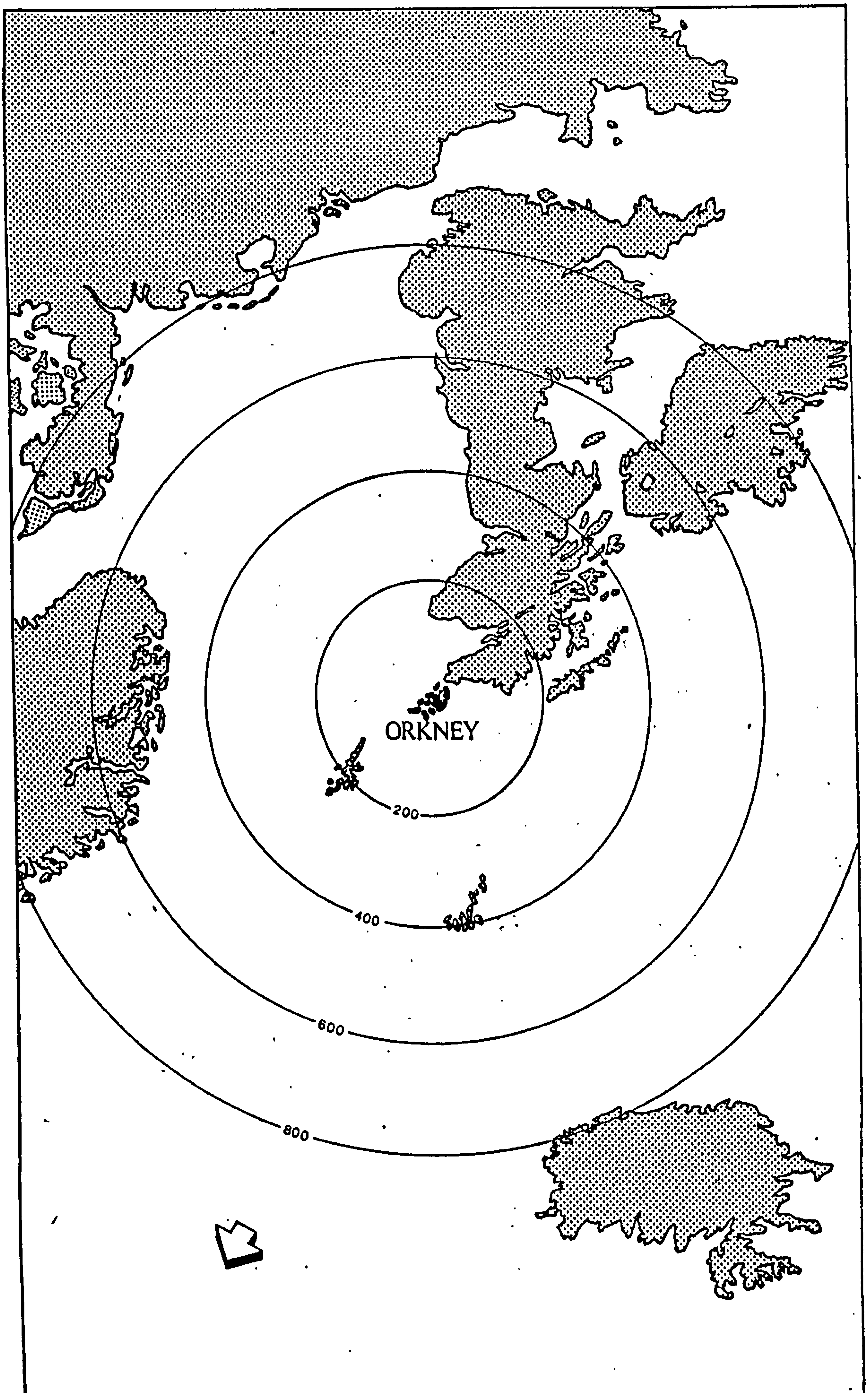
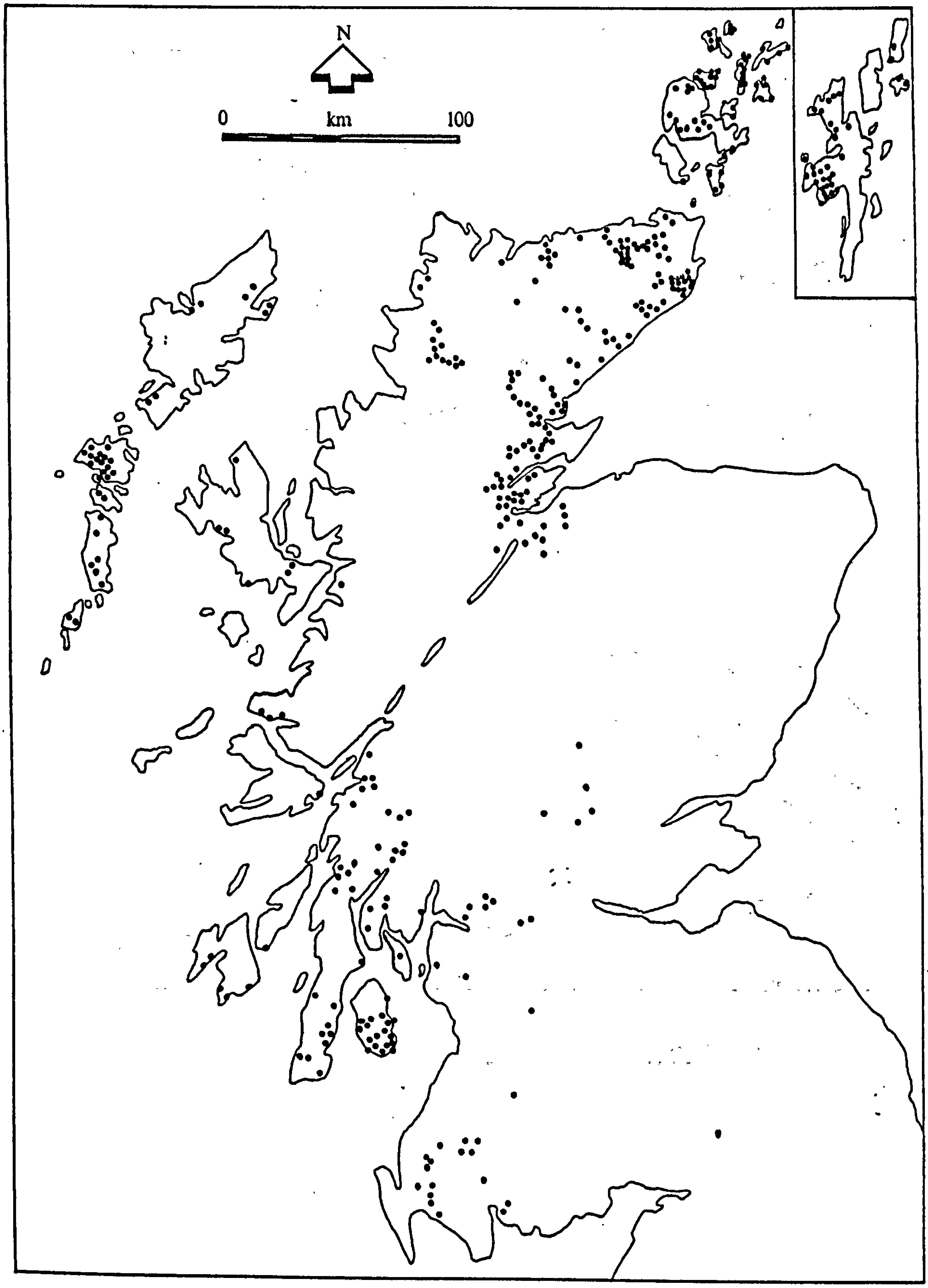


Figure 1.1. The position of Orkney, with 200 km circles centred on Kirkwall.

Figure 1.2. The chambered cairns of Orkney (in back pocket).



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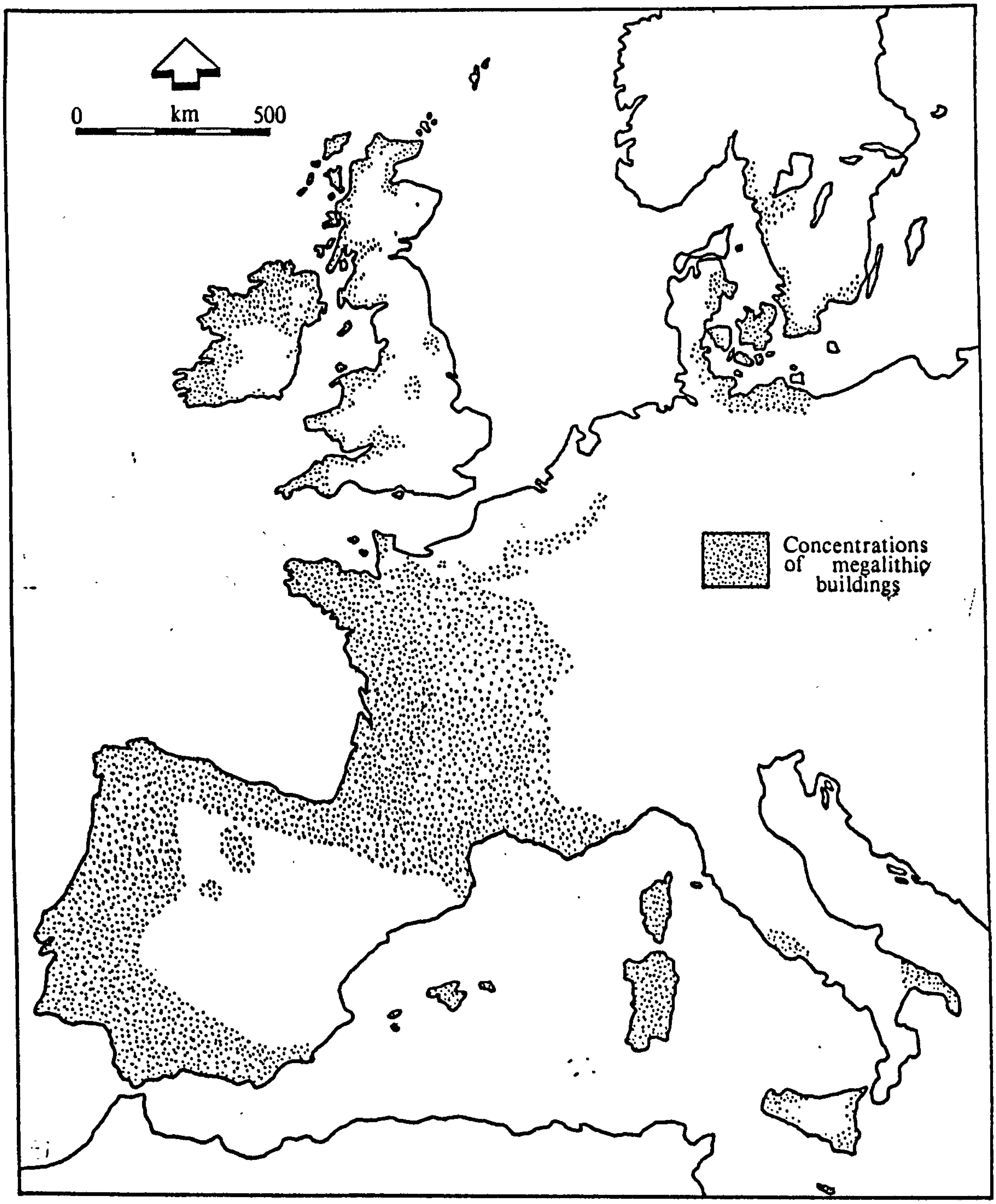


Figure 1.4. The megalithic tombs of Europe.

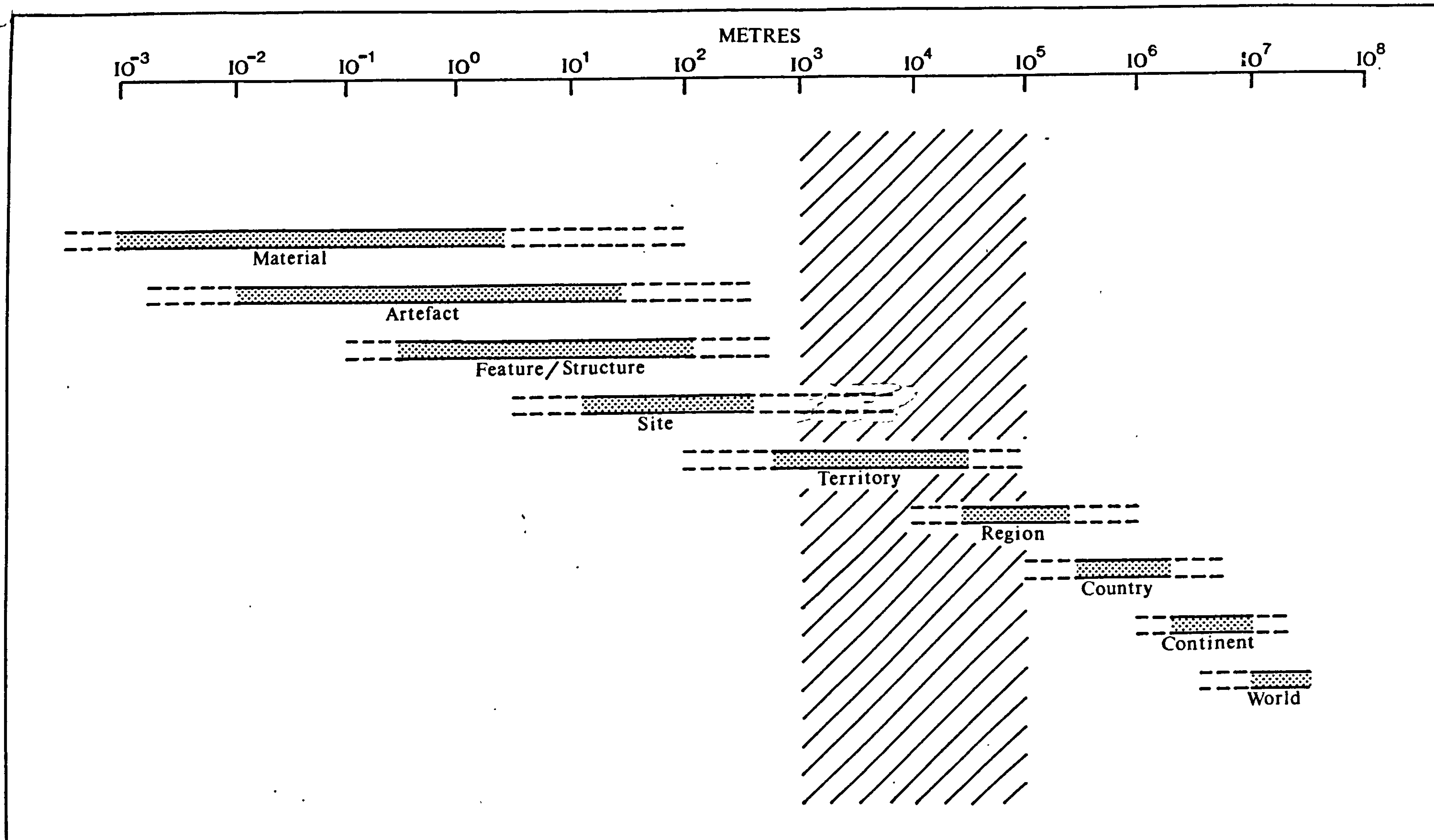


Figure 1.5. Spatial scales in archaeological studies, with hatched area showing primary scale of interest in this thesis.

Figure 1.6. Temporal scales in archaeological studies, with hatched area showing primary scale of interest in this thesis.

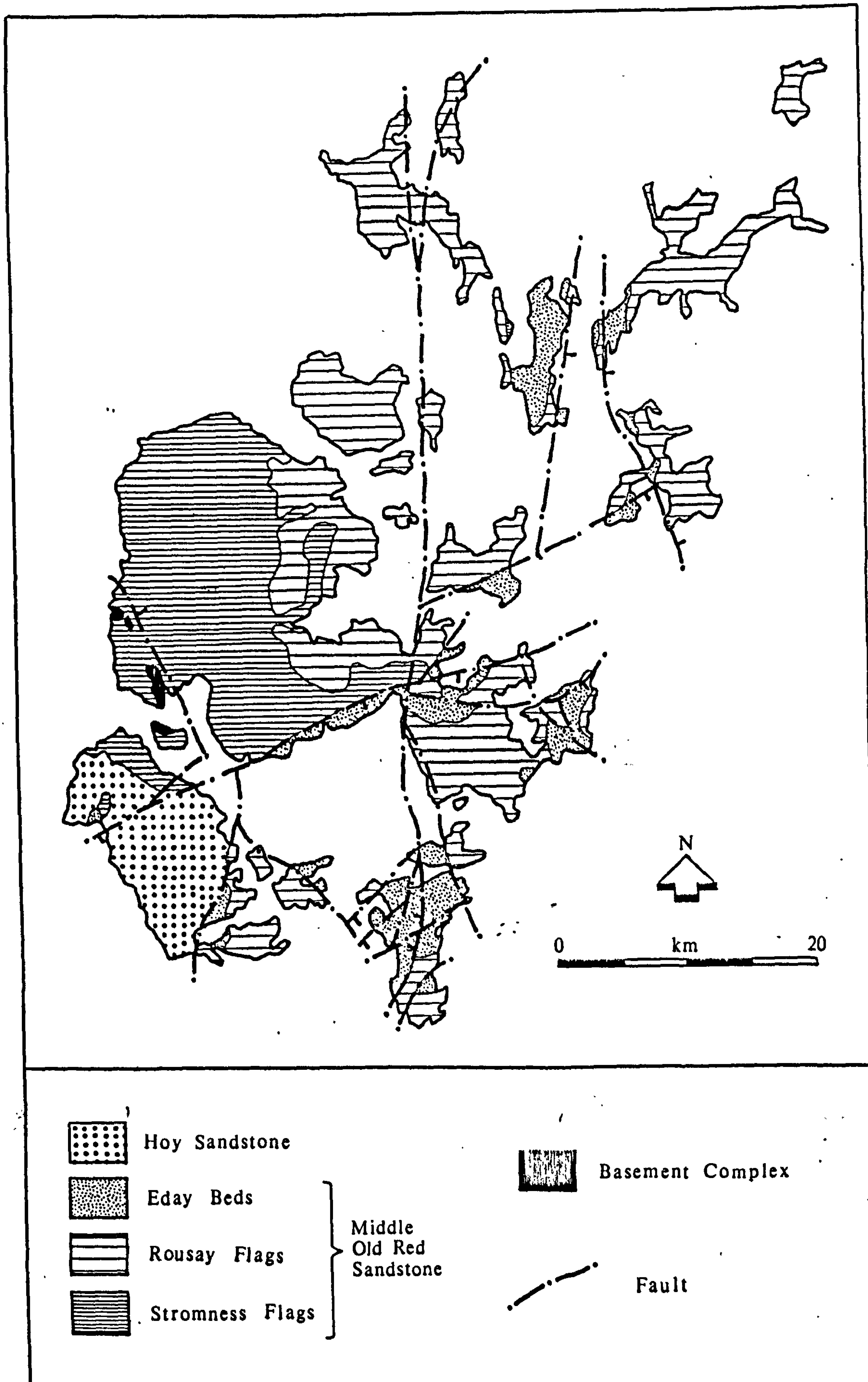


Figure 2.1. The geology of Orkney (after Mykura et al., 1976).

	STAGE	LITHOSTRATIGRAPHIC UNIT		FISH FAUNA ETC.
? U.O.R S.	UNCERTAIN		Top not exposed HOY SANDSTONE 1000+	
			HOY VOLCANICS (0 90 BASALT; 0-15 TUFF)	
			Gentle folding and some major faults	
MIDDLE OLD RED SANDSTONE	GIVETIAN	EDAY BEDS	UPPER EDAY SST 320+	
			EDAY MARLS 100	
			MIDDLE EDAY SST 100-500	*Tristichopterus alatus* *Microbrachius dicki* *Pentlandia macroptera* *Watsonosteus fletti*
			EDAY FLAGS ?10-150 (LAVAS)	
			LOWER EDAY SST 220–250	
			PASSAGE BEDS	*Dipterus valenciennessi*
			ROUSAY FLAGS 1500+	*Thursius pholidotus* *Millerosteus minor* '*Estheria membranacea*'
			UPPER STROMNESS FLAGS 330+ 'HOY CYCLES' MEMBER	*Dickosteus threiplandi* *Dipterus valenciennessi* *Glyptolepis paucidens*
	COUVINIAN (= EIFELIAN)		*SANDWICK FISH BED MEMBER*	*
			LOWER STROMNESS FLAGS 215+	*Coccosteus cuspidatus* *Dipterus sp.*
			Gentle folding giving rise to angular unconformity of 10°	
?L.O.R.S.	UNCERTAIN		WAREBETH RED BED FORM ? HARRA EBB FORM YESNABY SST FORM	
? MOINE				

*The *SANDWICK FISH BED* contains the following species: *Cheiracanthus murchisoni*, *Cheirolepis trailli*, *Coccosteus cuspidatus*, *Diplacanthus striatus*, *Dipterus valenciennessi*, *Gyroptychius agassizi*, *G. microlepidotus*, *Osteolepis macrolepidotus*, *Pterichthyodes milleri* and *Rhadinacanthus sp.*

Table 2.2. Geological stratigraphy of Orkney (after Mykura, 1975).

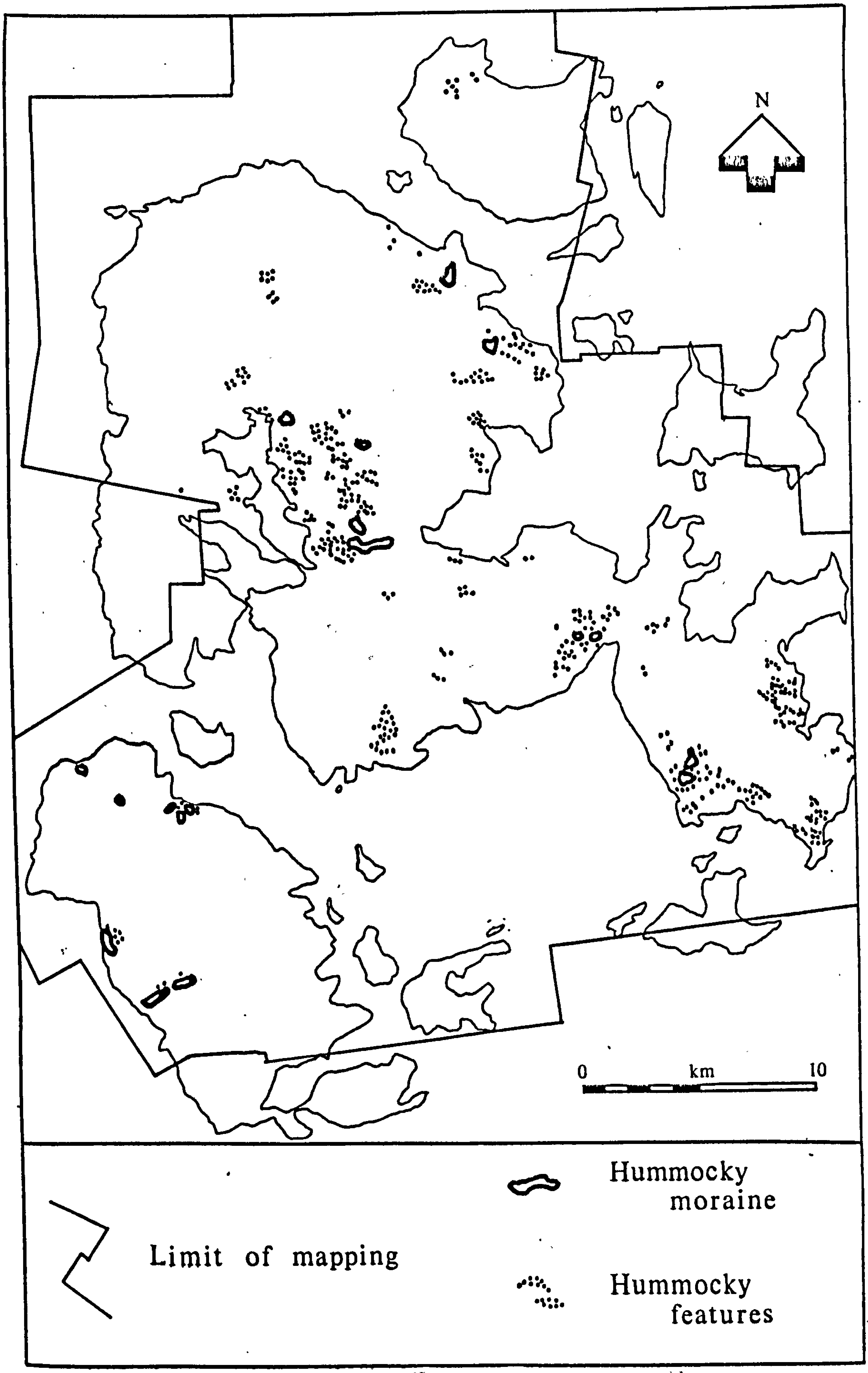


Figure 2.3. Distribution of drift-composed topographic features in Orkney (after Rae, 1976).

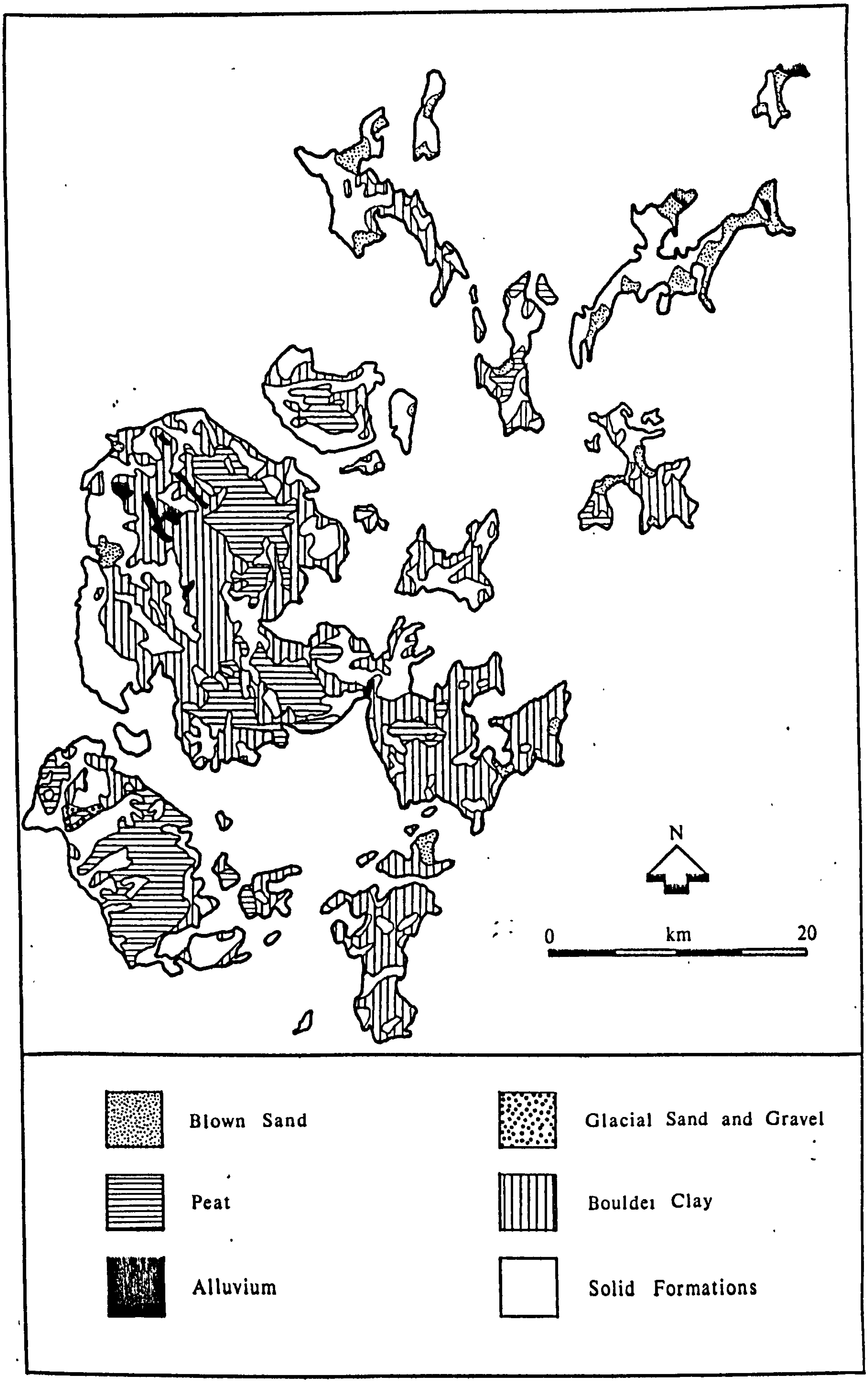


Figure 2.4. Distribution of superficial deposits in Orkney (after Davidson and Jones, forthcoming).

Pleistocene stage	Chronozone	Pollen zone	Radiocarbon years B.P.	Nature of vegetation	
FLANDRIAN	FL III		Present	Agricultural land, machair, fen, tall herb and fern communities, dwarf shrub-heath dominated by *Calluna vulgaris*, blanket peat with *Eriophorum vaginatum*	
			1000		Blanket peat formation begins Shrubland decline begins
		VIII -			
			2000	Open herbaceous communities including: Pasture land with *Plantago lanceolata* Arable land with *Artemisia*, Cruciferae, Chenopodiaceae *Calluna* heathland Machair with *Plantago maritima* and *Plantago coronopus* Tall herbs such as Umbelliferae and ferns including *Polypodium*	
			3000		
		VIIb			
			4000		
	FL II	VIIa	5000		Shrubland development begins
			6000		
			7000	*Betula* - *Corylus* shrubland with a rich ground flora of tall herbs and ferns	
	FL I	VI -	8000		
		V			
			9000		
		IV	10000	Denser heathland with *Juniperus* and *Empetrum*	
DEVENSIAN	LATE DEVENSIAN	III		Open grassland and heathland with *Artemisia* and *Empetrum*	
			11000		
		II		Denser grassland and heathland with *Empetrum* and *Juniperus*	
			12000		
		I		Open grassland and heathland with *Rumex*, *Artemisia* and *Empetrum*	

Table 2.5. Vegetational history of Orkney (after Davidson and Jones, forthcoming).

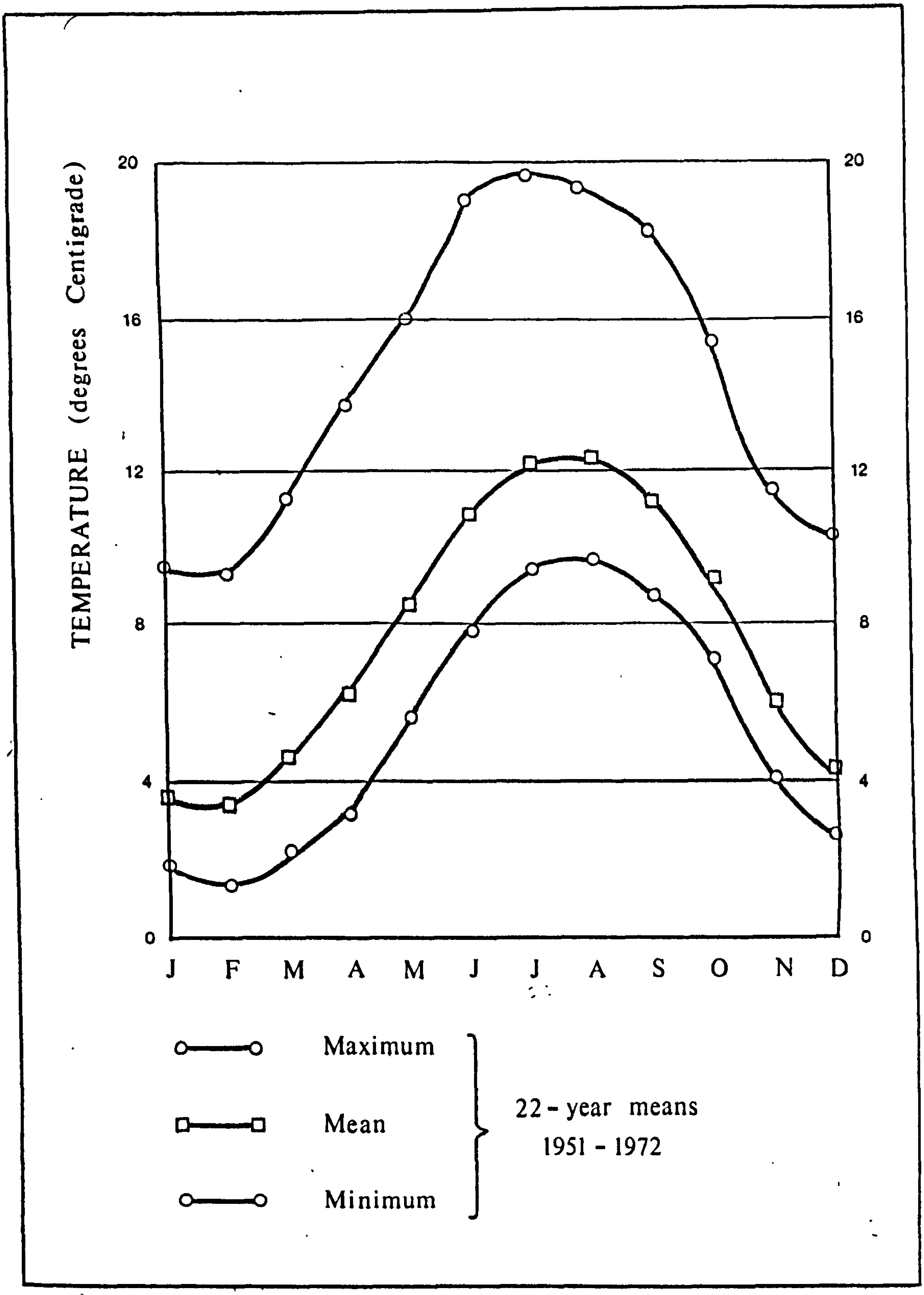


Figure 2.6. Climate of Orkney: temperature (after Plant and Dunsire, 1974).

Hourly mean wind speed	Wind directions in degrees (True)												
	350-010	020-040	050-070	080-100	110-130	140-160	170-190	200-220	230-250	260-280	290-310	320-340	All Directions
0 mph	-	-	-	-	-	-	-	-	-	-	-	-	2.7%
1-3 "	-	-	-	-	-	-	-	-	-	-	-	-	3.6%
4-7 "	0.5	0.6	0.6	0.8	0.9	0.8	0.9	0.8	0.7	1.3	0.7	0.5	9.1%
8-12 "	1.2	1.2	1.2	1.5	1.9	2.1	3.2	2.7	1.7	2.1	1.7	1.1	21.6%
13-18 "	1.9	1.5	1.0	1.5	2.8	4.1	5.2	3.4	2.9	3.4	2.5	2.1	32.3%
19-24 "	1.1	0.7	0.3	0.5	1.6	2.2	1.9	1.2	1.8	2.0	1.2	1.1	15.6%
25-31 "	0.7	0.4	0.2	0.4	1.1	1.4	0.7	0.5	1.4	1.6	0.7	0.9	10.0%
32-38 "	0.3	0.1	0.1	0.1	0.4	0.4	0.1	0.1	0.6	0.7	0.2	0.4	3.5%
39-46 "	0.2	0.1	0.0+	0.0+	0.1	0.1	0.0+	0.0+	0.2	0.4	0.1	0.2	1.4%
47-54 "	0.0+	0.0+	0.0+		0.0+	0.0+	0.0+		0.1	0.1	0.0+	0.0+	0.2%
55-63 "	0.0+								0.0+	0.0+	0.0+	0.0+	0.0+%
64-72 "									0.0+	0.0+			0.0+%
> 72 "													0.0%
	5.9	4.6	3.4	4.8	8.8	11.1	12.0	8.7	9.4	11.6	7.1	6.3	100.0%

Table 2.7. Climate of Orkney: wind (annual percentage frequency of wind direction and speed at Kirkwall Airport, 1963-1972) (after Plant and Dunsire, 1974).

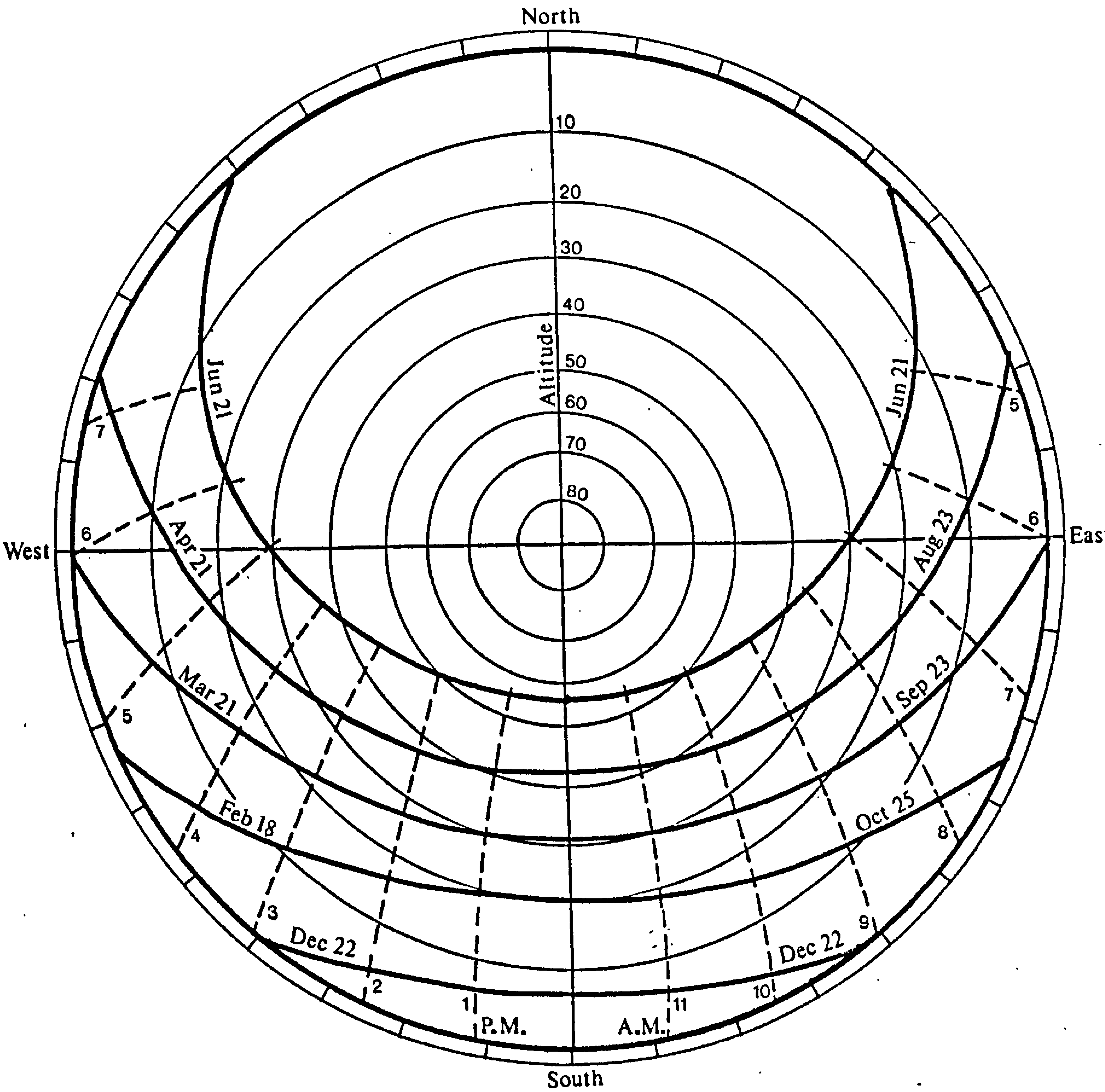


Figure 2.8. Climate of Orkney: daylight hours (after Plant and Dunsire, 1974).

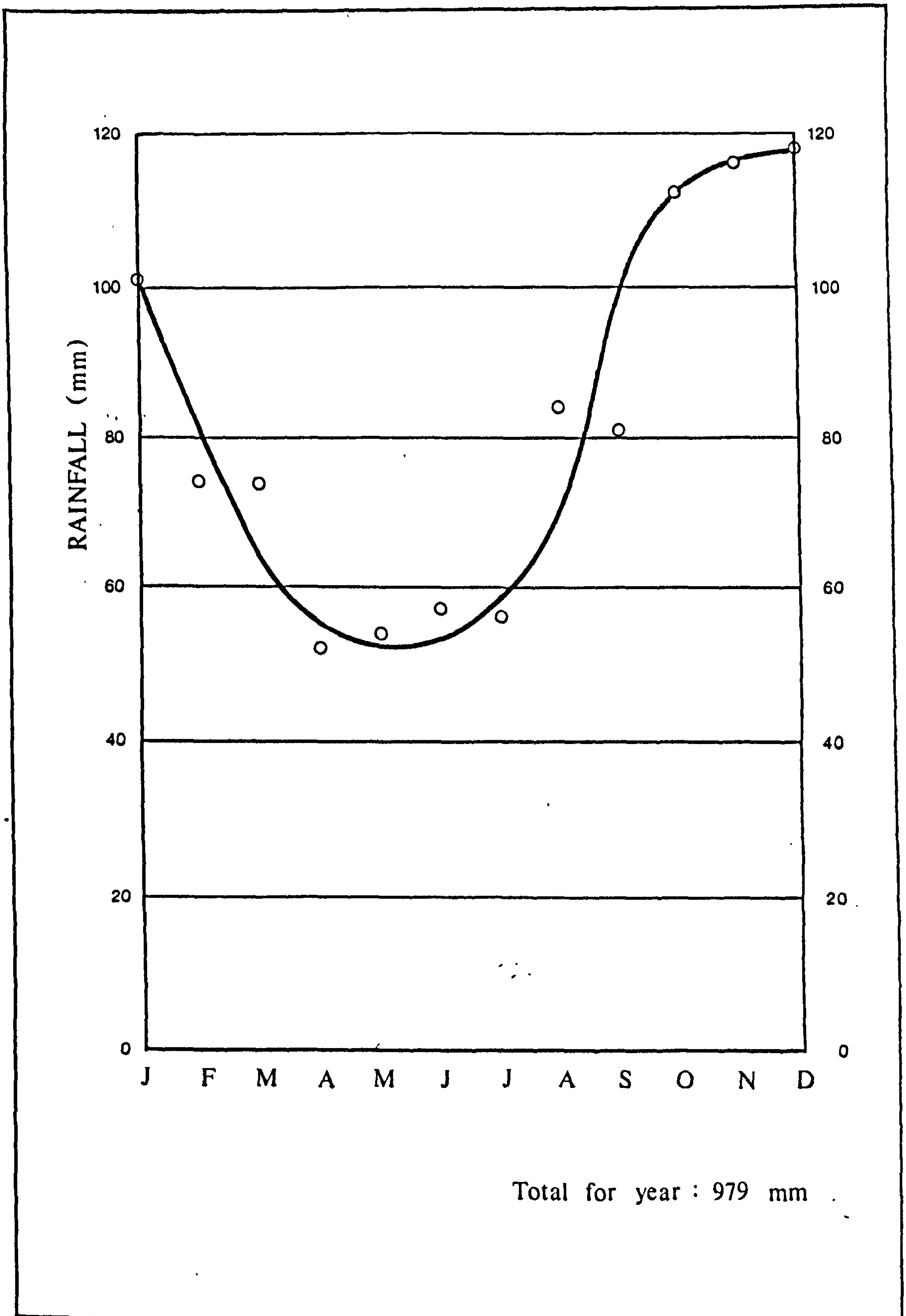


Figure 2.9. Climate of Orkney: rainfall (after Plant and Dunsire, 1974).

Date	Site	Excavator
c. 1792	Earl's Knoll	-
c. 1805	Quanterness (1)	Barry
1849	Holm of Papa Westray South	Thomas
1849	Wideford Hill (1)	Petrie
1850s	Skara Brae (1)	Watt
1854	Holm of Papa Westray North	Petrie
1855	Calf of Eday North West	Farrer
1855	Calf of Eday South East (1)	Hebden and Farrer
1855	Withebeir	Farrer
1857	Vinquoy Hill	Farrer and Hebden
1860	Eday Manse	Hebden
1861	Bookan	Farrer
1861	Maes Howe (1)	Farrer
1861	Skara Brae (2)	Farrer
1860s	Skara Brae (3)	Petrie and Watt
1863	Burray	Petrie
1867	Quoyness (1)	Farrer and Petrie
1884	Unstan	Clouston
1888	Cuween Hill (1)	Cursiter
1898	Taversoe Tuick (1)	Traill Burroughs
1901	Cuween Hill (2)	Charleson
1913	Skara Brae (4)	Stewart
1928-30	Skara Brae (5)	Childe
1932-34	Midhowe	Craw, Callander and Grant
1934	Knowe of Yarso	Callander and Grant
1935	Knowe of Ramsay	Callander and Grant
1935	Wideford Hill (2)	Kilbride-Jones
1936	Blackhammer	Callander and Grant
1936	Calf of Eday Long	Calder
1936	Calf of Eday South East (2)	Calder
1936	Knowe of Lairo	Grant
1936-37	Knap of Howar (1)	Traill and Kirkness
1937	Huntersquoy	Calder
1937	Sandyhill Smithy	Calder
1937	Knowe of Rowiegar	Grant
1937	Taversoe Tuick (2)	Grant
1938	Bigland Round	Grant
1938	Rinyo (1)	Childe and Grant
1940	Kierfea Hill	Grant
1941	Knowe of Craie	Grant
1946	Rinyo (2)	Childe and Grant
1951-52	Quoyness (2)	Childe
1954-55	Maes Howe (2)	Childe
1954-55	Maes Howe (2)	Childe
1958	Isbister	Simison
c. 1970	Nev Hill	Watson
1972-73	Skara Brae (6)	Clarke
1972-74	Quanterness (2)	Renfrew
1973	Maes Howe (3)	Renfrew
1973	Ring of Brogar	Renfrew
1973-74	Stones of Stenness	G. Ritchie
1973-75	Knap of Howar (2)	A. Ritchie
1976-78	Isbister (2)	Simison
1977	Skara Brae (7)	Clarke
1978-	Links of Noltland	Clarke

Table 4.1. Recorded excavations of early prehistoric sites in Orkney.

Figure 4.2. Recorded excavations of chambered cairns, settlements and henges in Orkney, by decade.

Figure 5.1. Map of Arran, showing the distribution of chambered cairns in relation to modern farming land. Hypothetical territories are demarcated by straight lines (from Renfrew, 1973a).

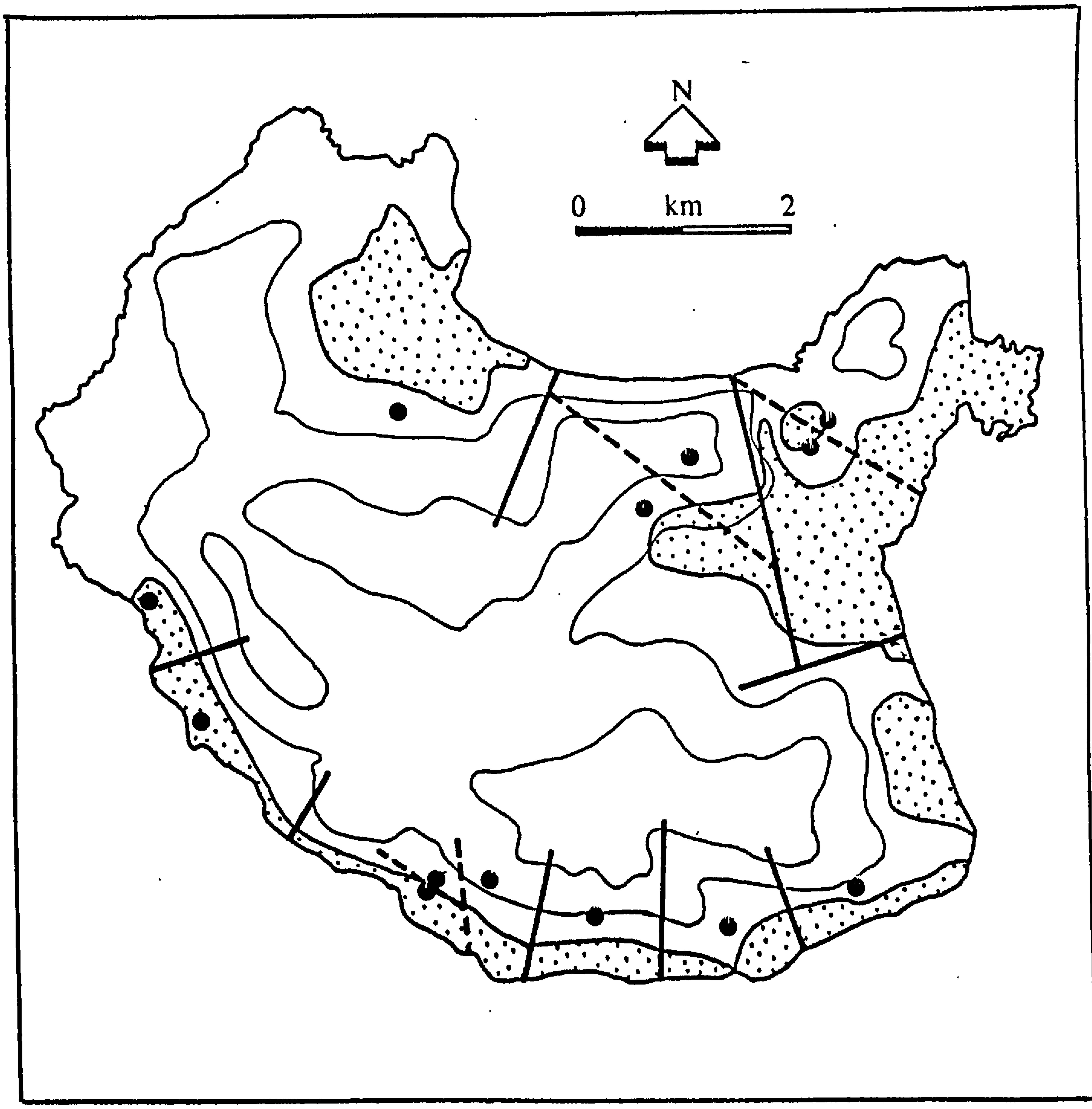


Figure 5.2. Map of Rousay, showing the distribution of chambered cairns in relation to modern arable land. Hypothetical territories are demarcated by straight lines (after Renfrew, 1973a).

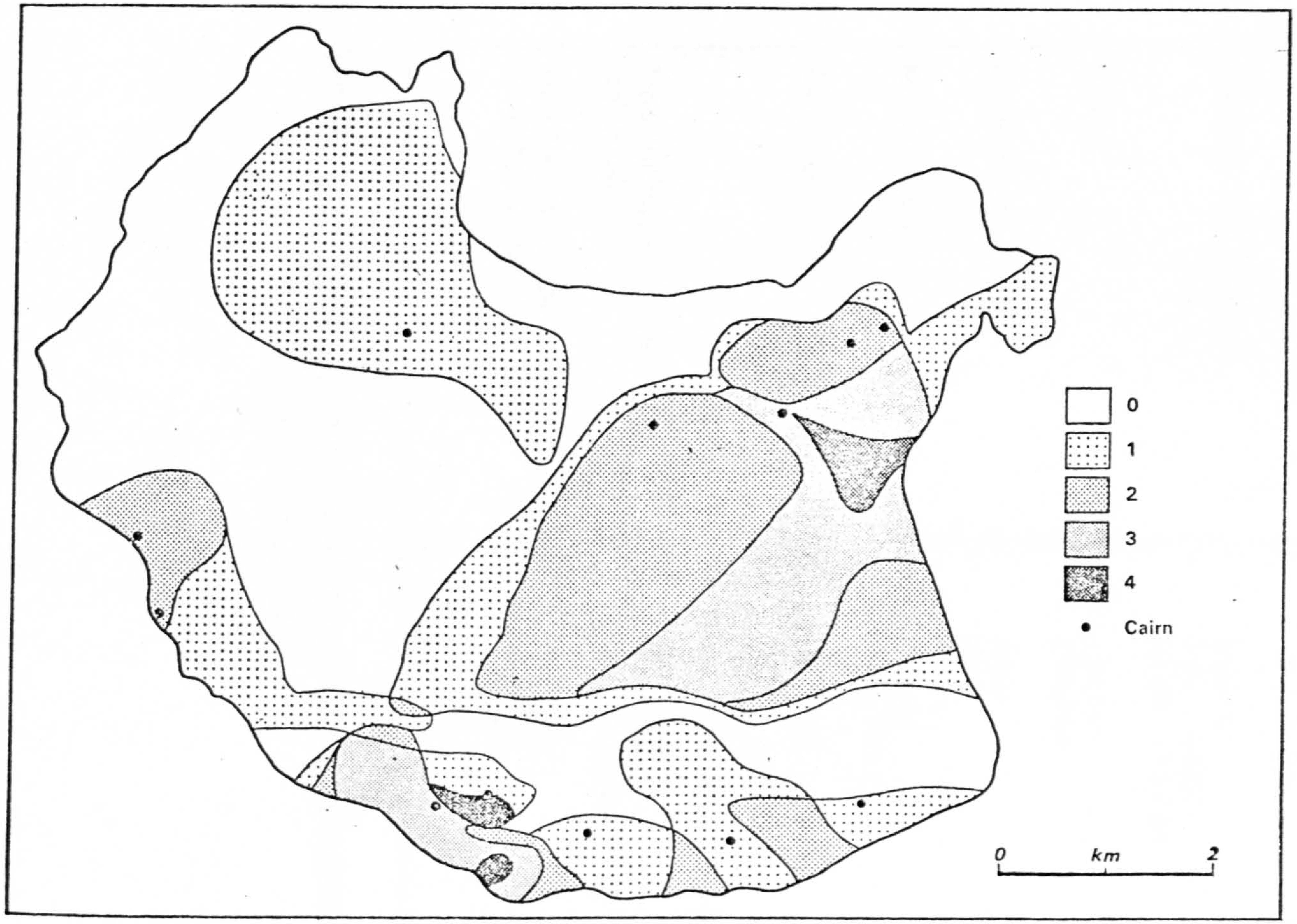


Figure 5.3. Numbers of chambered cairns which are visible from different localities throughout Rousay (from Renfrew, 1979).

Description	Sub-classes
Distance from coast	< 1 km 1-2 km > 2 km
Nature of coast	beach low cliffs high cliffs
Slope	steep gentle
Drainage	wet dry
Rockiness	rocky not rocky
Altitude	0 - 75.9 m 76 - 152 m > 152 m
Visibility from mainland	visible not visible
Distance from arable land	< 1 km 1-2 km > 2 km

Table 5.4. Locational factors, and sub-classes (after Renfrew, 1979).

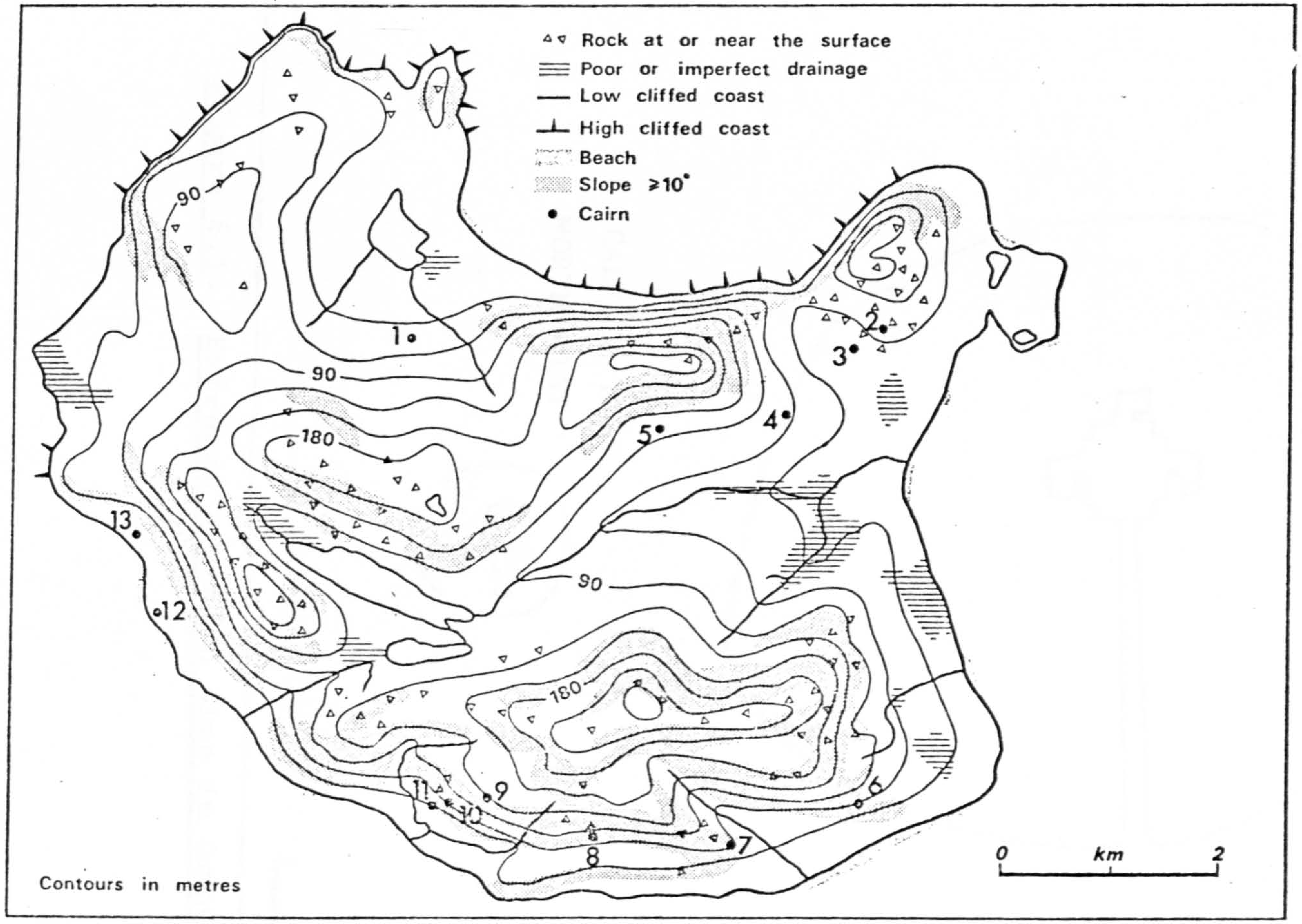


Figure 5.5. Geomorphology of Rousay (from Renfrew, 1979).

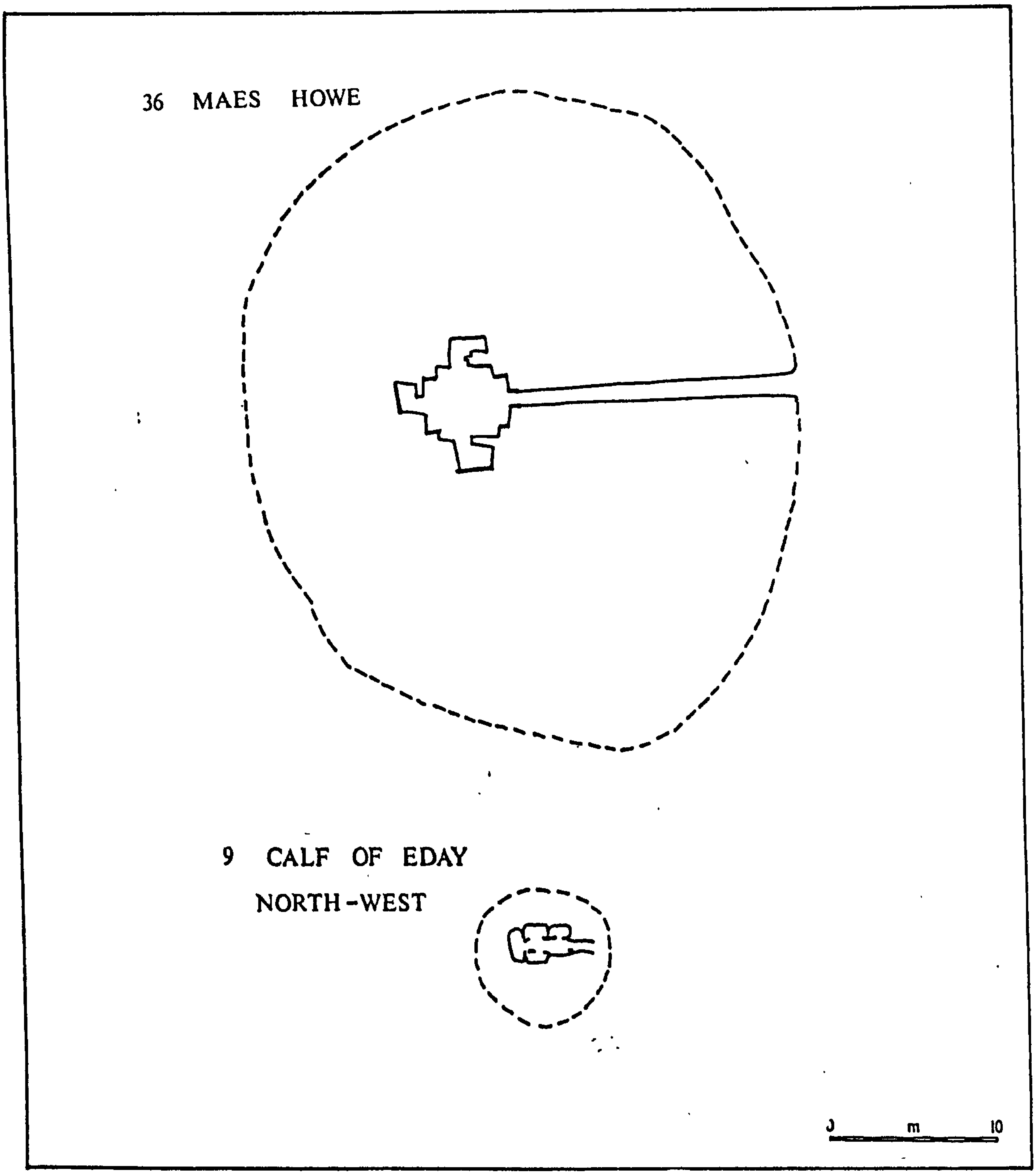


Figure 6.1. Extremes of cairn size in Orkney.

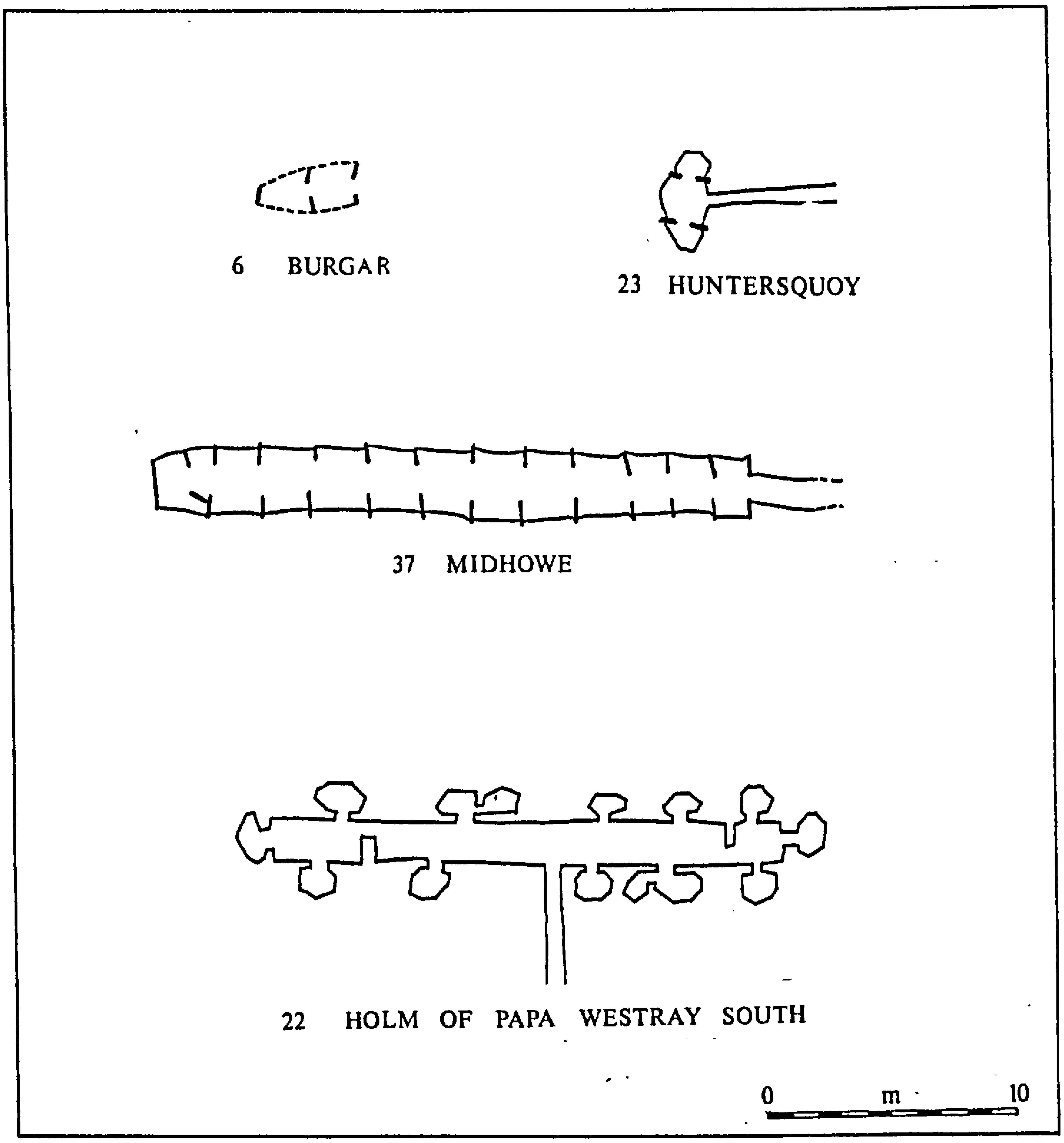


Figure 6.2. Extremes of chamber design in Orkney.

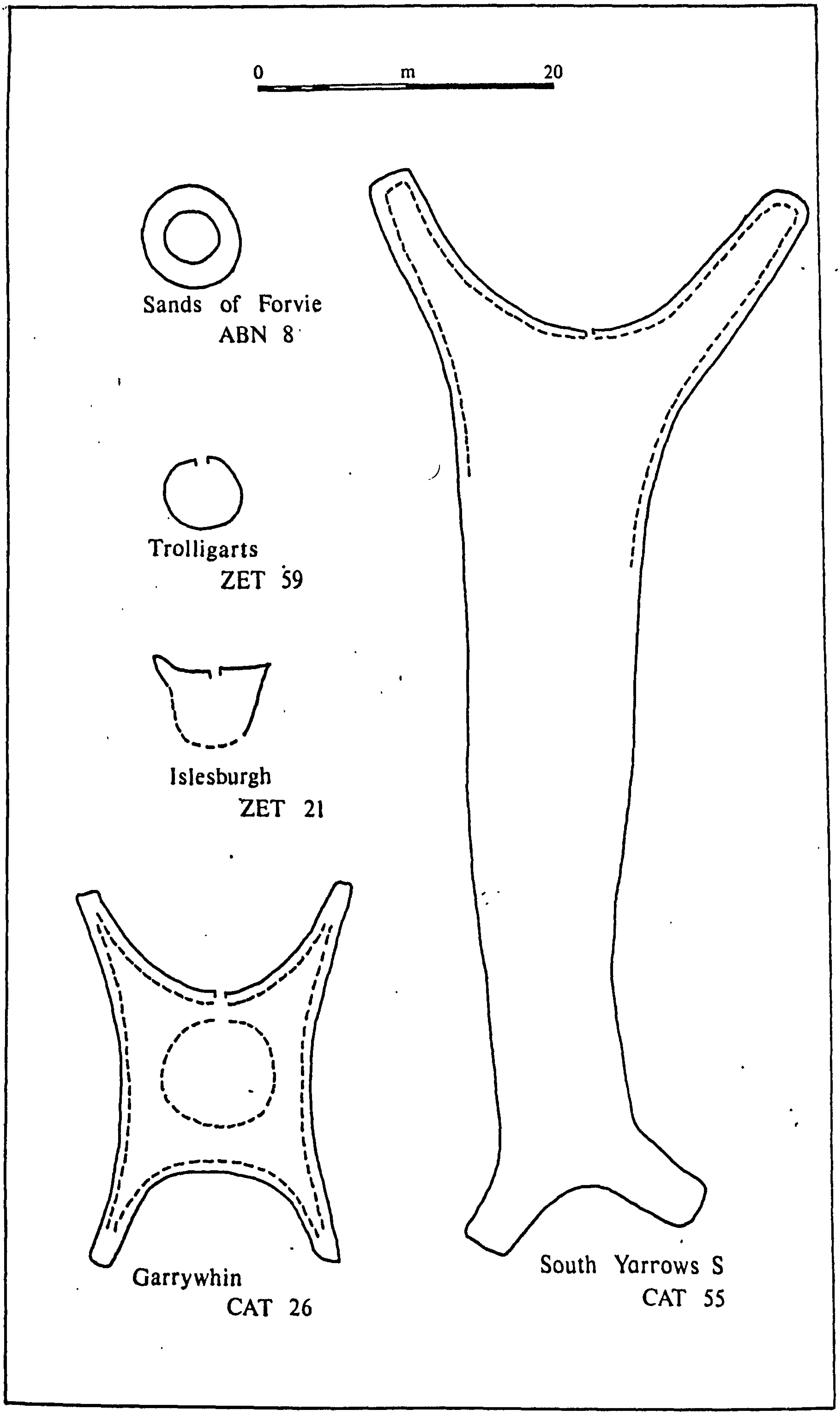


Figure 6.3. Extremes of cairn design in Scotland.

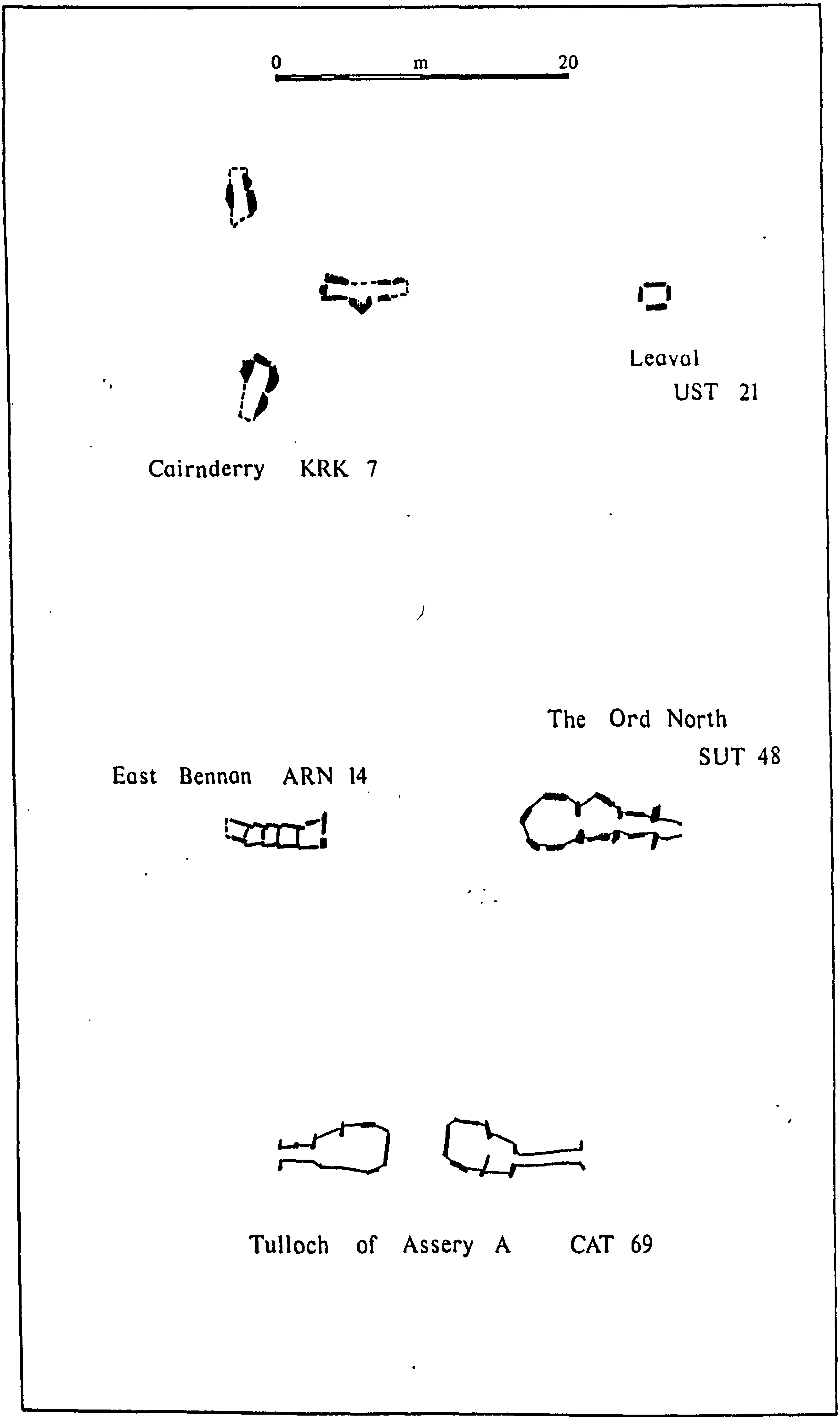


Figure 6.4. Extremes of chamber design in Scotland.

	Sites listed by Henshall (1963 & 1972)	Additional Sites	Totals
Category Alpha	28	1	29
Category Beta	19	6	25
Category Gamma	8	14	22
Category Delta	1	24	25
Category Epsilon	1	13	14
Totals	57	58	115

Table 6.5. Sites considered during field-work broken down by categories.

ORK 2	Bigland Round
ORK 3	Blackhammer
ORK 4	Bookan
ORK 8	Calf of Eday Long
ORK 12	Cuween Hill
ORK 25	Isbister
ORK 26	Kierfea Hill
ORK 28	Knowe of Lairo
ORK 32	Knowe of Yarso
ORK 36	Maes Howe
ORK 37	Midhowe
ORK 43	Quanterness
ORK 44	Quoyness
ORK 47	Sandyhill Smithy
ORK 51	Unstan
ORK 54	Wideford Hill

Table 6.6. Cairns with internal construction walls

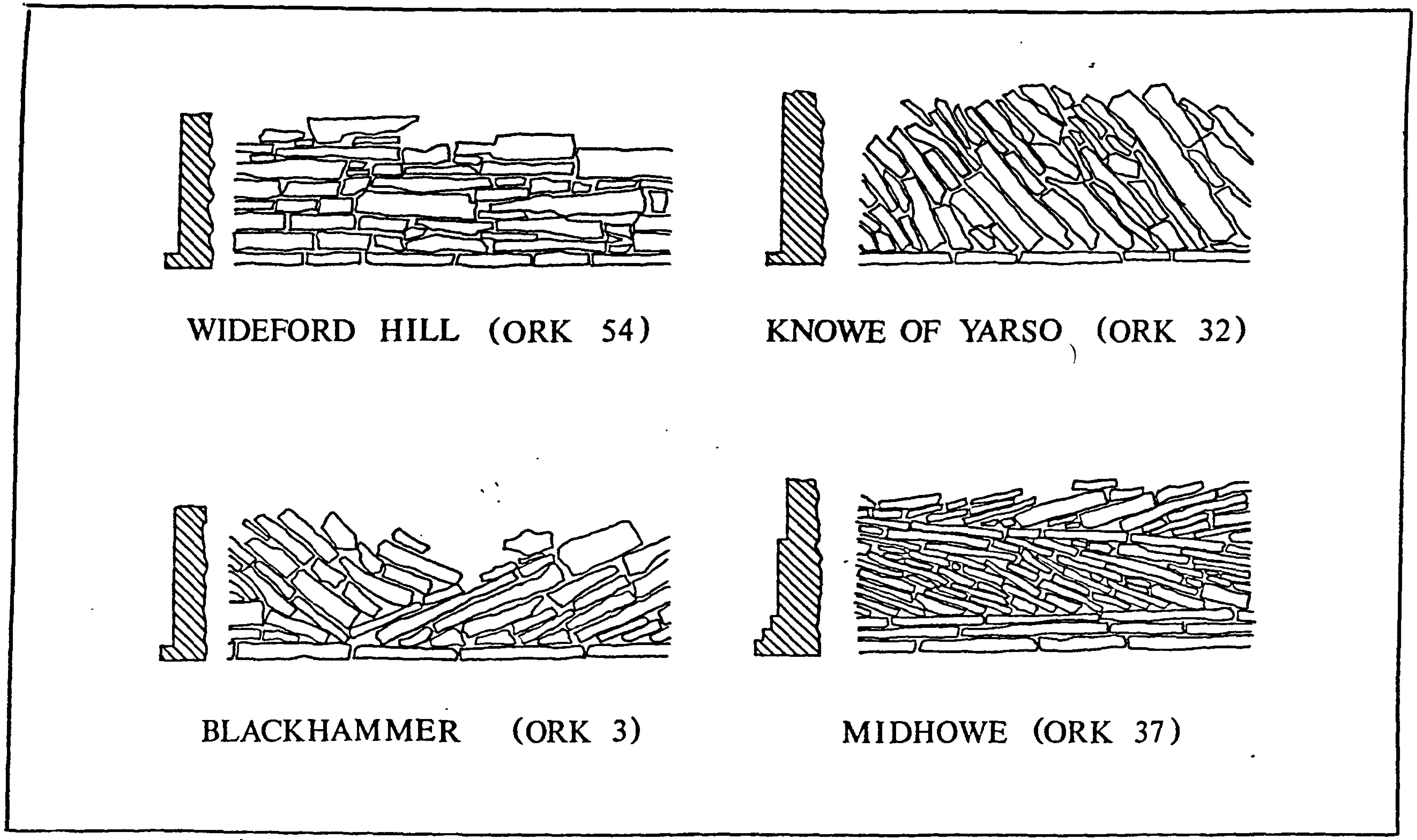


Figure 6.7. Patterns of stone work on external walls (after Kilbride-Jones, 1973).

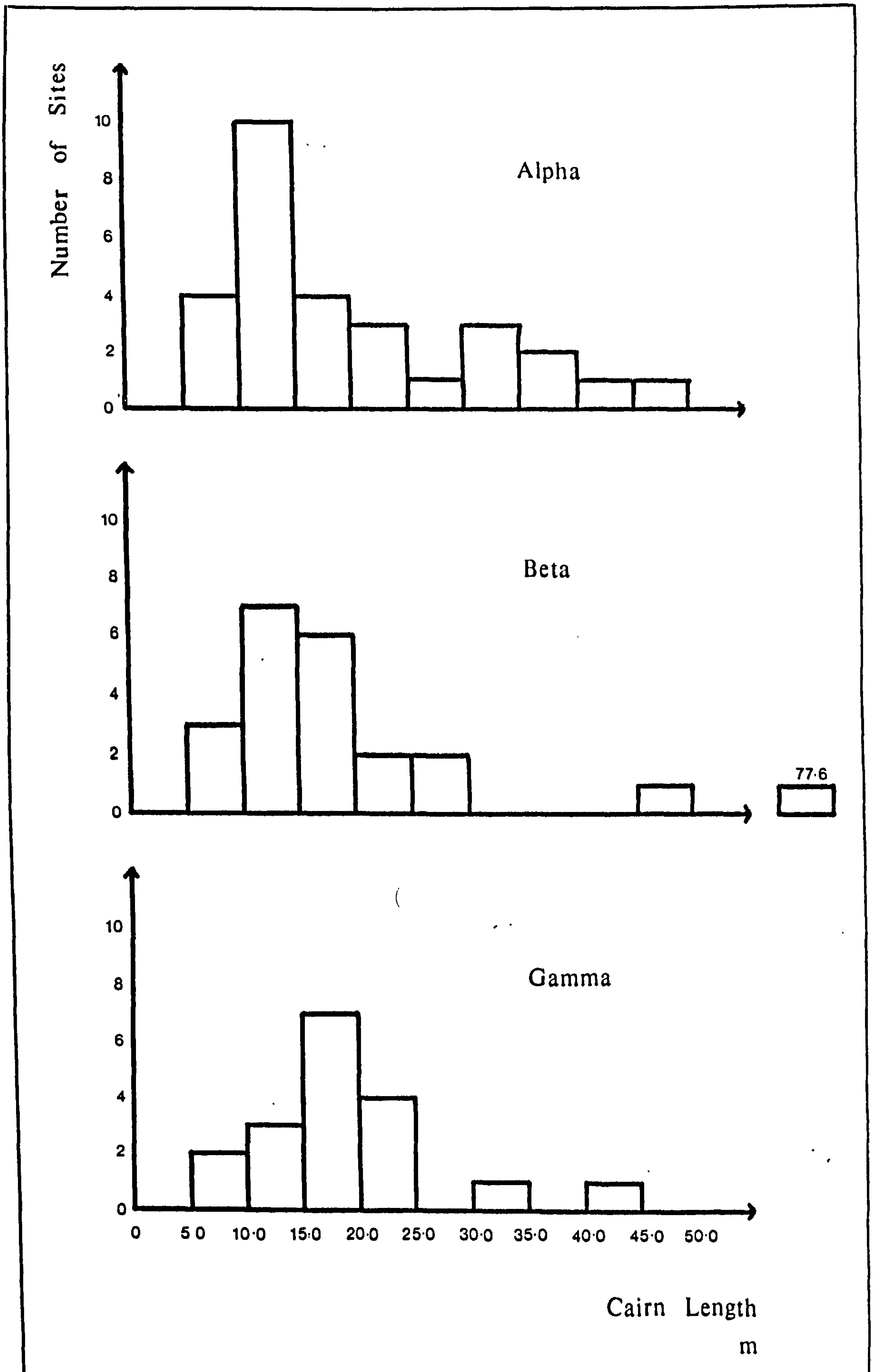


Figure 6.8. Cairn length: histograms for categories Alpha, Beta and Gamma (n = 29, 22, 18).

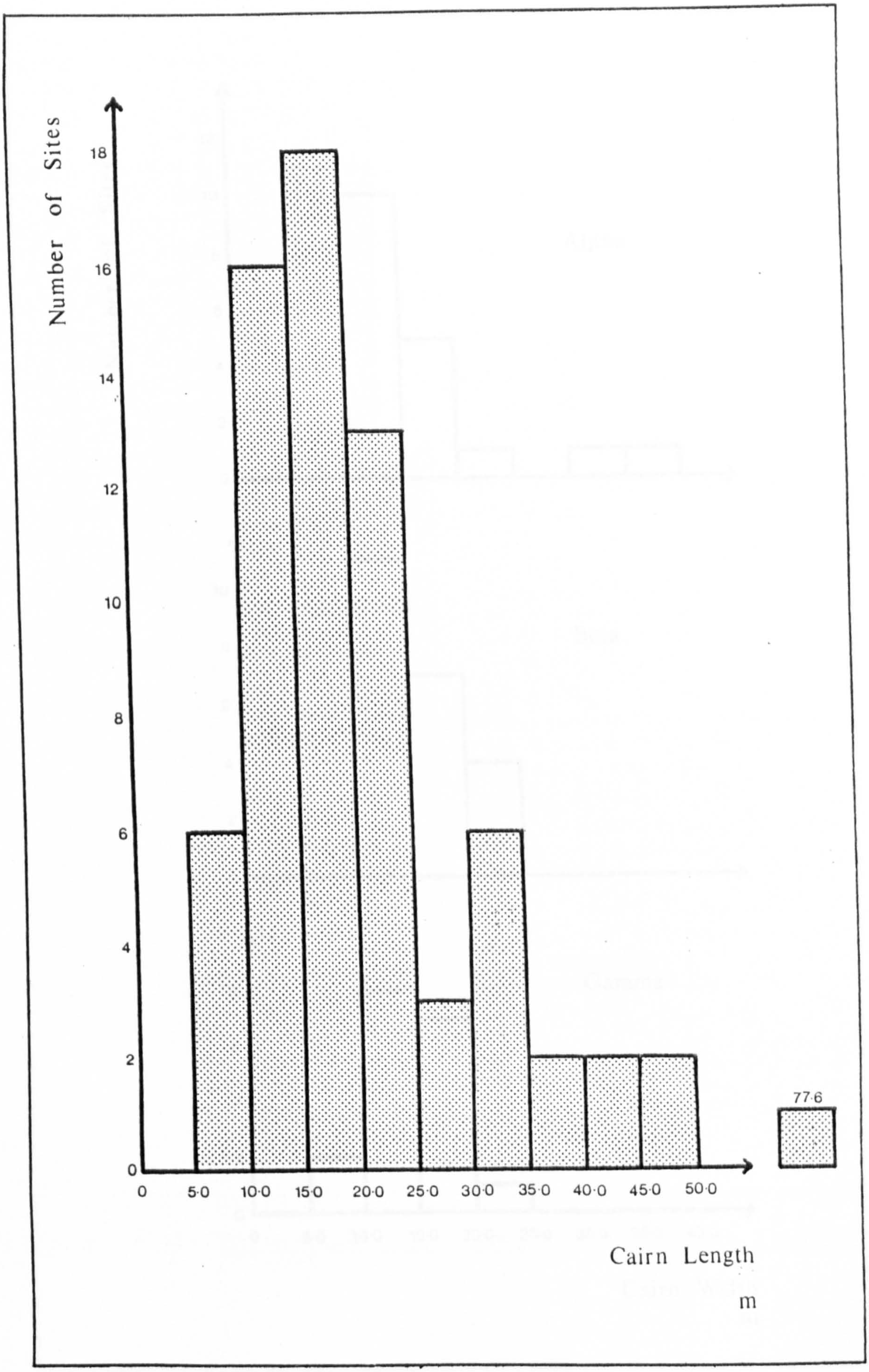


Figure 6.9. Cairn length: histogram for all cairns (n = 69).

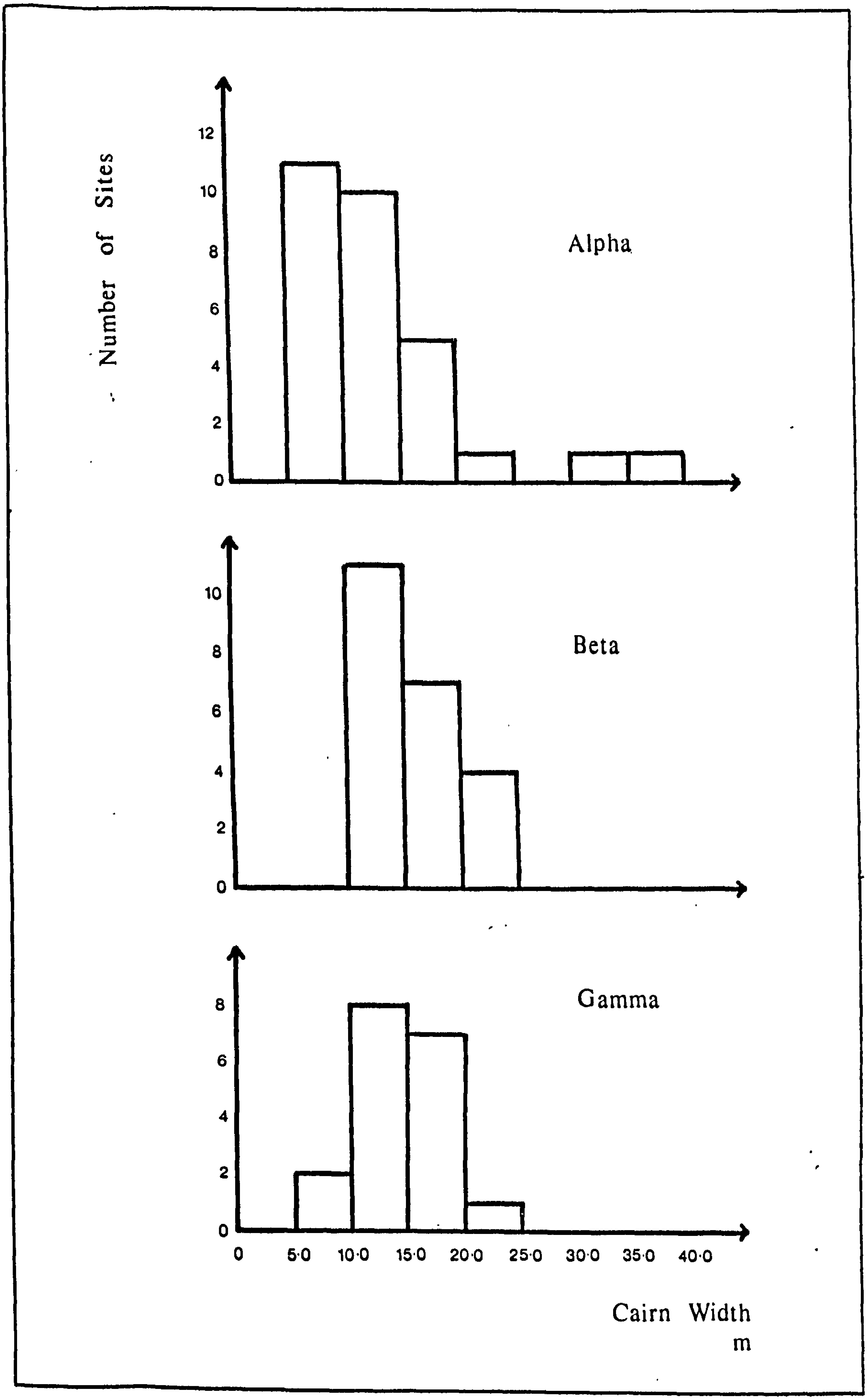


Figure 6.10. Cairn width: histograms for categories Alpha, Beta, and Gamma (n = 29, 22, 18).

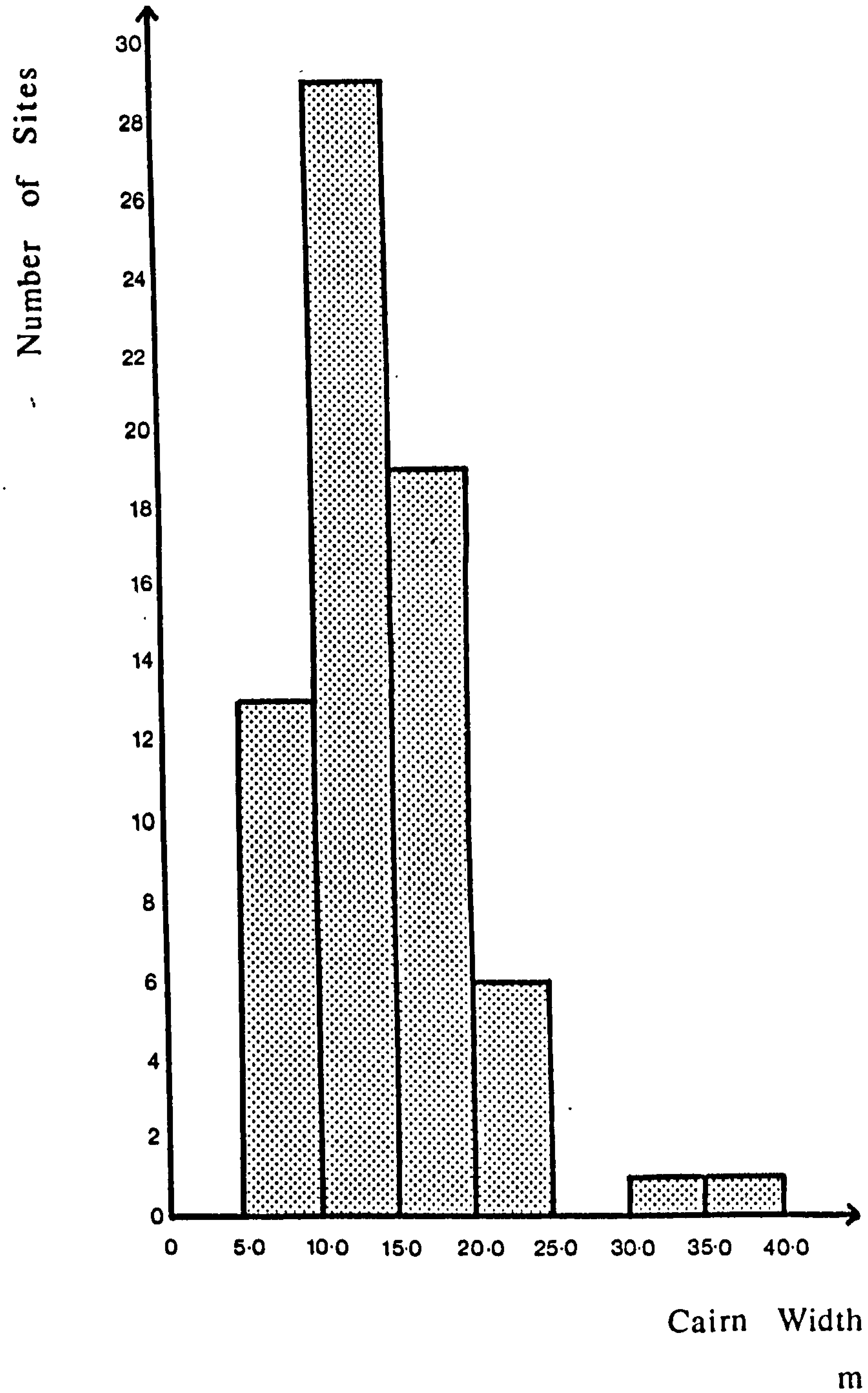


Figure 6.11. Cairn width: histogram for all cairns (n = 69).

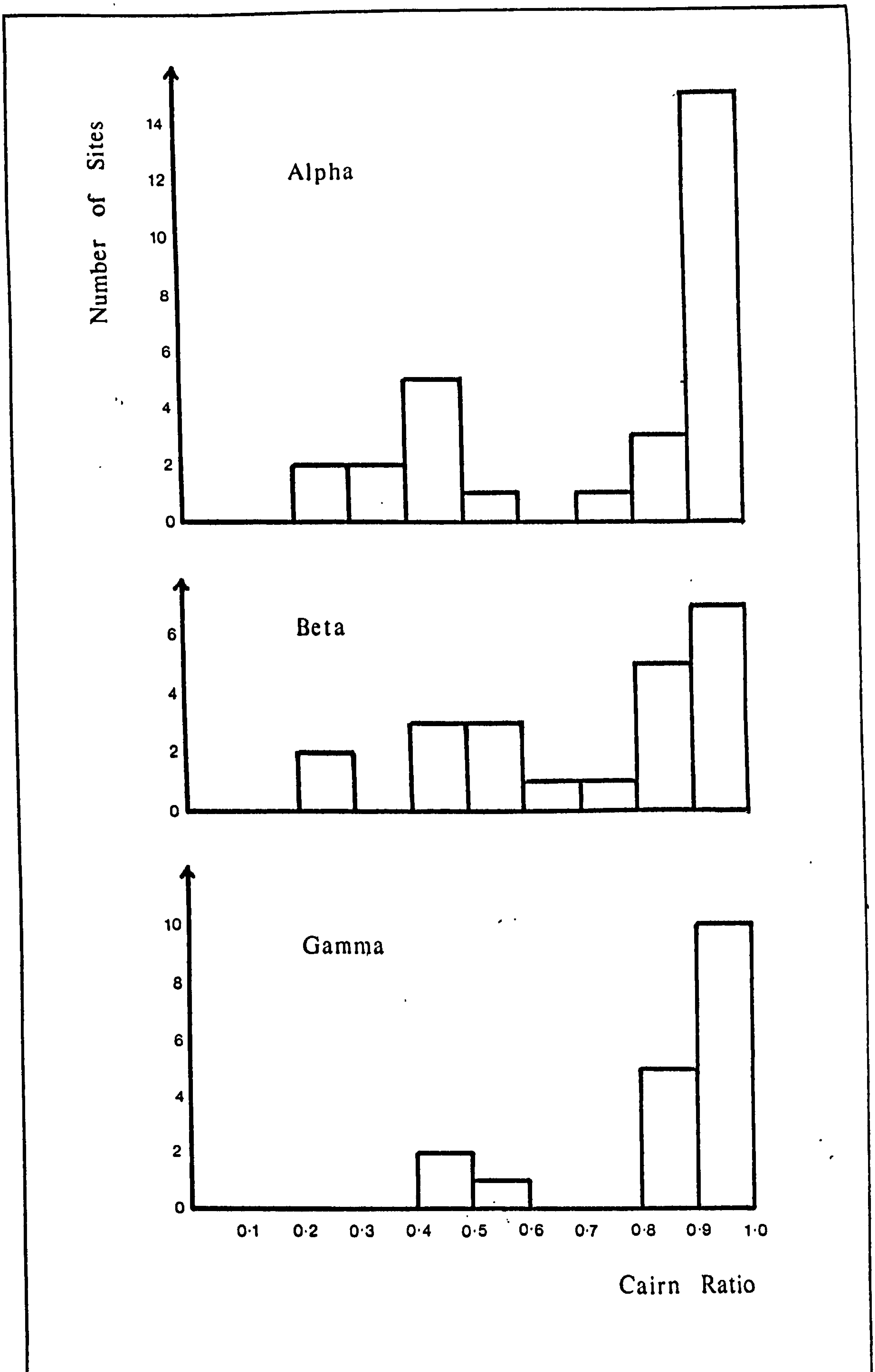


Figure 6.12. Cairn ratio: histograms for categories Alpha, Beta and Gamma (n = 29, 22, 18).

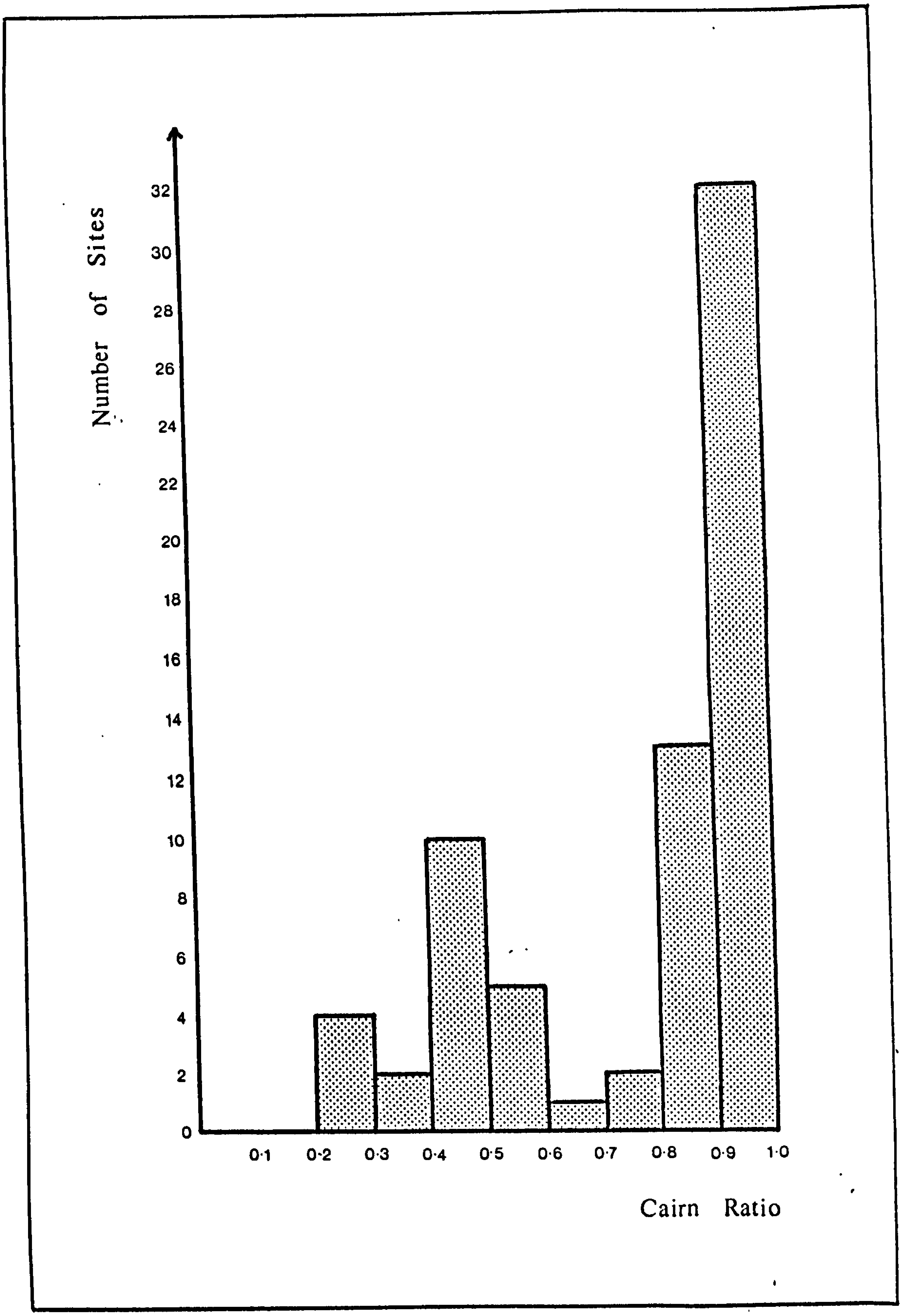


Figure 6.13. Cairn ratio: histogram for all cairns (n = 69).

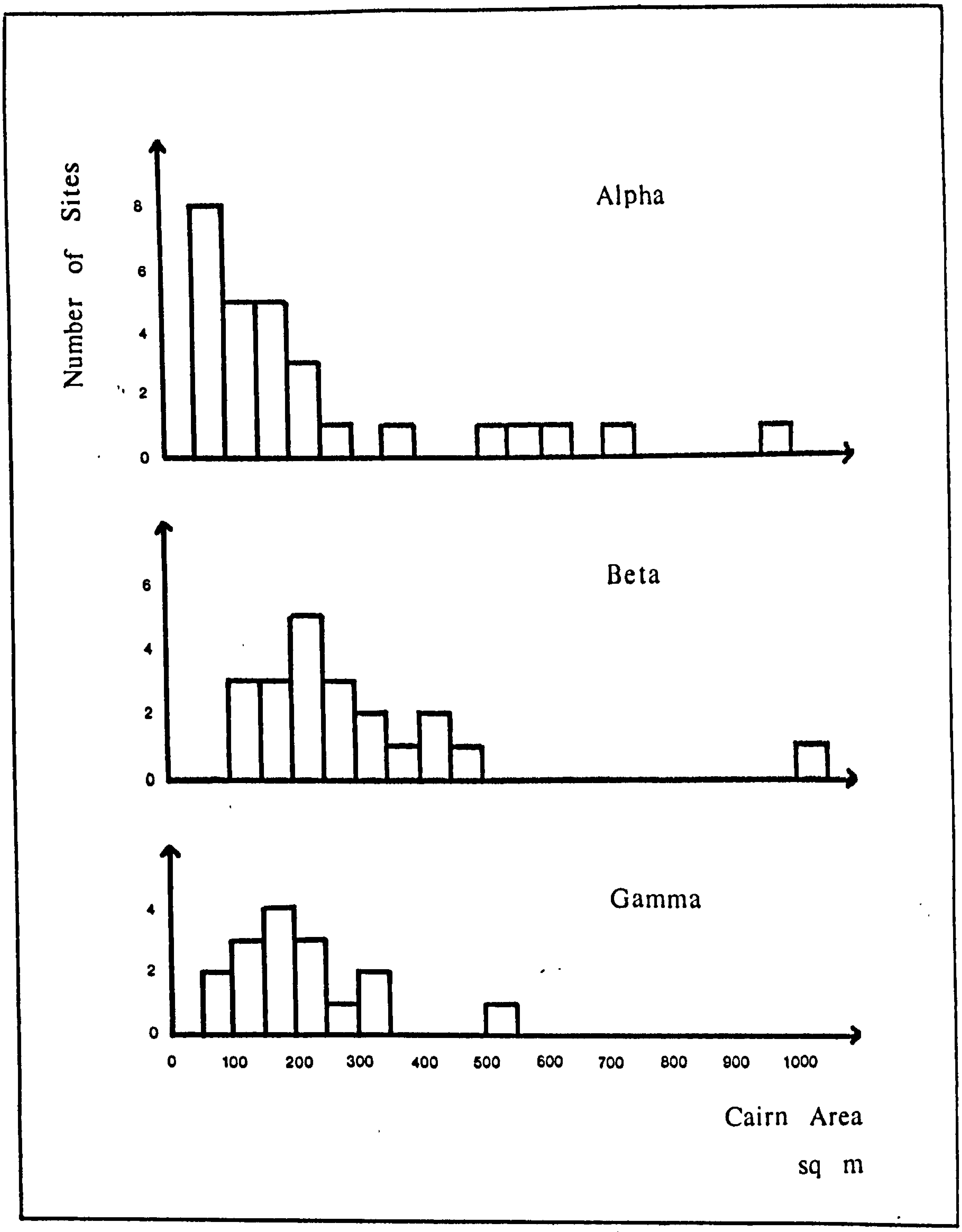


Figure 6.14. Cairn area: histograms for categories Alpha, Beta, and Gamma (n = 28, 21, 16).

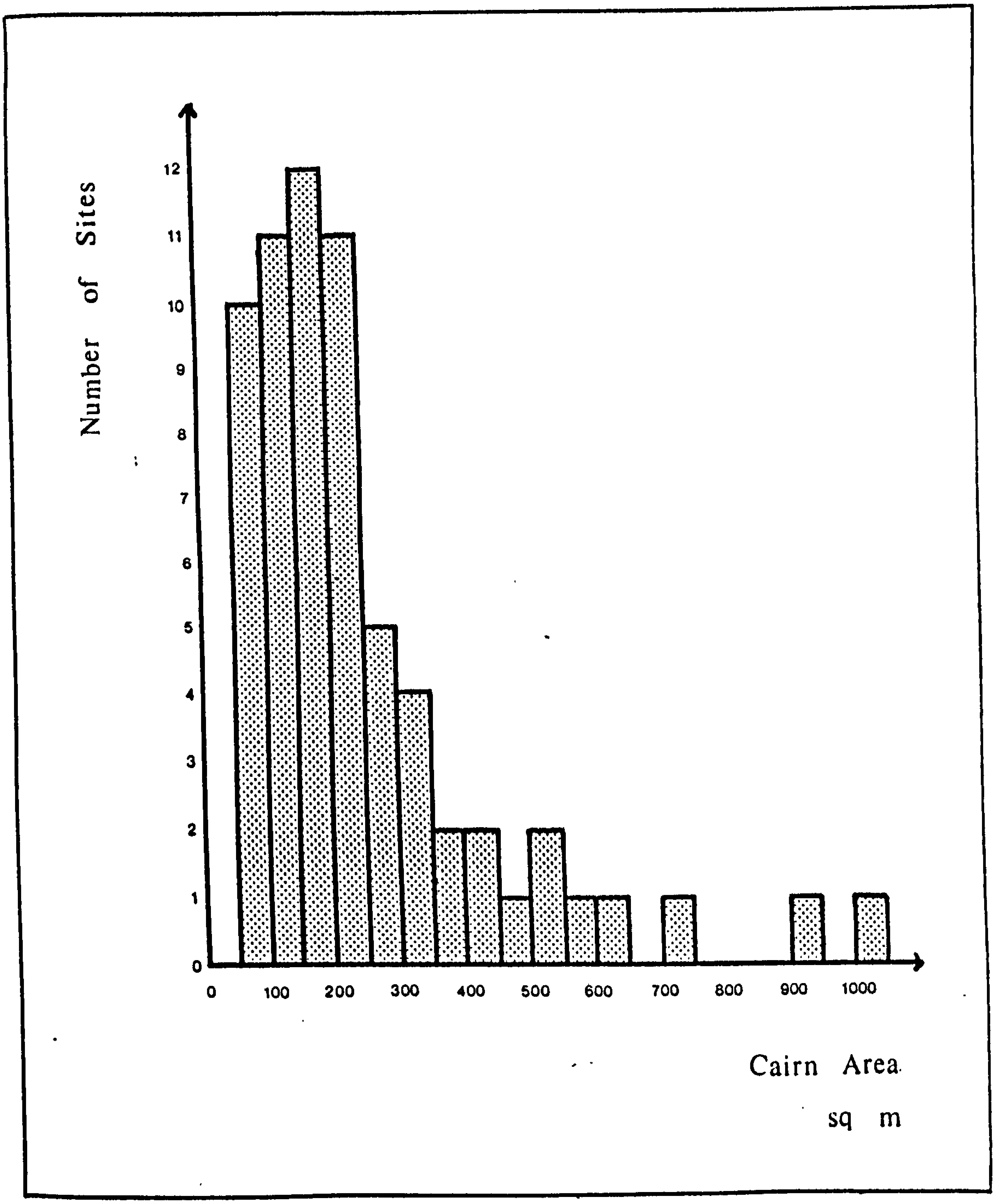


Figure 6.15. Cairn area: histogram for all cairns (n = 65).

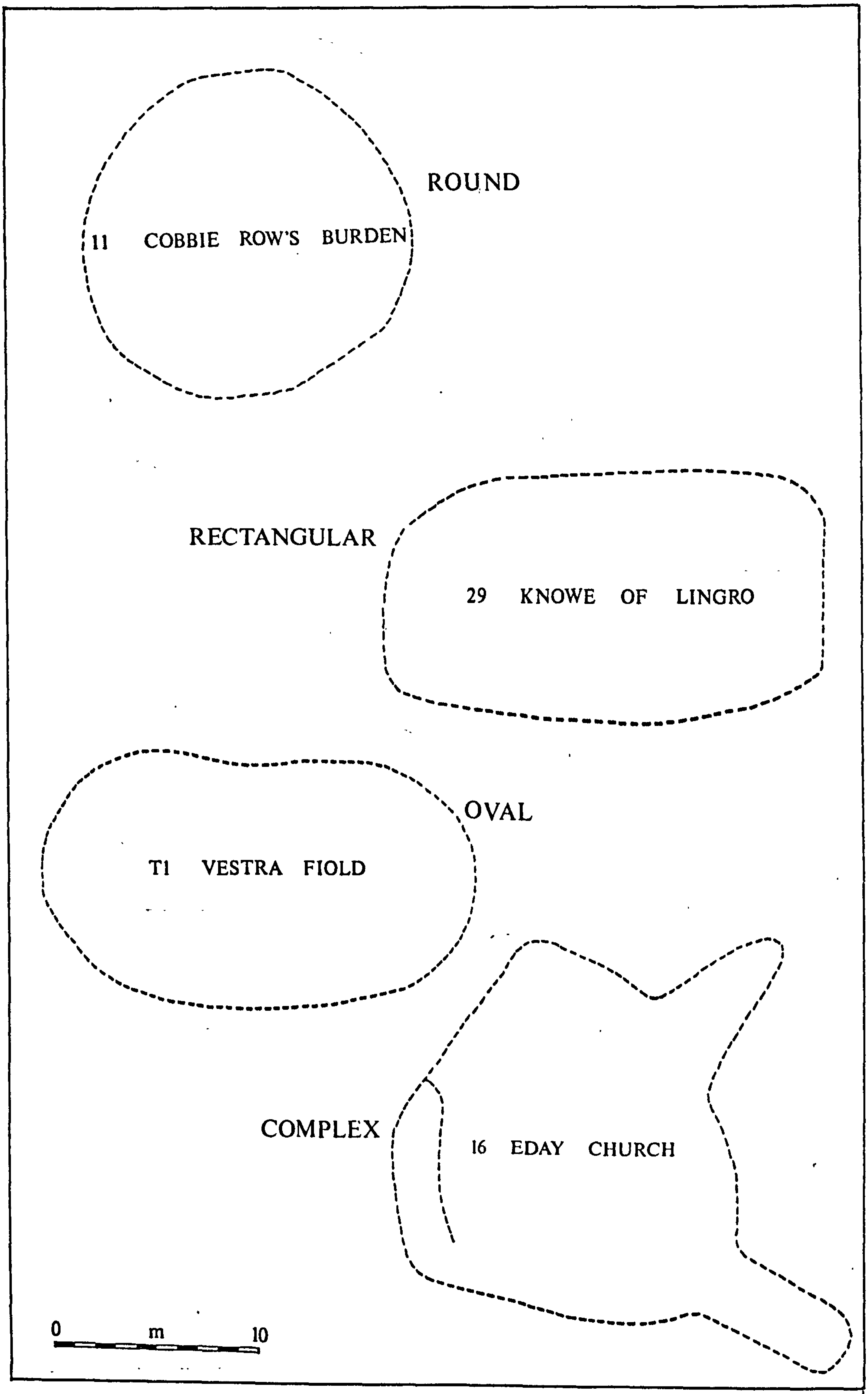


Figure 6.16. Cairn shape, four examples.

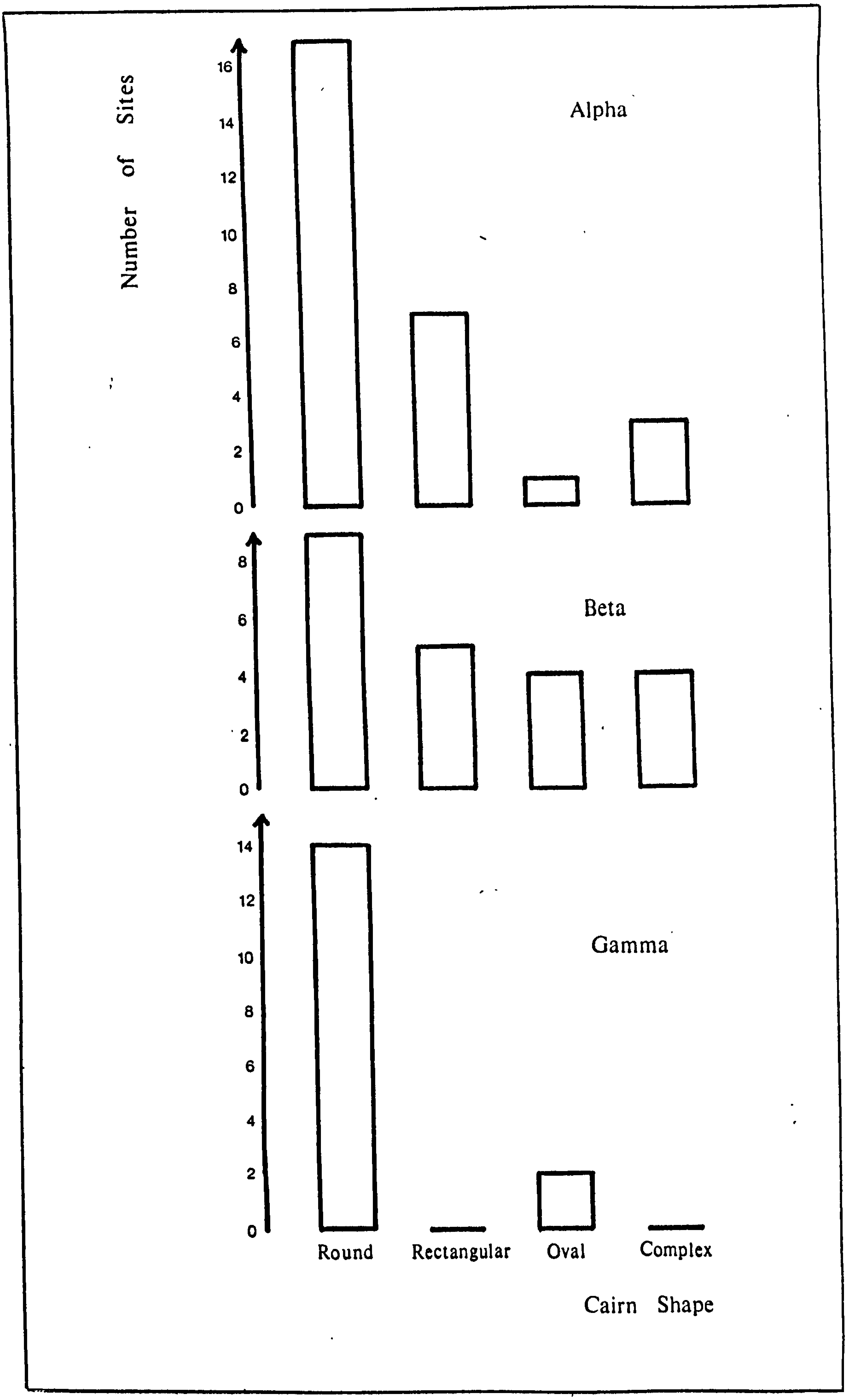


Figure 6.17. Cairn shape: histograms for categories Alpha, Beta, and Gamma (n = 27, 22, 16).

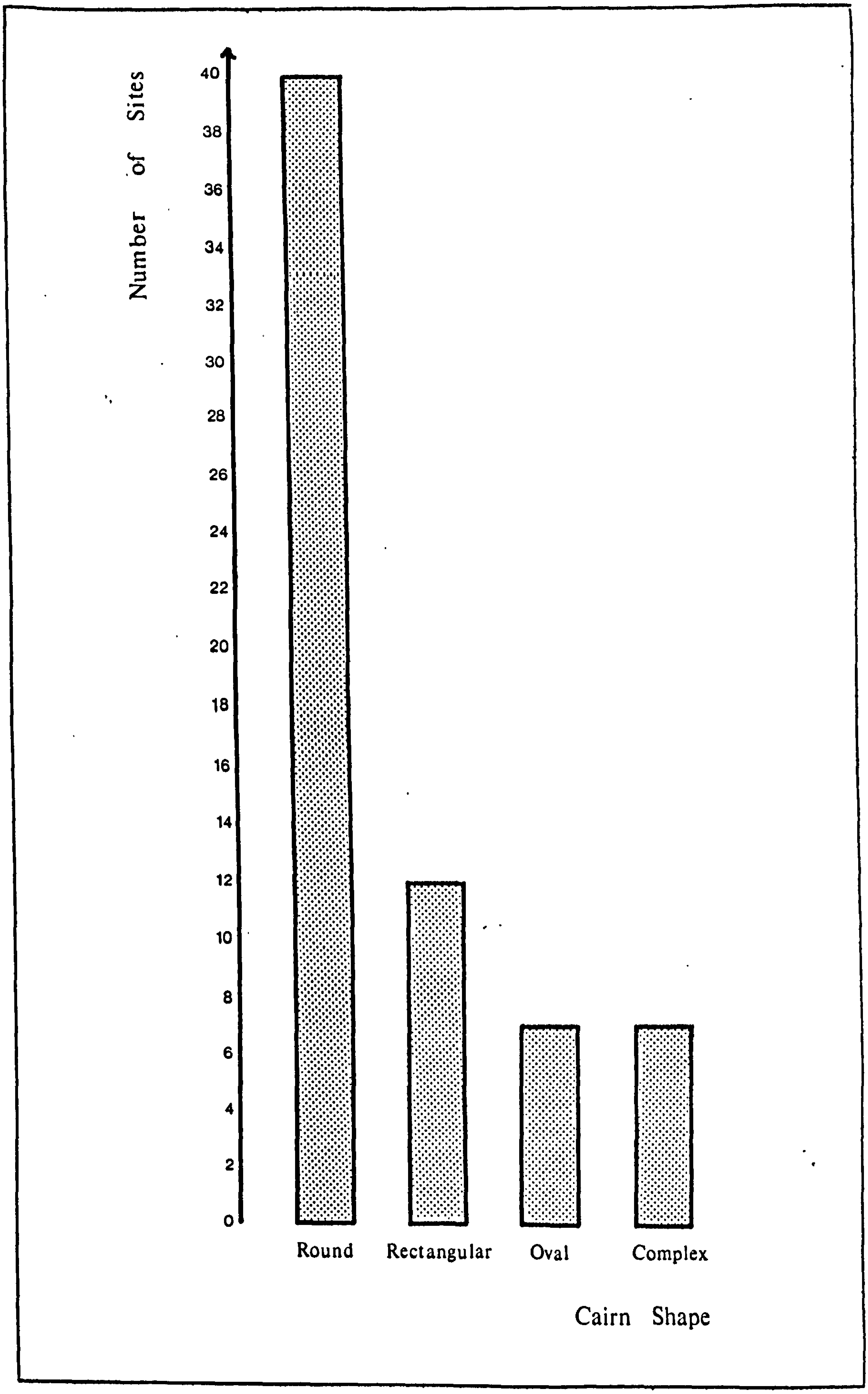


Figure 6.18. Cairn shape: histogram for all cairns (n = 66).

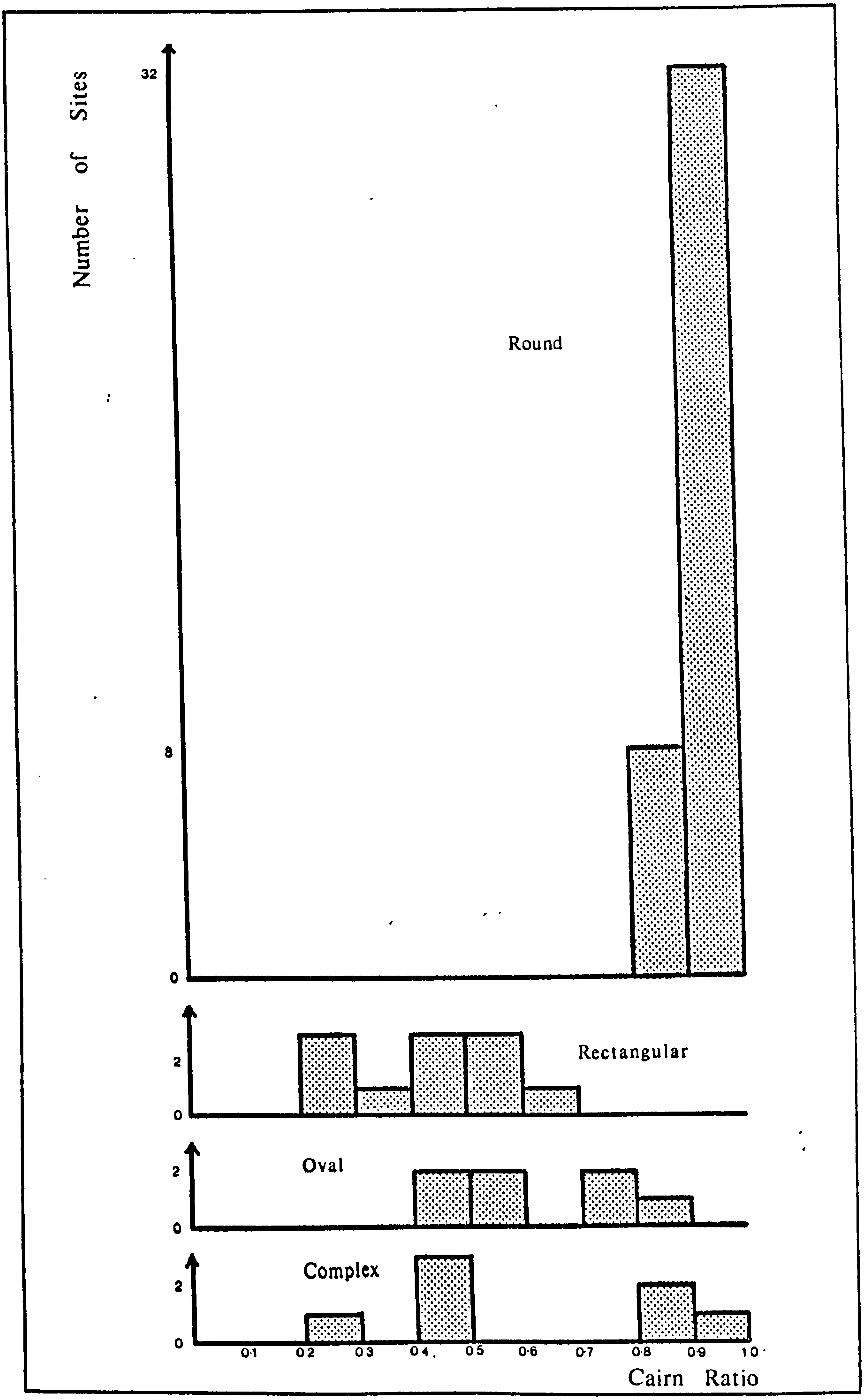


Figure 6.19. Cairn shape and cairn ratio: histograms for all cairns (n = 65).

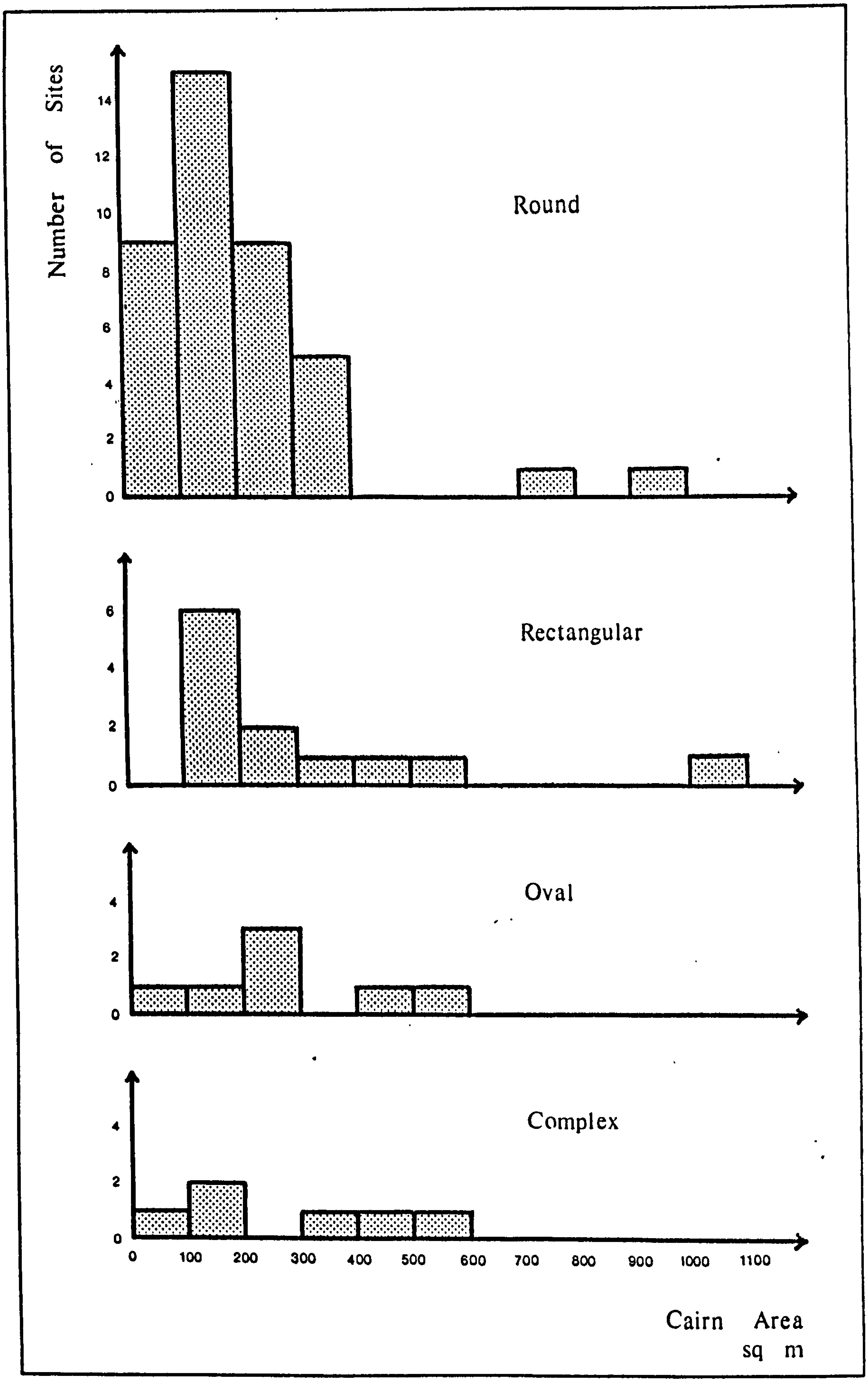


Figure 6.20. Cairn shape and cairn area: histograms for all cairns (n = 65).

Chambers with orthostat-and-walling construction:	
ORK 1	Bigland
ORK 2	Bigland Round
ORK 3	Blackhammer
ORK 4	Bookan
ORK 5	Braeside
ORK 8	Calf of Eday Long
ORK 9	Calf of Eday North-West
ORK 10	Calf of Eday South-East
ORK 15	Eday Church
ORK 21	Holm of Papa Westray North
ORK 23	Huntersquoy
ORK 25	Isbister
ORK 26	Kierfea Hill
ORK 27	Knowe of Craie
ORK 28	Knowe of Lairo
ORK 29	Knowe of Lingro
ORK 30	Knowe of Ramsay
ORK 31	Knowe of Rowiegar
ORK 32	Knowe of Yarso
ORK 36	Maes Howe
ORK 37	Midhowe
ORK 41	Point of Cott
ORK 47	Sandyhill Smithy
ORK 49	Taversoe Tuick
ORK 51	Unstan
ORK T15	Nev Hill

Chambers with horizontally coursed walling only:	
ORK 12	Cuween Hill
ORK 22	Holm of Papa Westray South
ORK 43	Quanterness
ORK 44	Quoyness
ORK 53	Vinquoy Hill
ORK 54	Wideford Hill

Table 6.21. Methods of chamber construction.

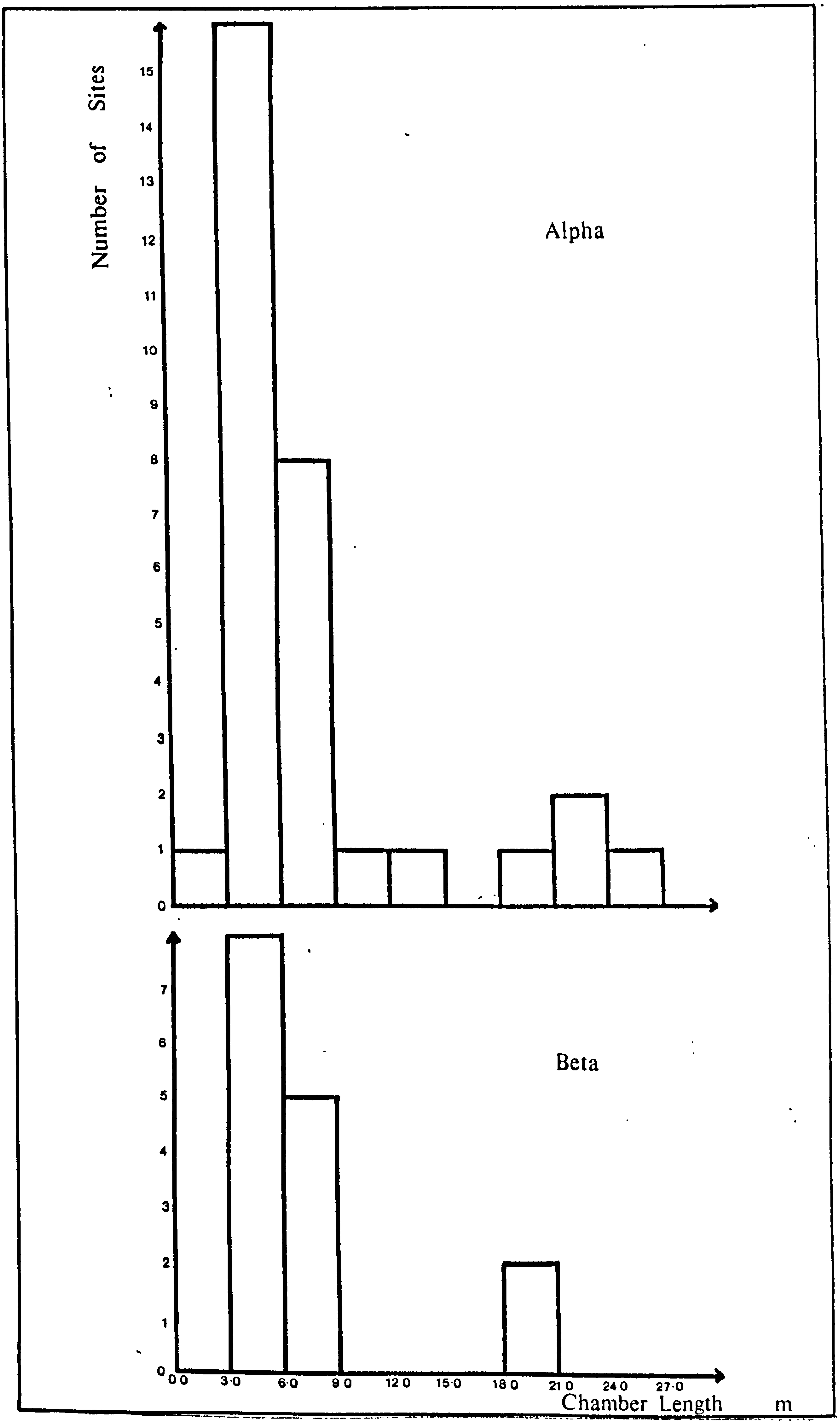


Figure 6.22. Chamber length: histograms for categories Alpha and Beta (n = 31, 15).

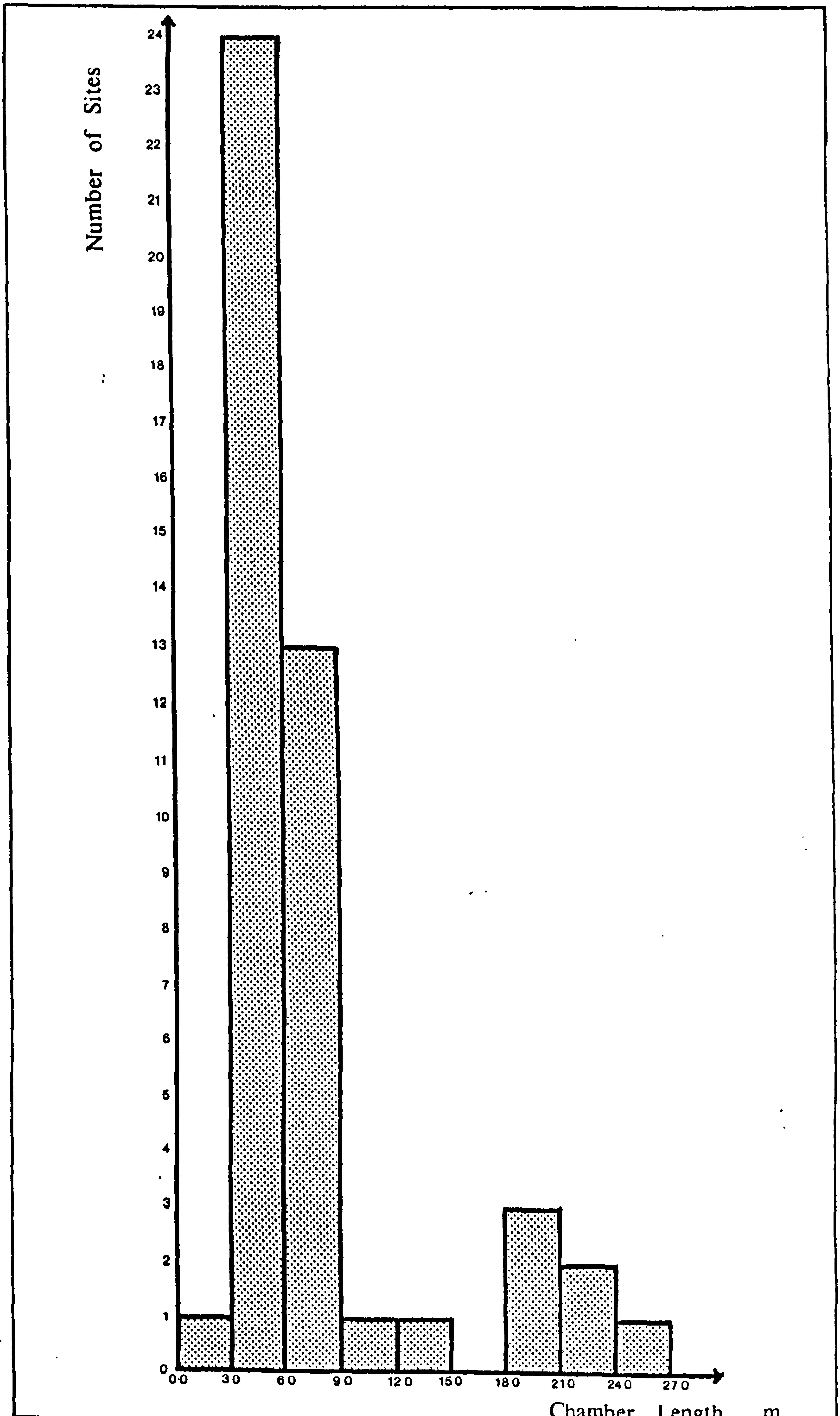


Figure 6.23. Chamber length: histogram for all chambers (n = 46).

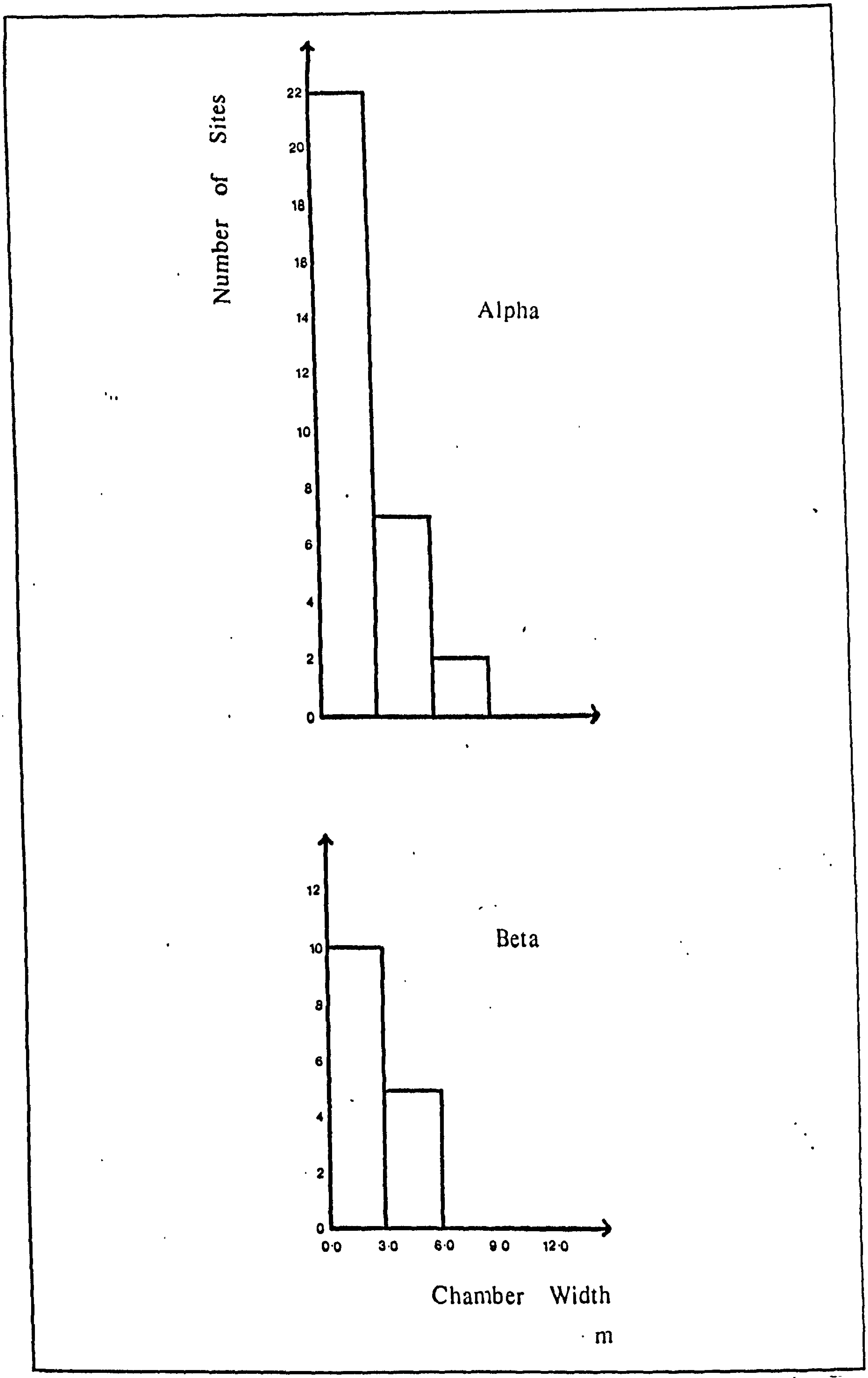


Figure 6.24. Chamber width: histograms for categories Alpha and Beta (n = 31, 15)

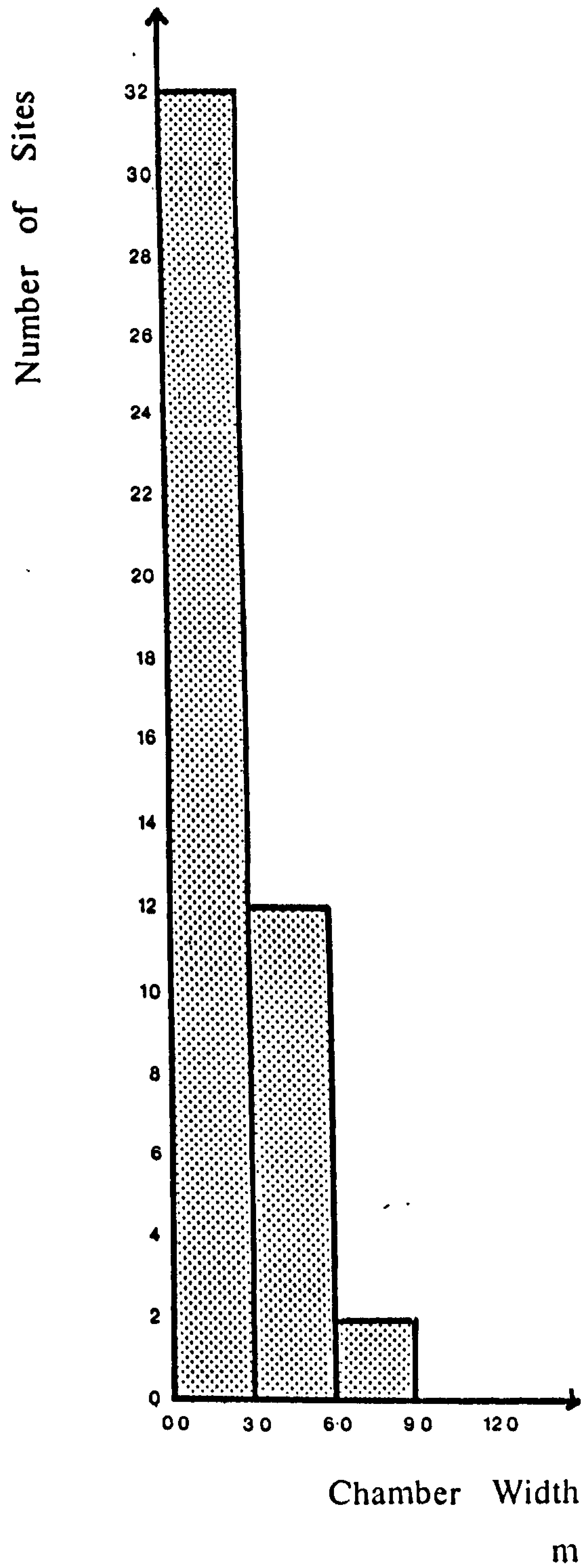


Figure 6.25. Chamber width: histogram for all chambers (n = 46)

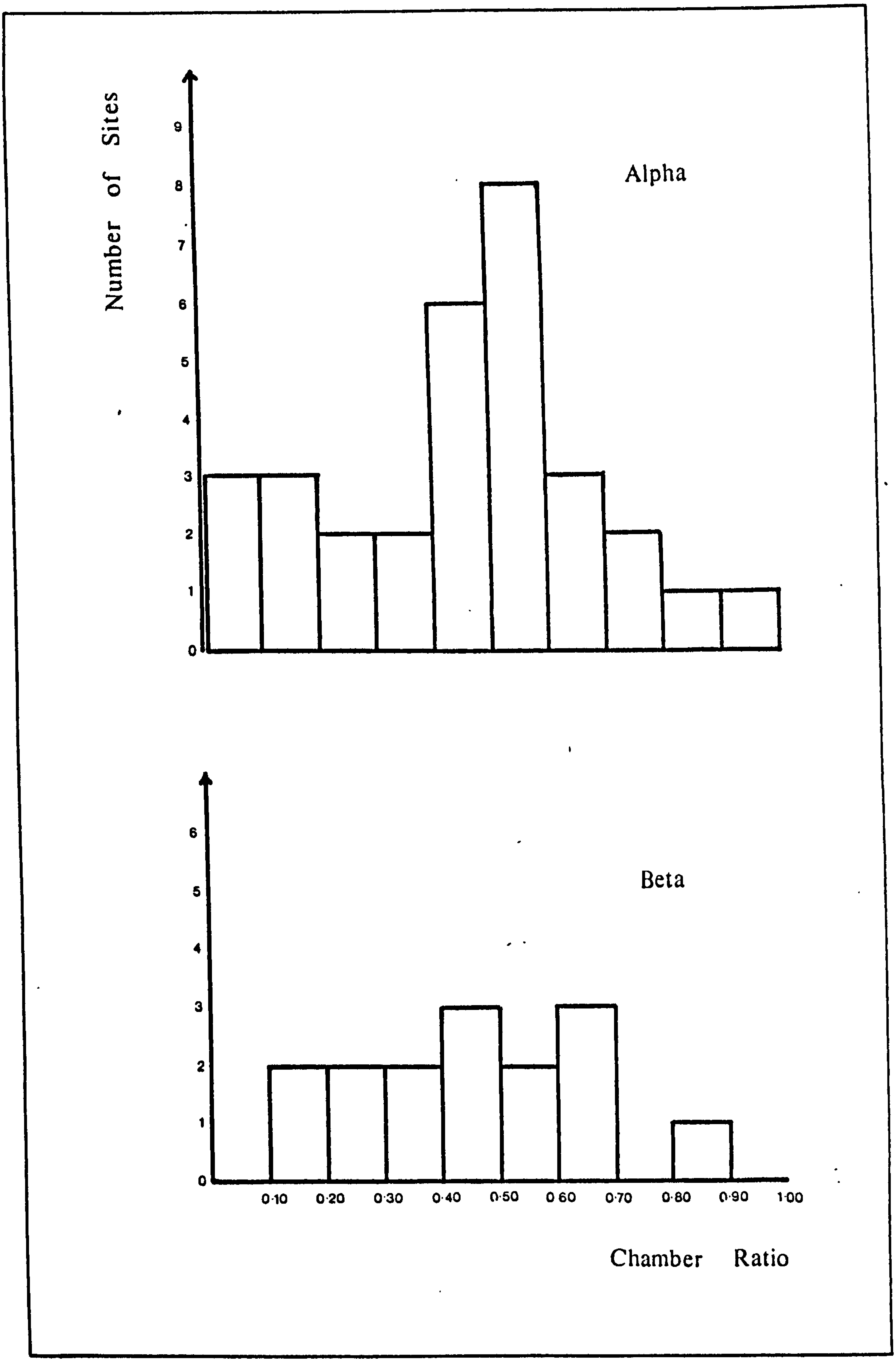


Figure 6.26. Chamber ratio: histograms for categories Alpha and Beta (n = 31, 15).

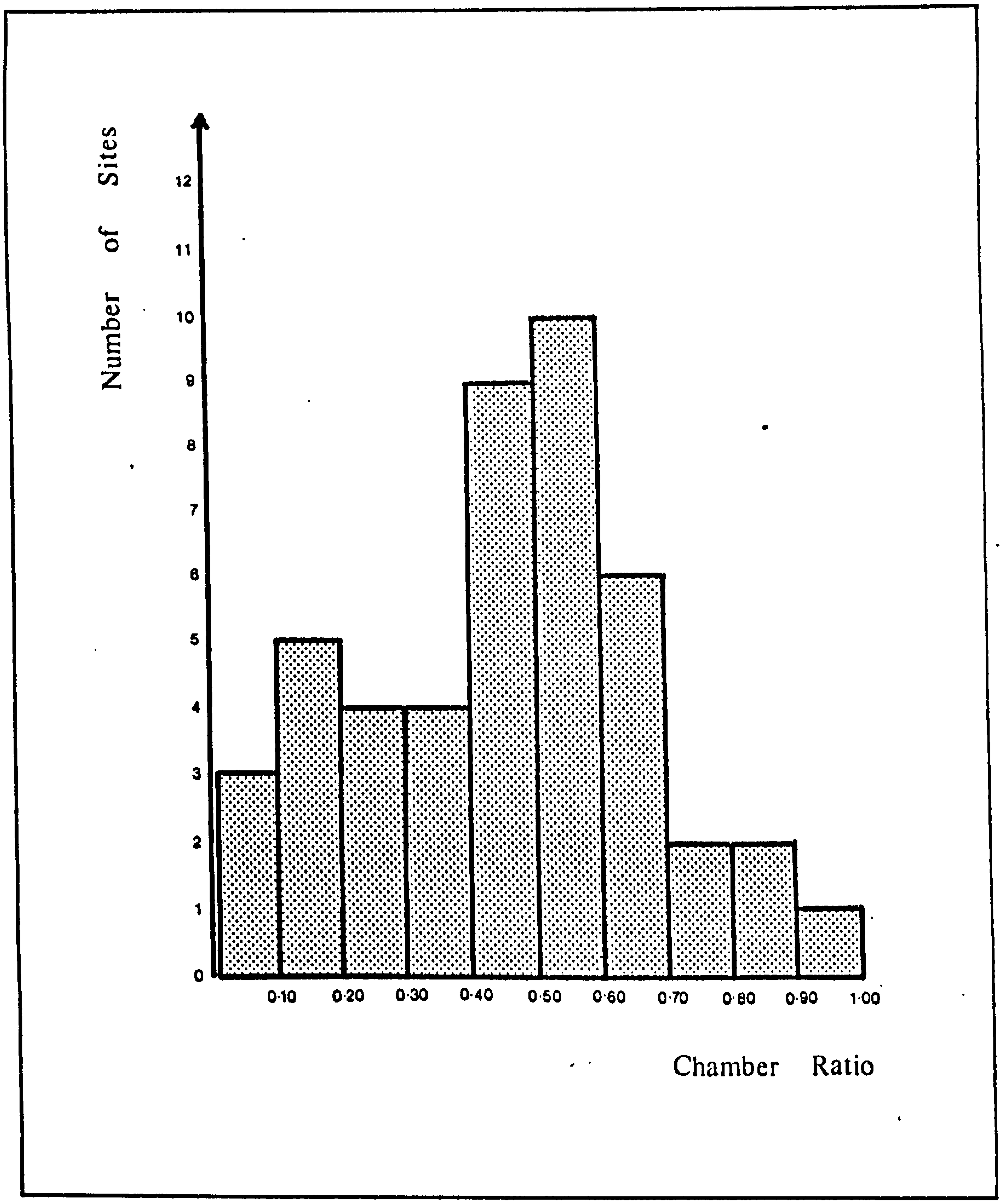


Figure 6.27. Chamber ratio: histogram for all chambers (n = 46).

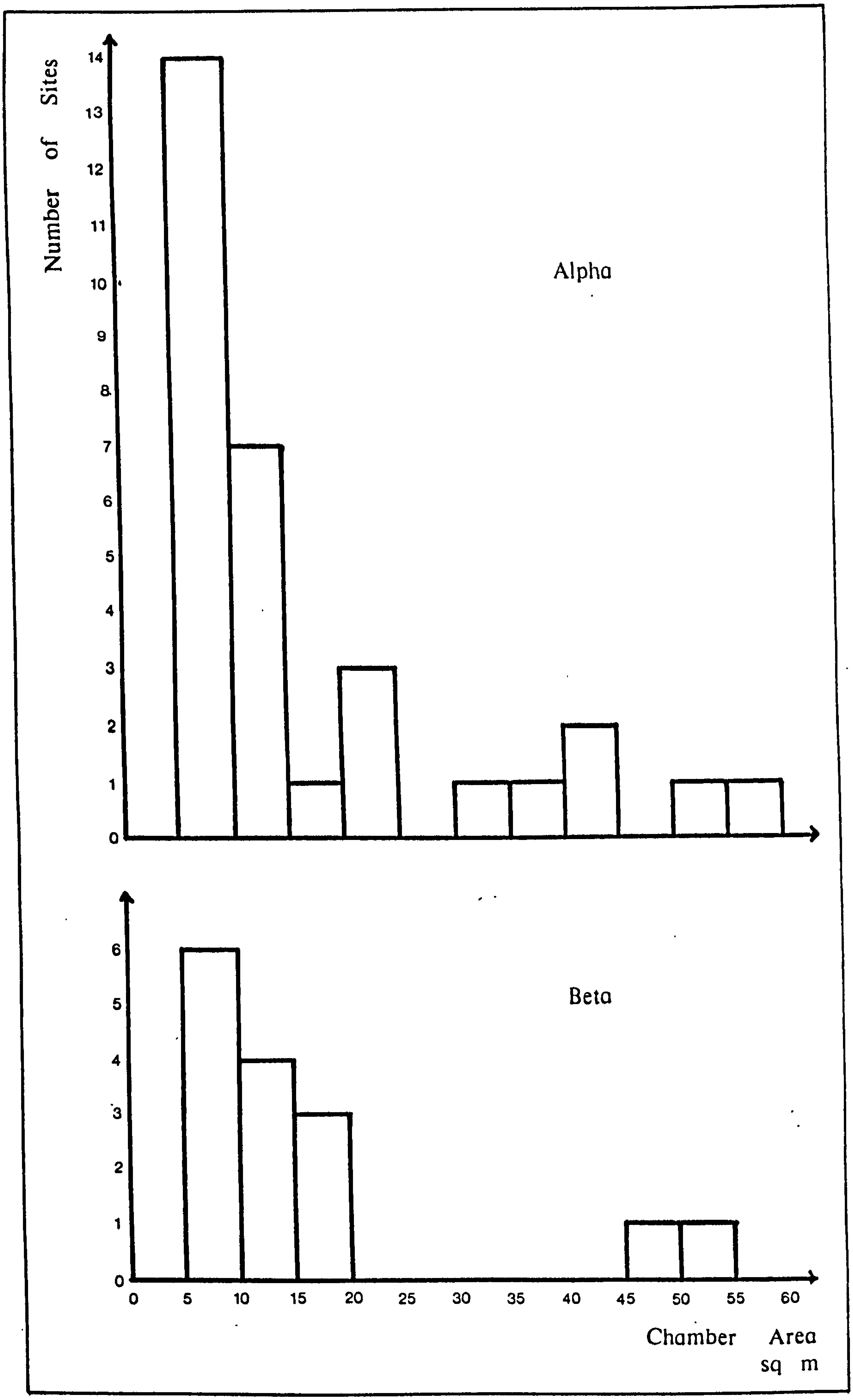


Figure 6.28. Chamber area: histograms for categories Alpha and Beta (n = 31, 15).

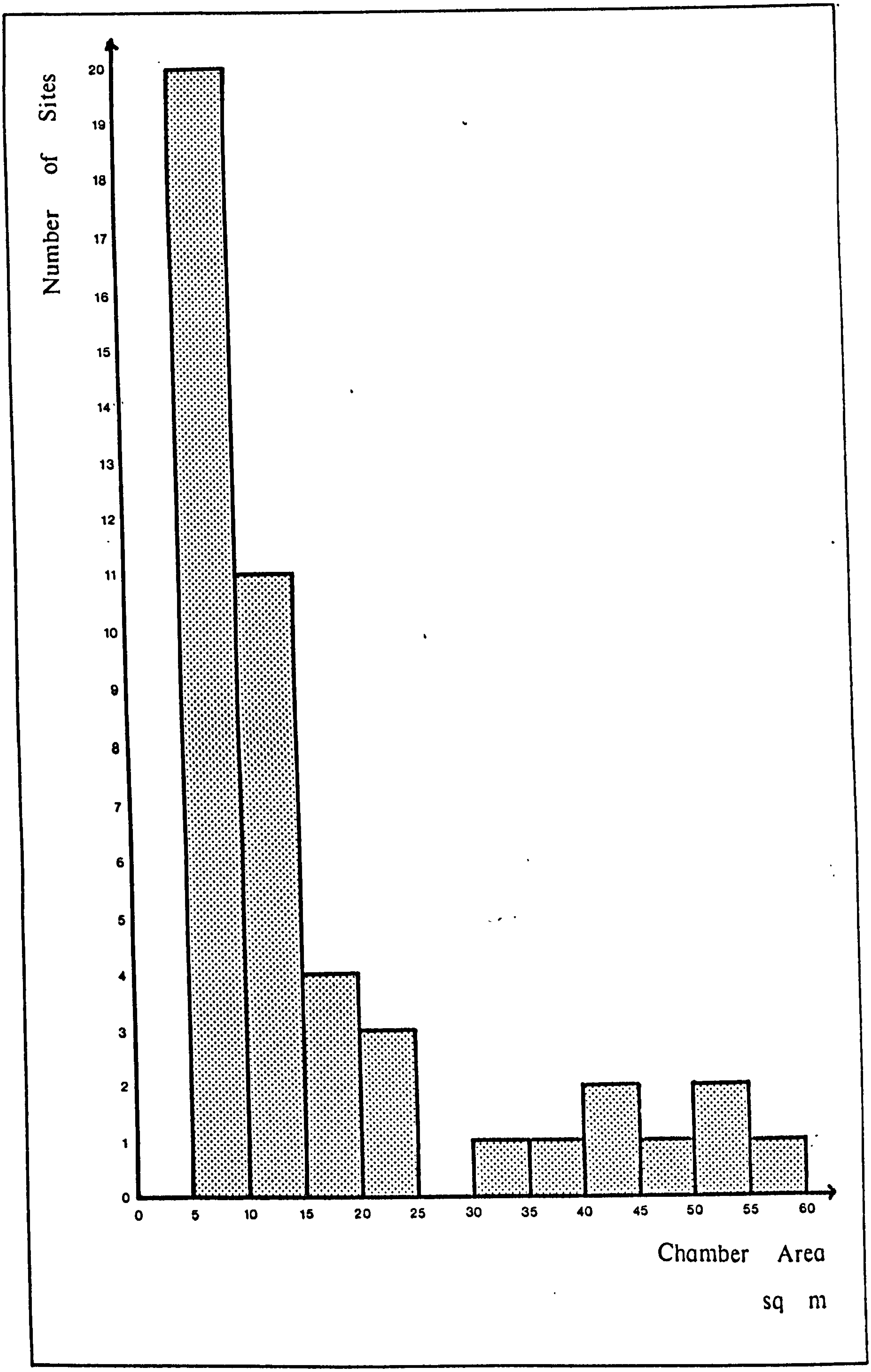


Figure 6.29. Chamber area: histogram for all chambers (n = 46).

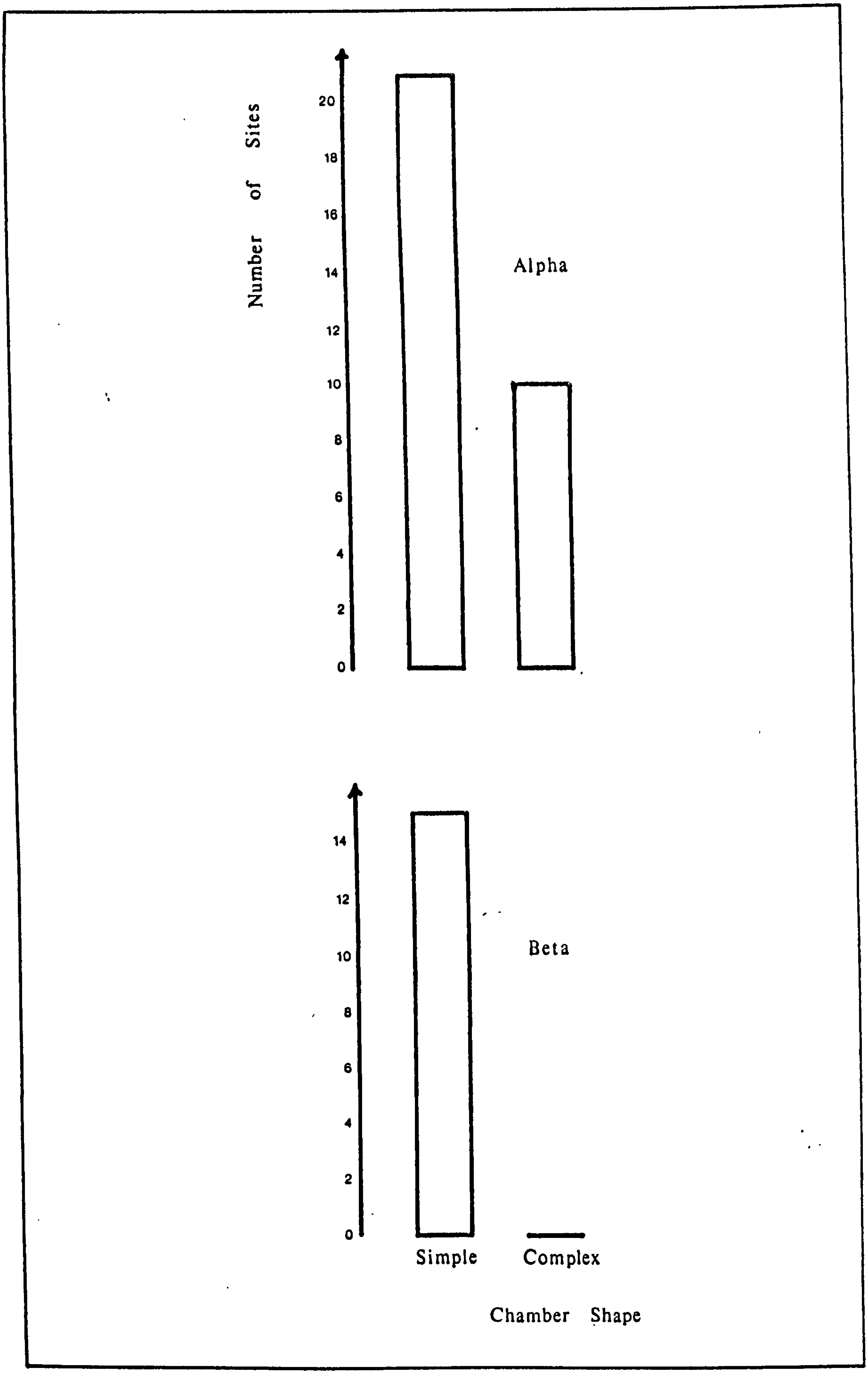


Figure 6.30. Chamber shape: histograms for categories Alpha and Beta (n = 31, 15).

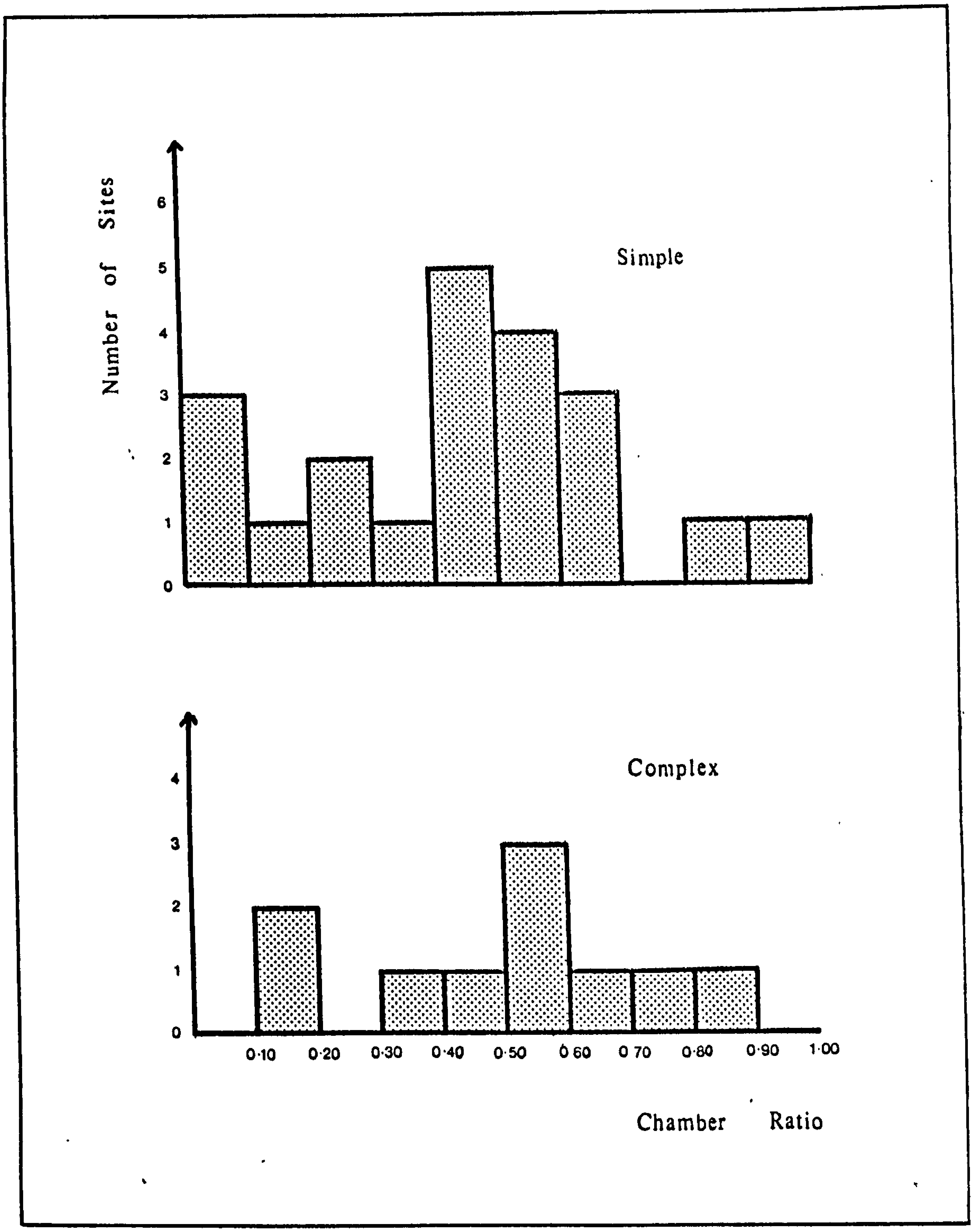


Figure 6.31. Chamber shape and chamber ratio: histogram for category Alpha (n = 31)

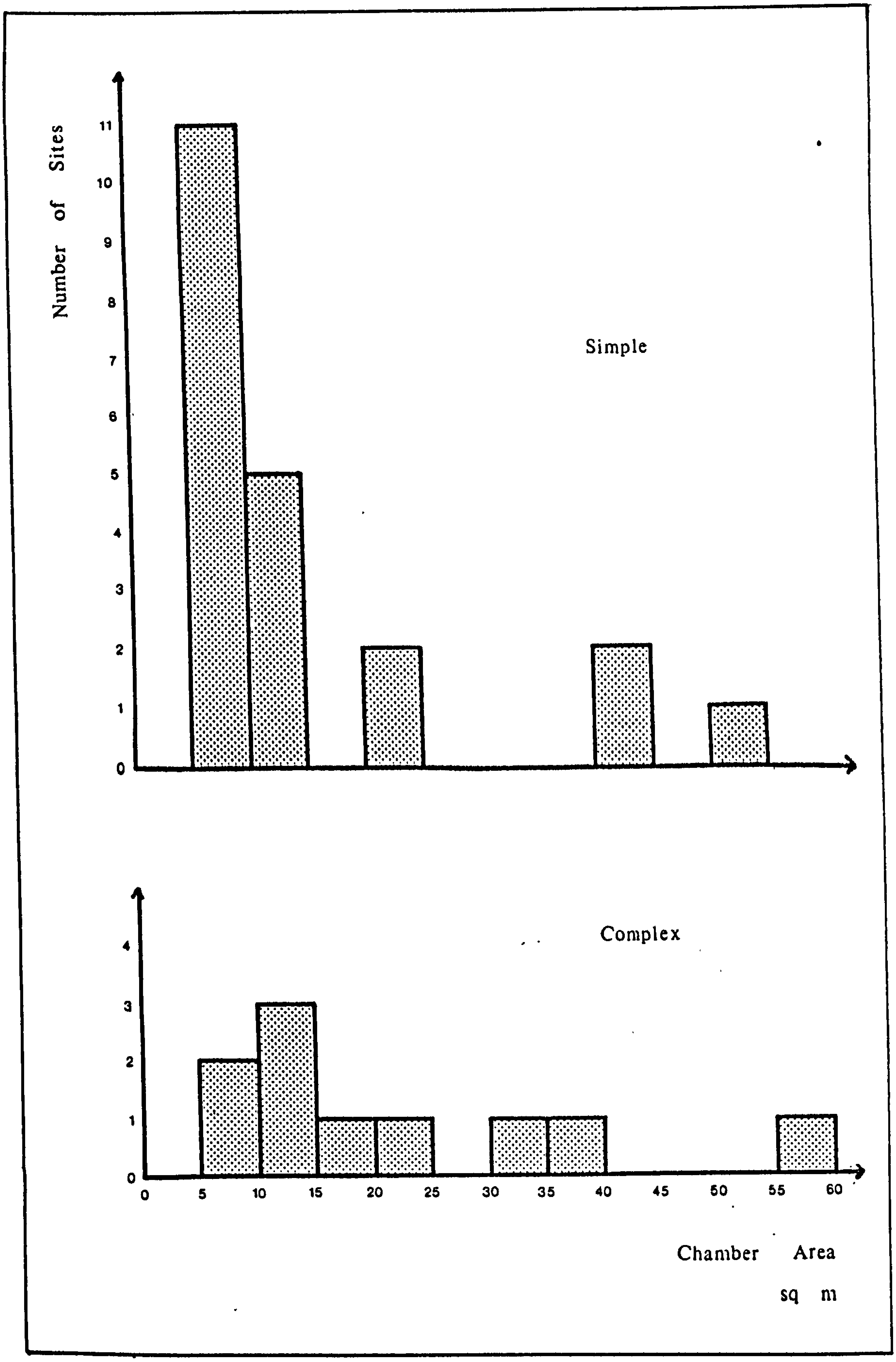


Figure 6.32. Chamber shape and chamber area: histogram for category Alpha (n = 31)

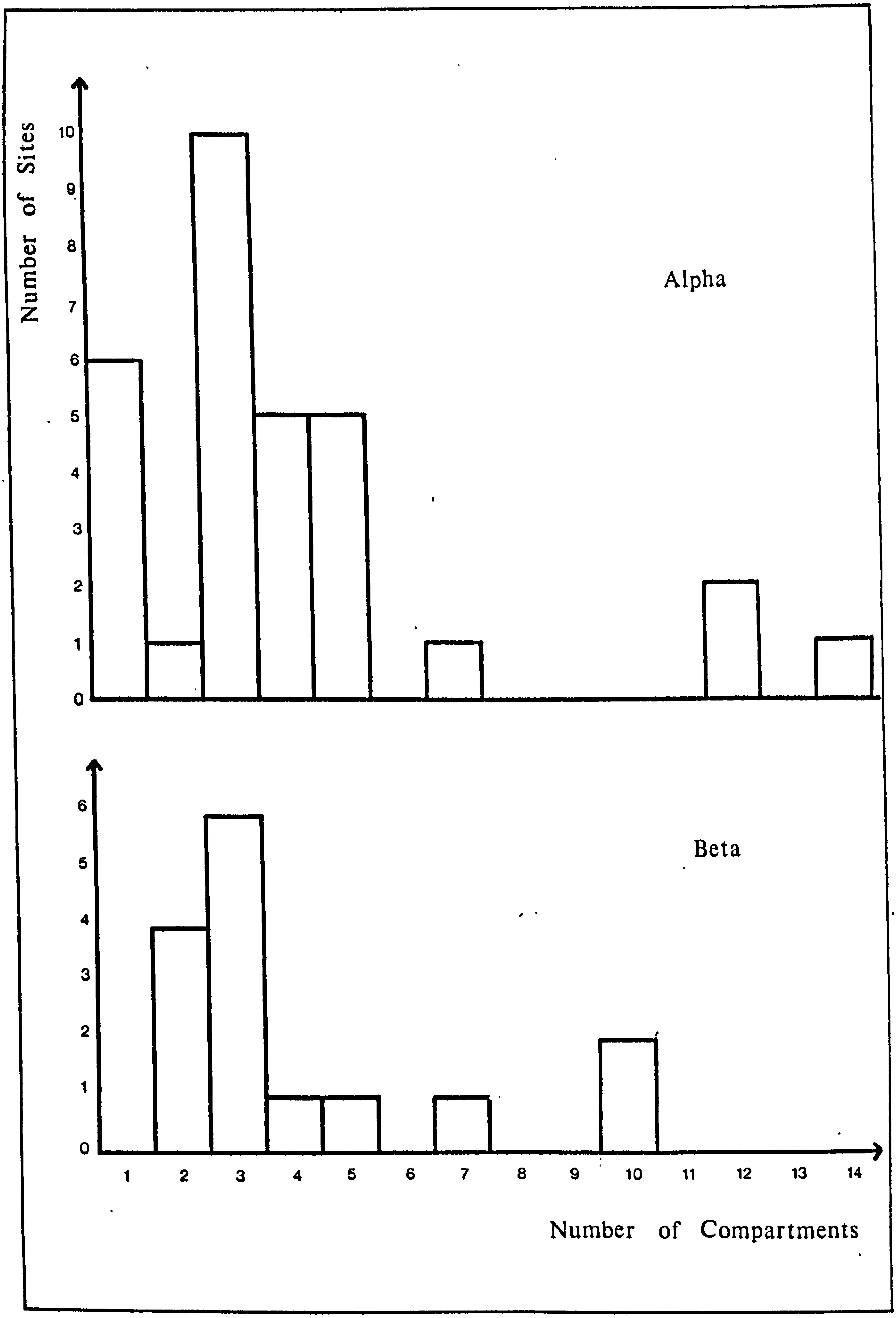


Figure 6.33. Number of compartments: histograms for Alpha and Beta (n = 31, 15).

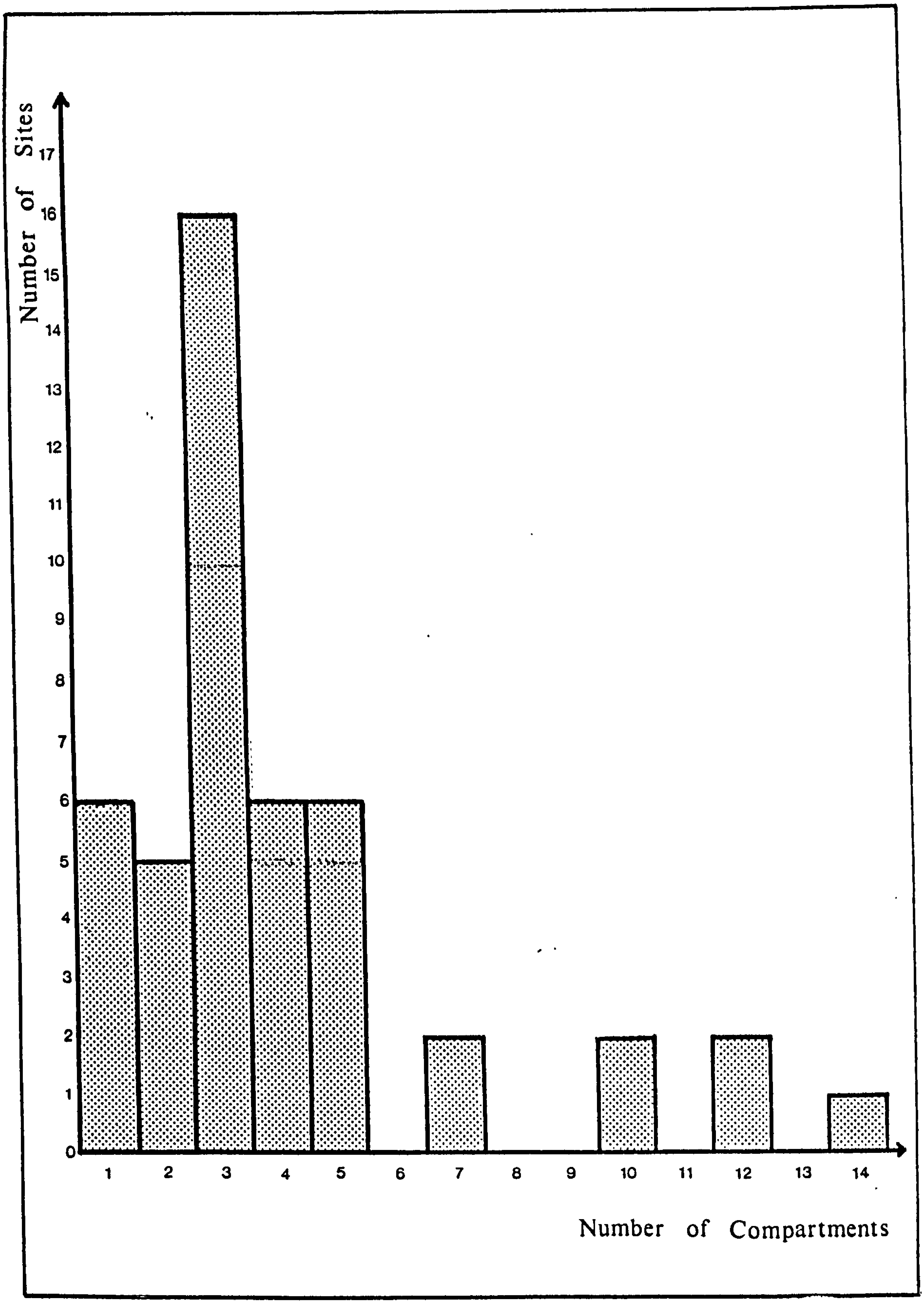


Figure 6.34. Number of compartments: histogram for all chambers (n = 46).

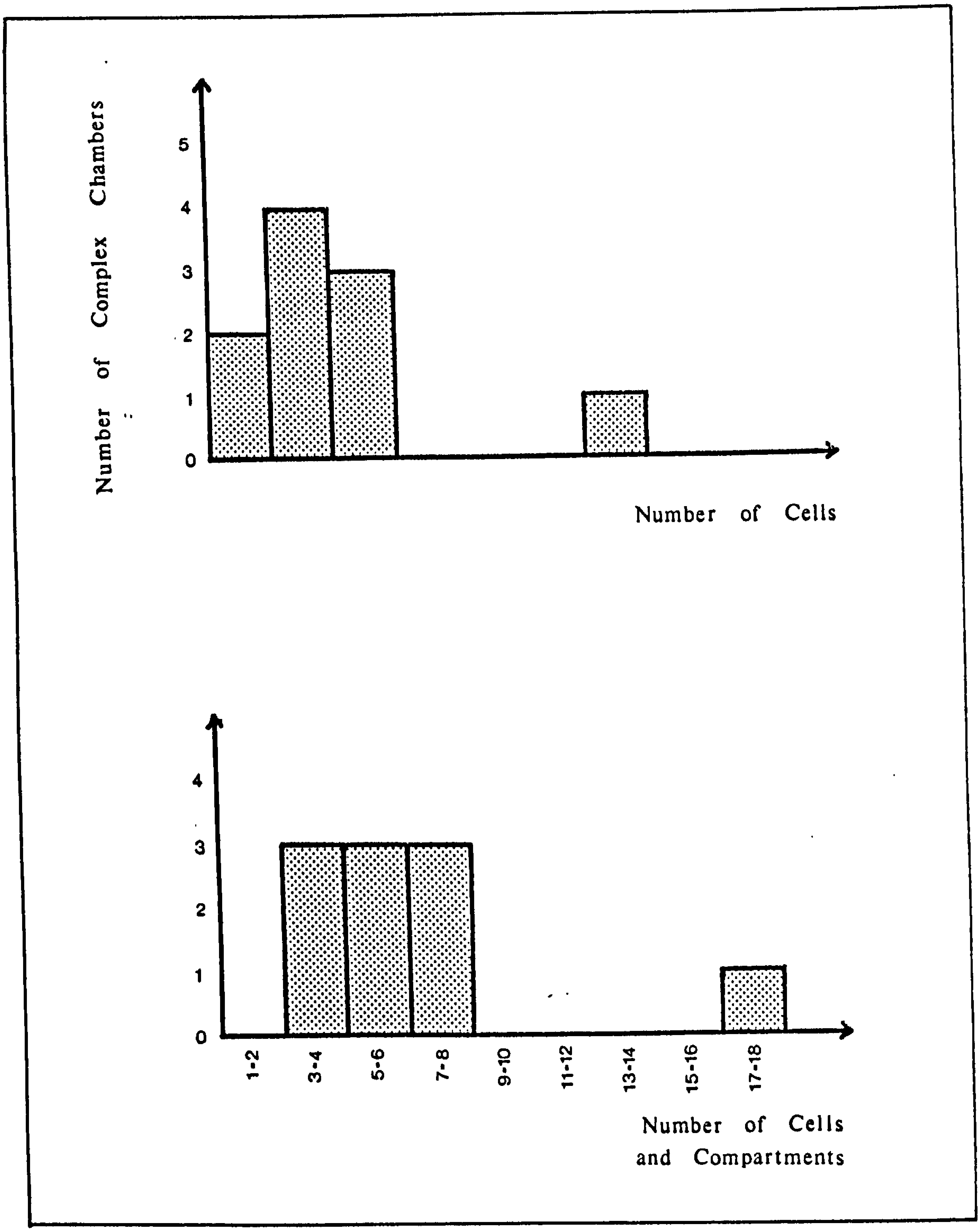


Figure 6.35. Number of cells, and number of cells and compartments, for complex chambers (n = 10).

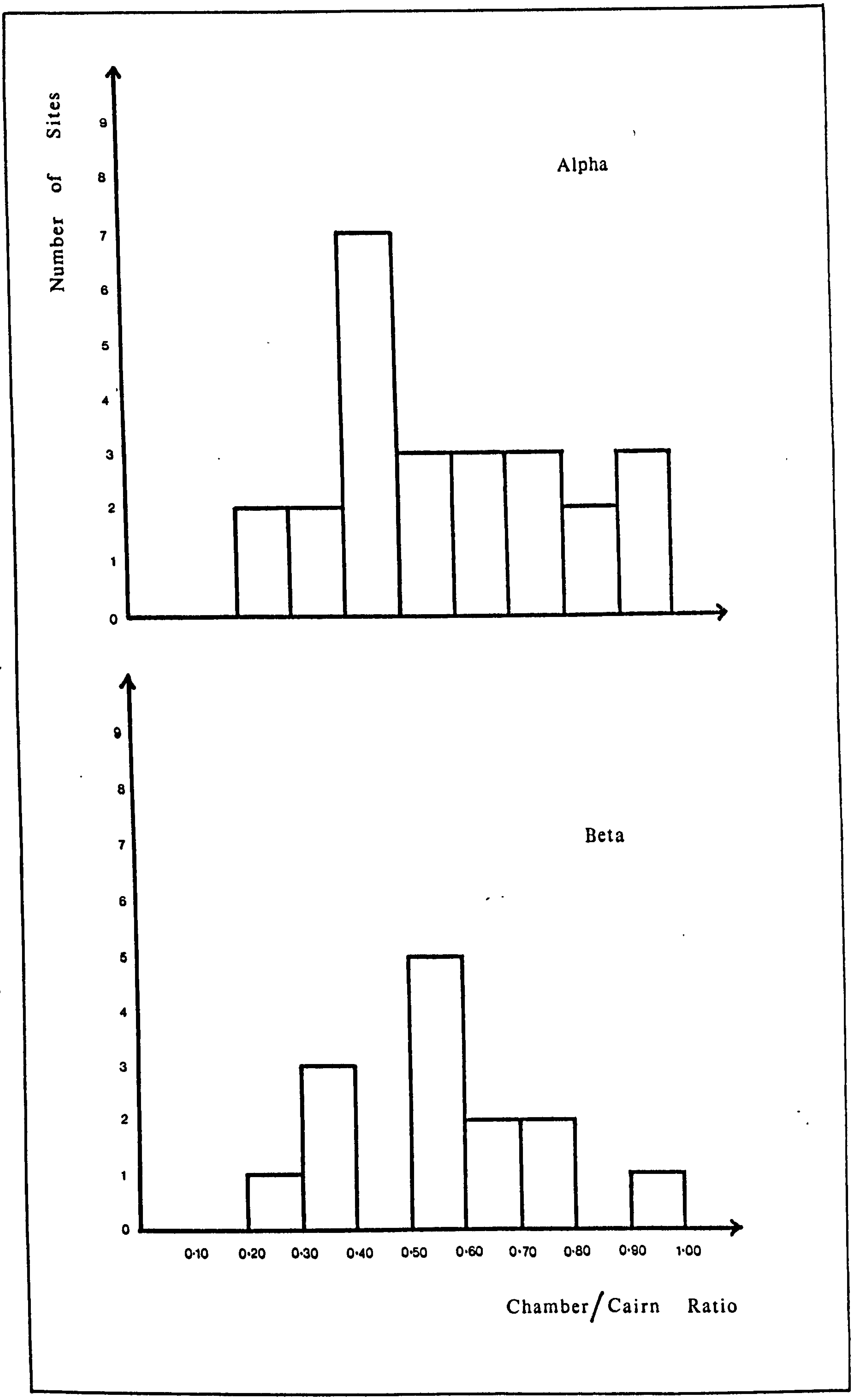


Figure 6.36. Chamber/cairn ratio: histograms for categories Alpha and Beta (n = 25, 14).

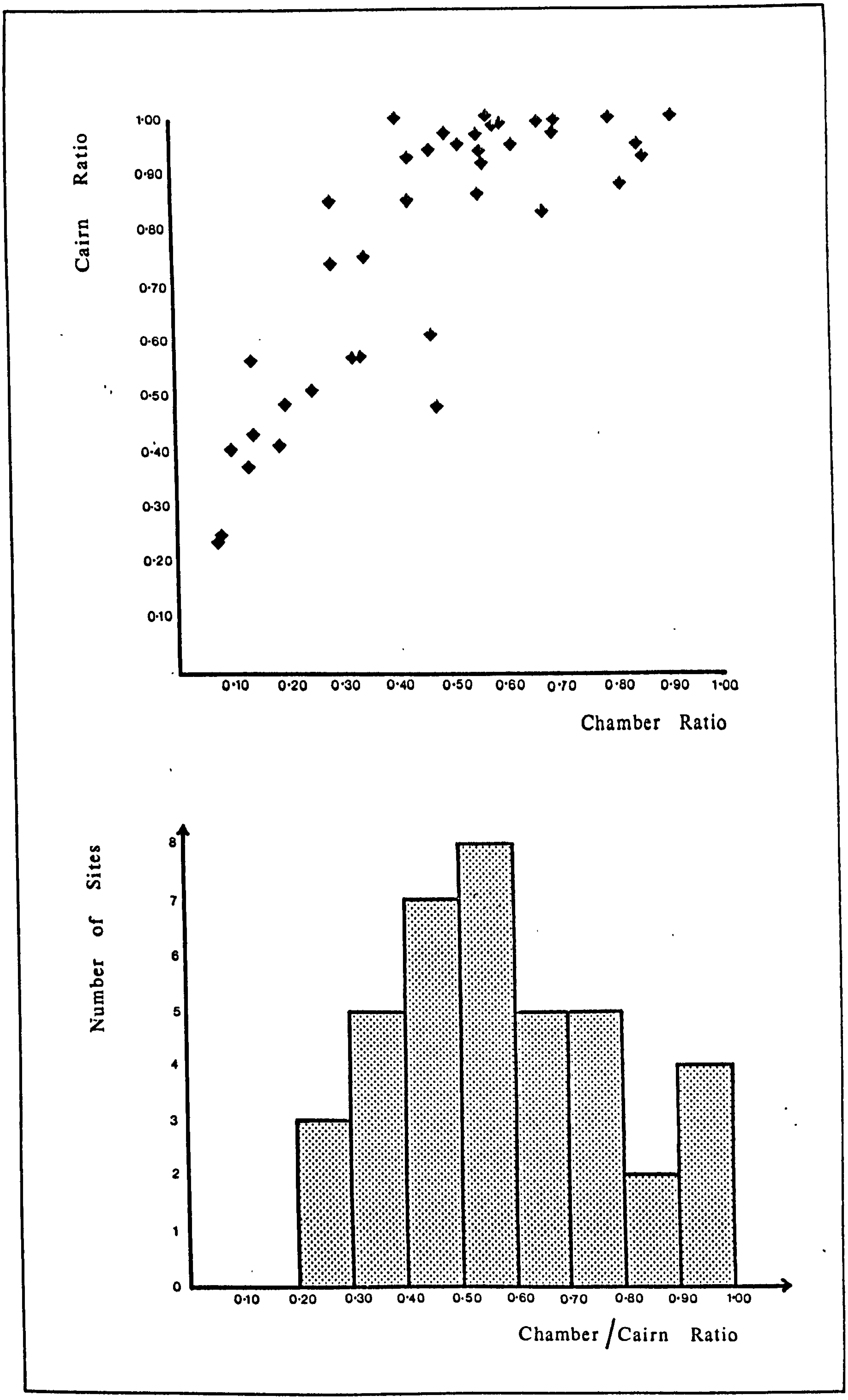


Figure 6.37. Chamber/cairn ratio: scatter diagram (n = 39). Chamber/cairn ratio: histogram for all chambered cairns (n = 39).

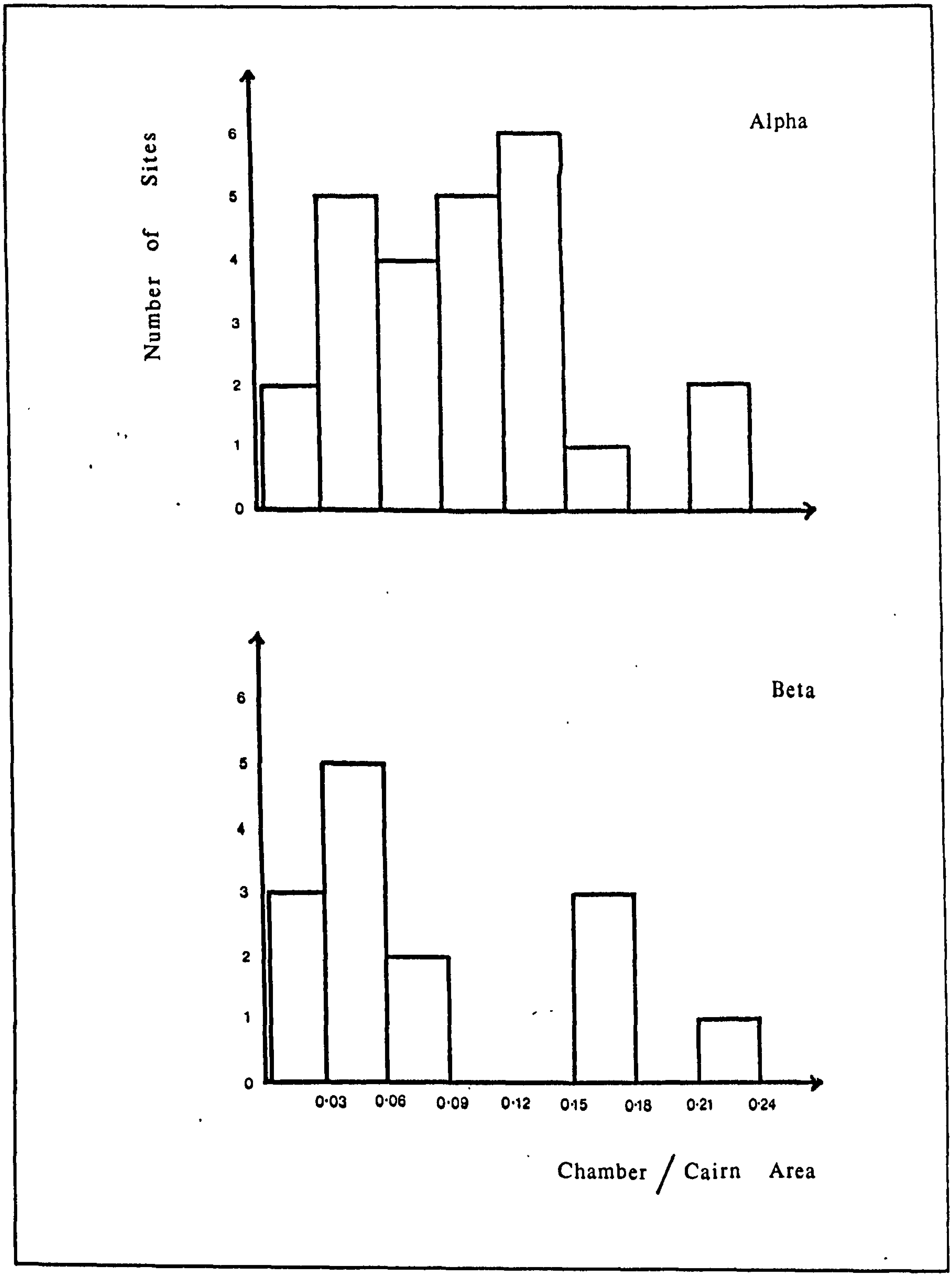


Figure 6.38. Chamber/cairn area: histograms for categories Alpha and Beta (n = 25, 14).

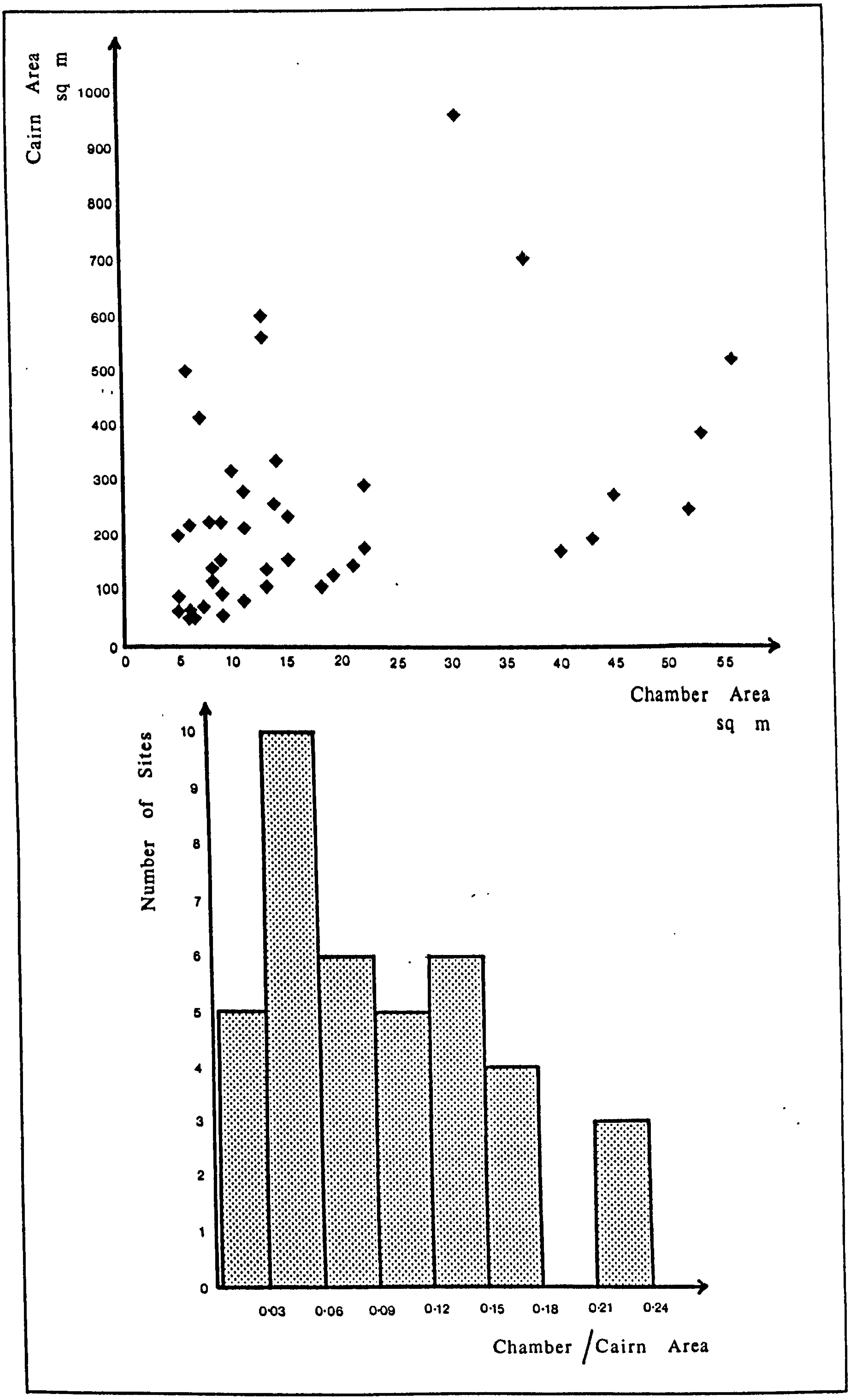


Figure 6.39. Chamber/cairn area: scatter diagram (n = 39).
Chamber/cairn area: histogram for all chambered cairns (n = 39).

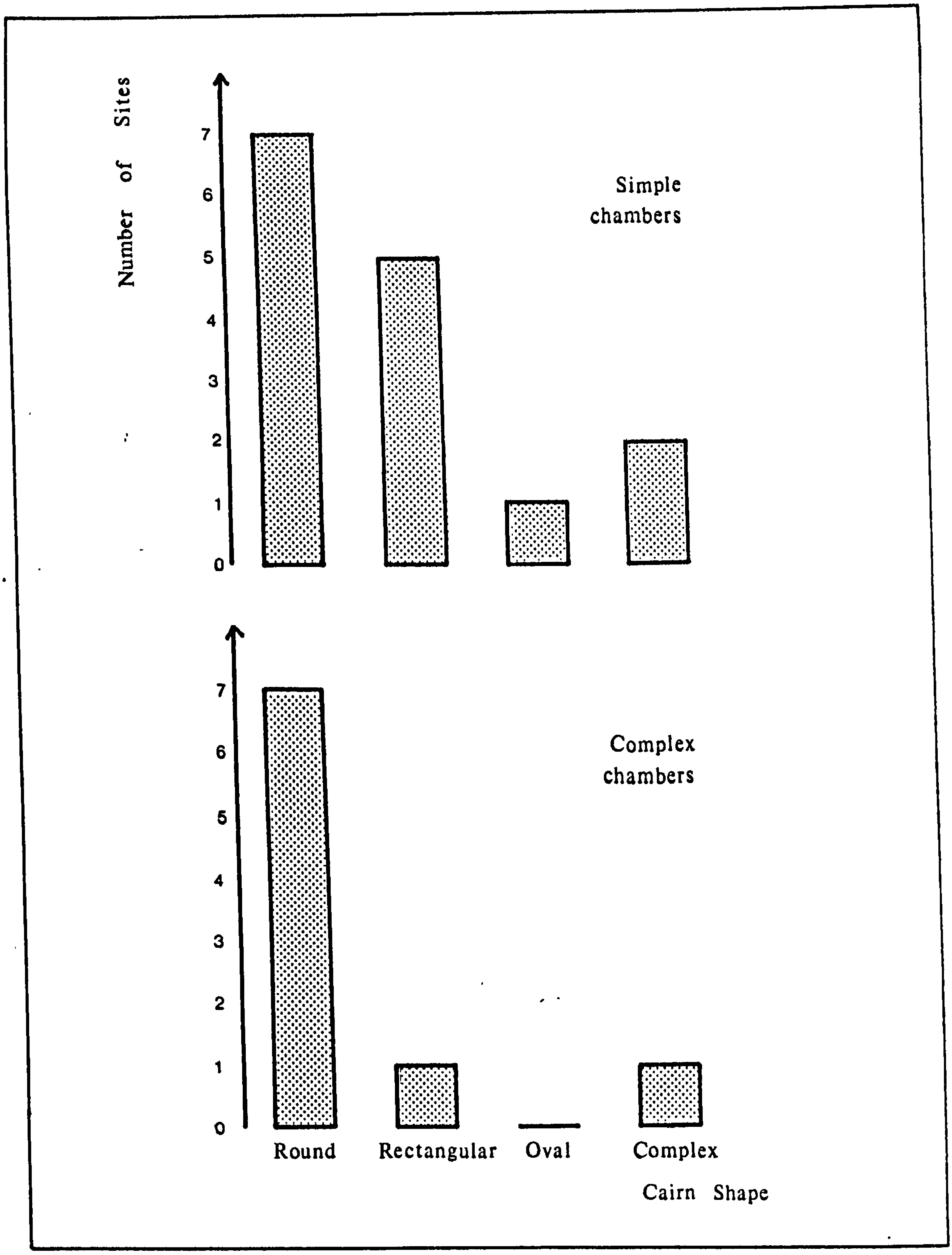


Figure 6.40. Chamber shape and cairn shape: histograms for all chambered cairns (n = 24).

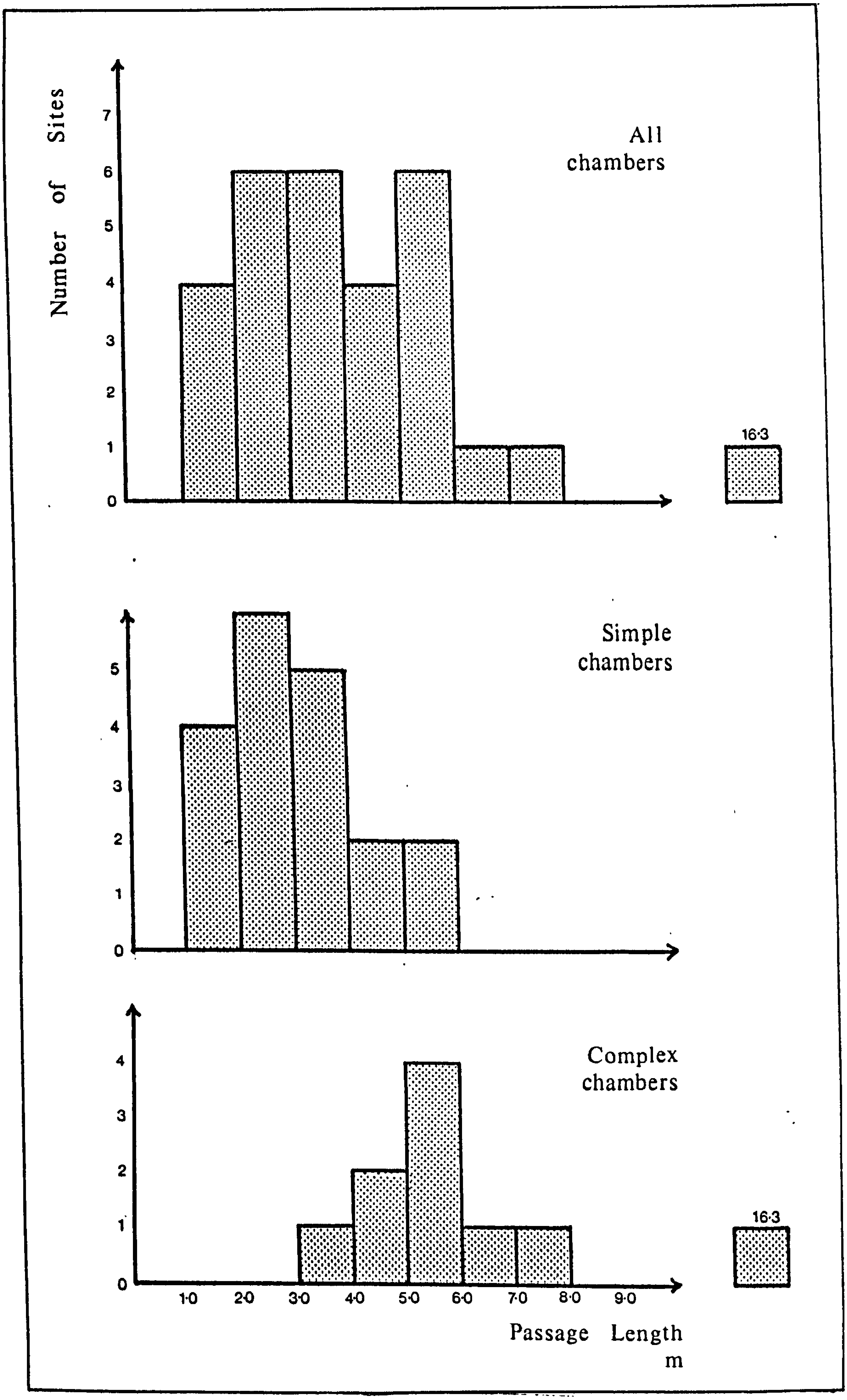


Figure 6.41. Passage length: histogram for all passages (n = 29).
Passage length: histograms for simple and complex chambers (n = 19, 10).

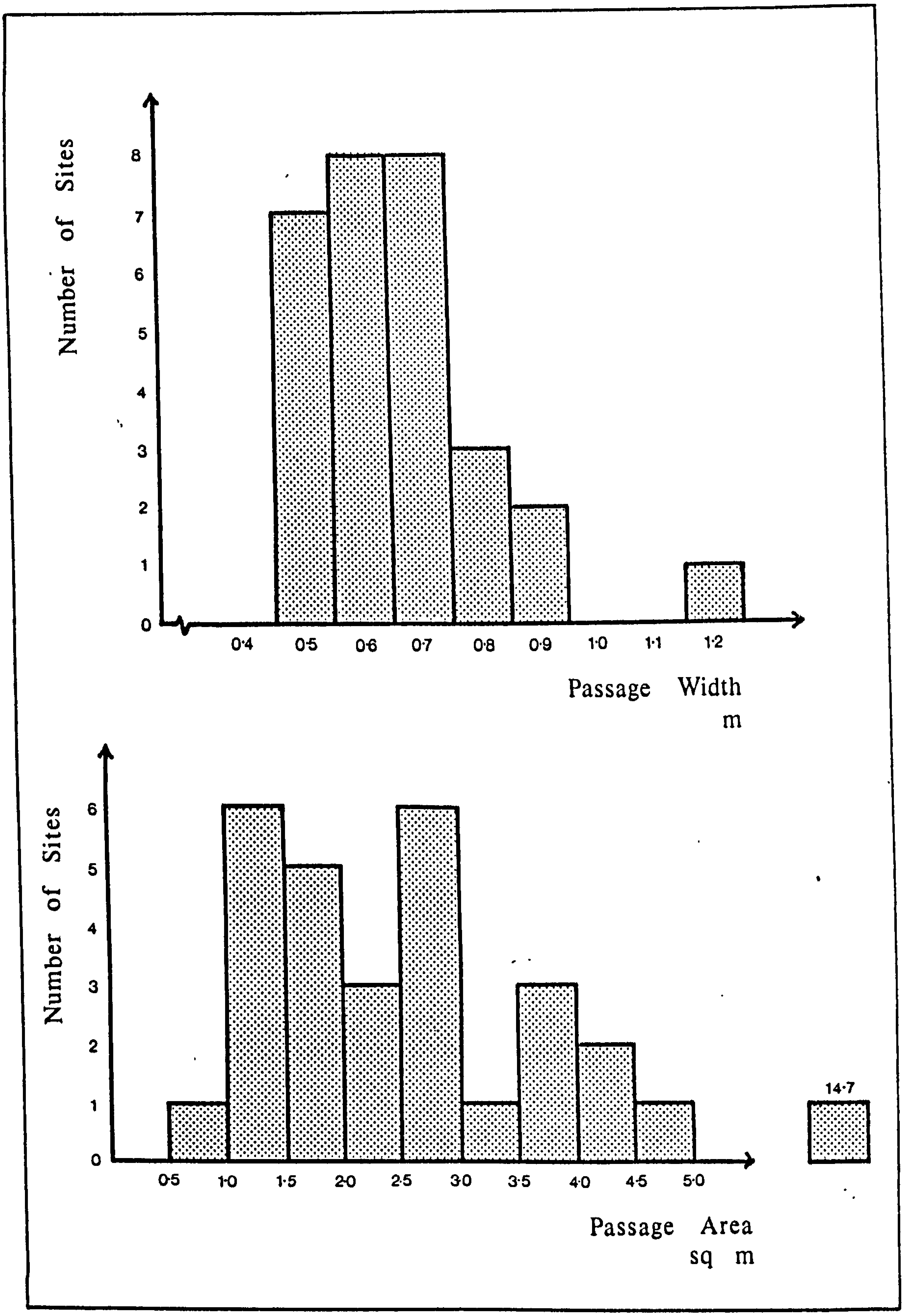


Figure 6.42. Passage width: histogram for all passages (n = 29).
Passage area: histogram for all passages (n = 29).

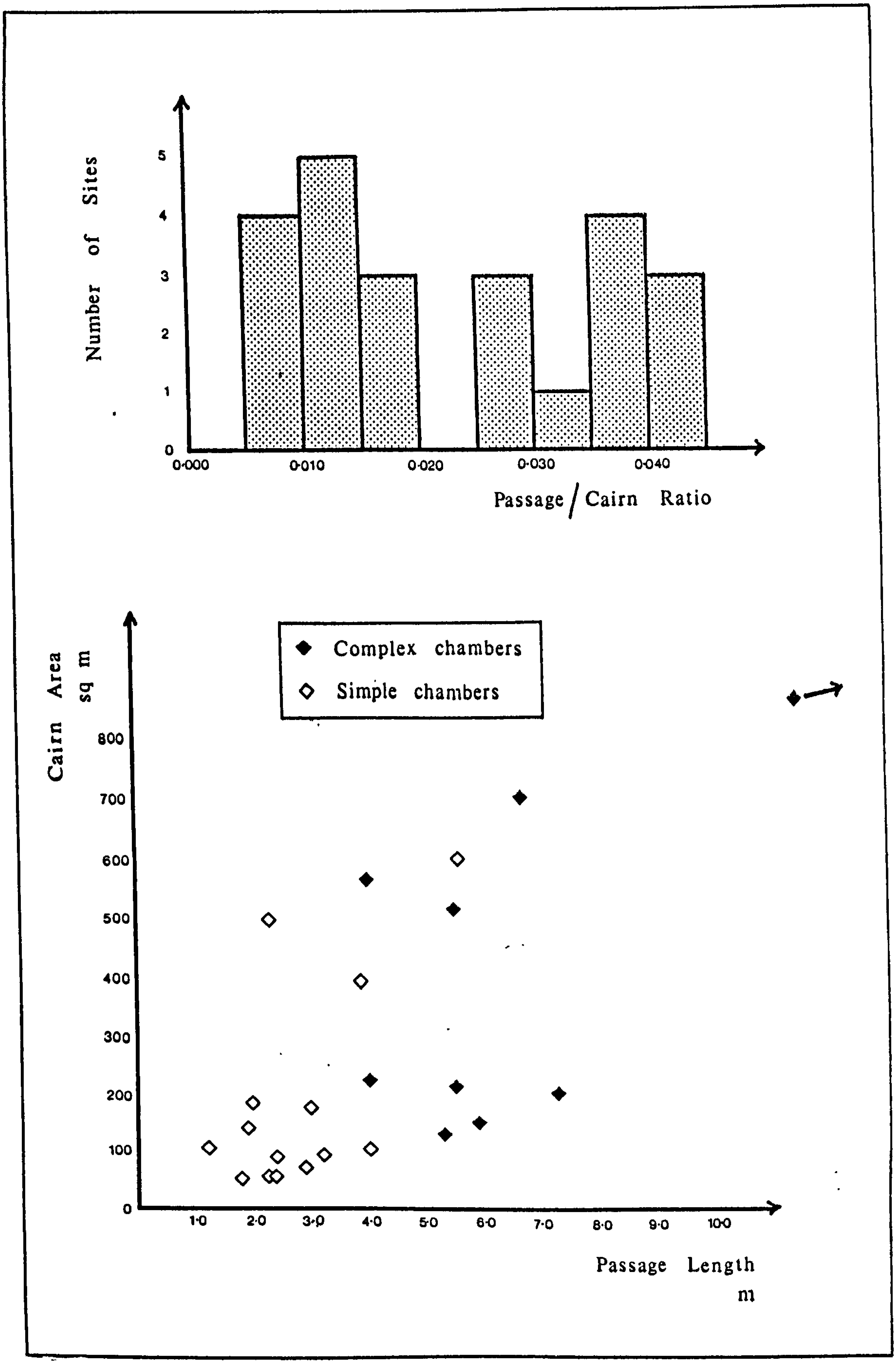


Figure 6.43. Passage/cairn ratio: histogram for all chambered cairns (n = 23).
Passage/cairn ratio: scatter diagram for simple and complex chambers (n = 14, 9).

ORK 1	Bigland Long
ORK 2	Bigland Round
ORK 3	Blackhammer
ORK 4	Bookan
ORK 5	Braeside
ORK 6	Burgar
ORK 7	Burray
ORK 8W	Calf of Eday Long (West chamber)
ORK 8E	Calf of Eday Long (East chamber)
ORK 9	Calf of Eday North-West
ORK 10	Calf of Eday South-East
ORK 11	Cobbie Row's Burden
ORK 12	Cuween Hill
ORK 15	Eday Church
ORK 17	Fara
ORK 19	Helliar Holm
ORK 21	Holm of Papa Westray North
ORK 22	Holm of Papa Westray South
ORK 23L	Huntersquoy (Lower chamber)
ORK 23U	Huntersquoy (Upper chamber)
ORK 25	Isbister
ORK 26	Kierfea Hill
ORK 27	Knowe of Craie
ORK 28	Knowe of Lairo
ORK 30	Knowe of Ramsay
ORK 31	Knowe of Rowiegar
ORK 32	Knowe of Yarso
ORK 33	Knucker Hill
ORK 36	Maes Howe
ORK 37	Midhowe
ORK 43	Quanterness
ORK 44	Quoyness
ORK 47	Sandyhill Smithy
ORK 49L	Taversoe Tuick (Lower chamber)
ORK 49U	Taversoe Tuick (Upper chamber)
ORK 51	Unstan
ORK 52	Vere Point
ORK 53	Vinquoy Hill
ORK 54	Wideford Hill
ORK 56	Quoys
ORK T14	Swona
ORK T15	Nev Hill
ORK T16	Hesta Head
ORK T20	Redland South

Table 6.44. Chambered cairns used in cluster analysis.

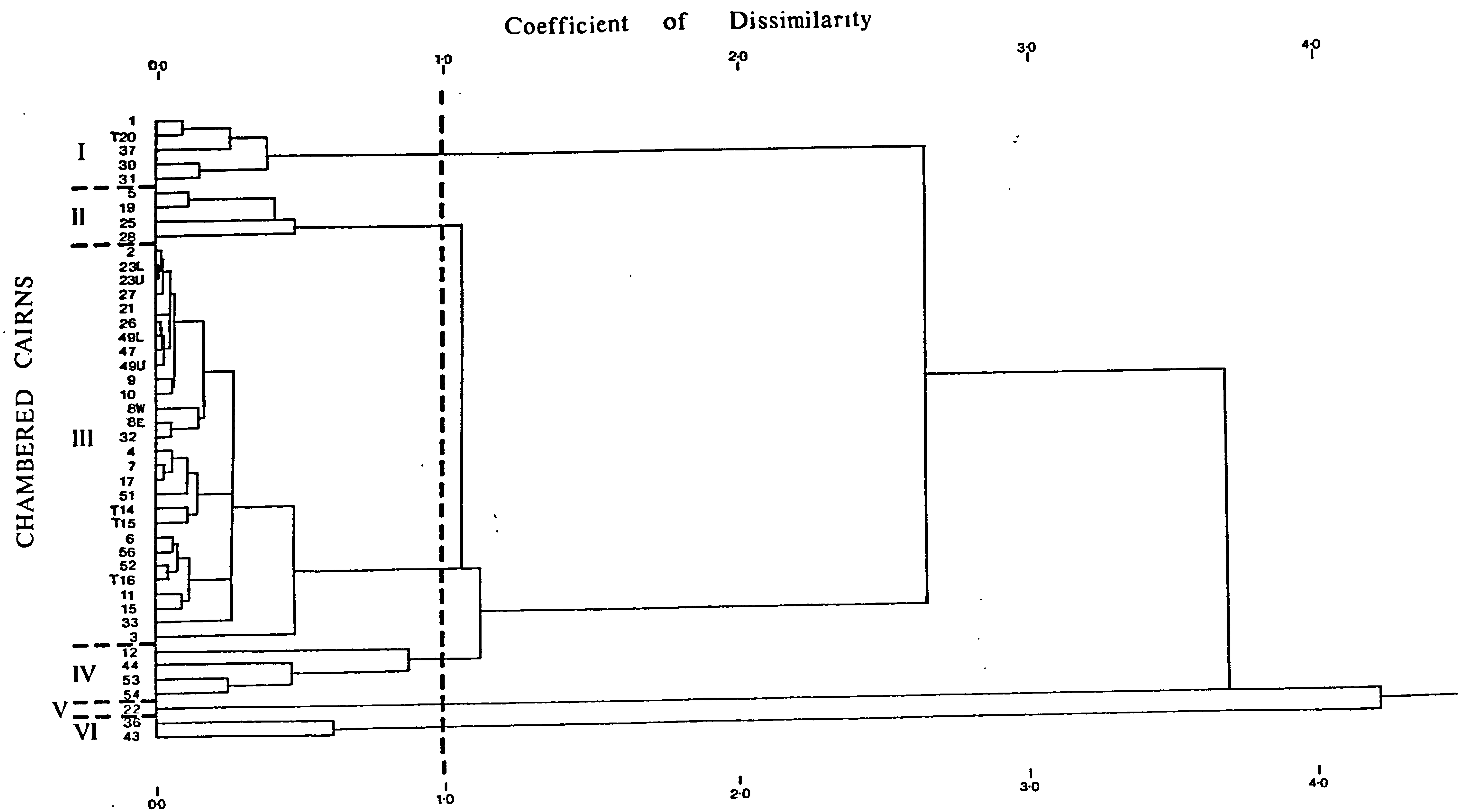


Figure 6.45. Median linkage dendogram.

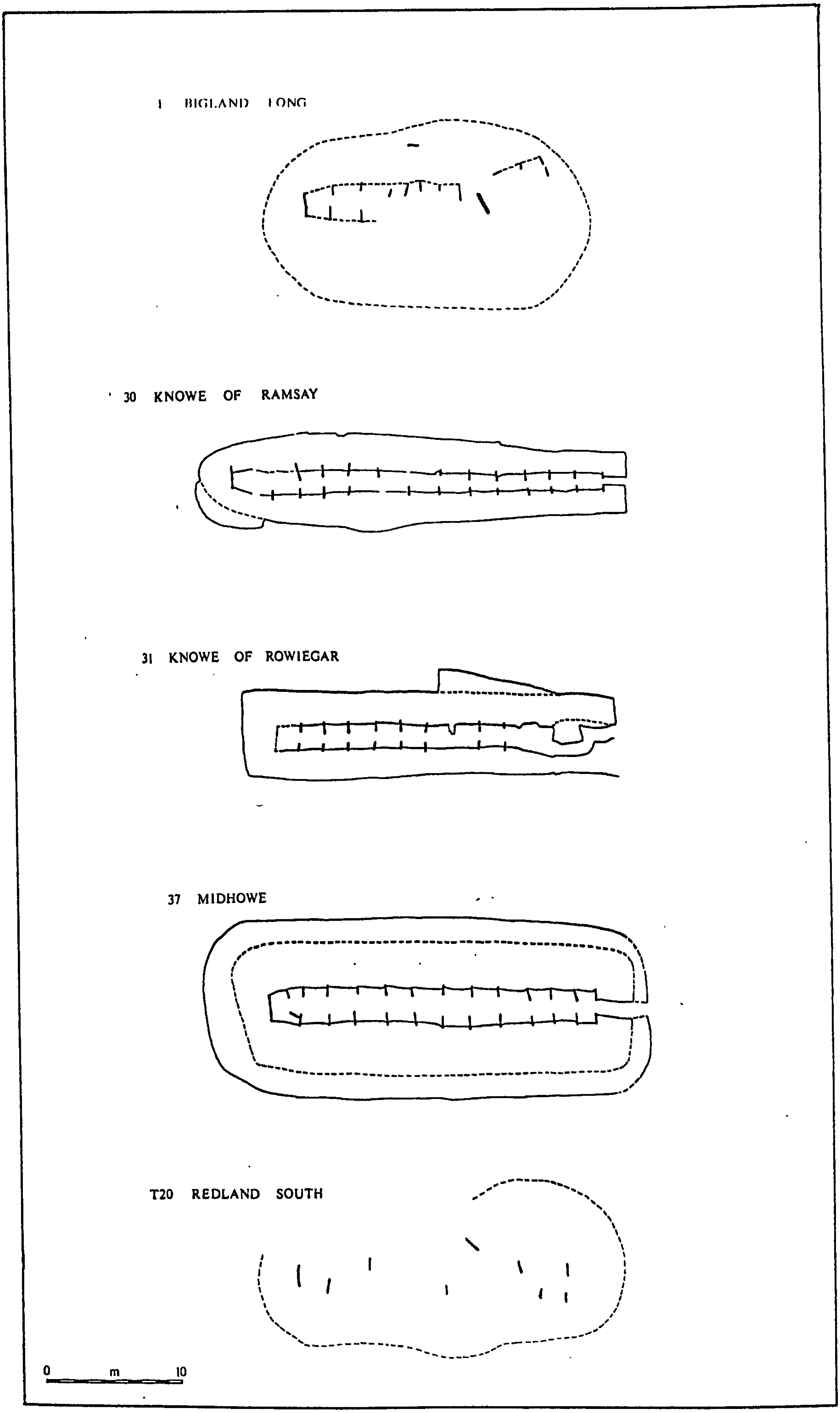


Figure 6.46. Chambered cairns of cluster I.

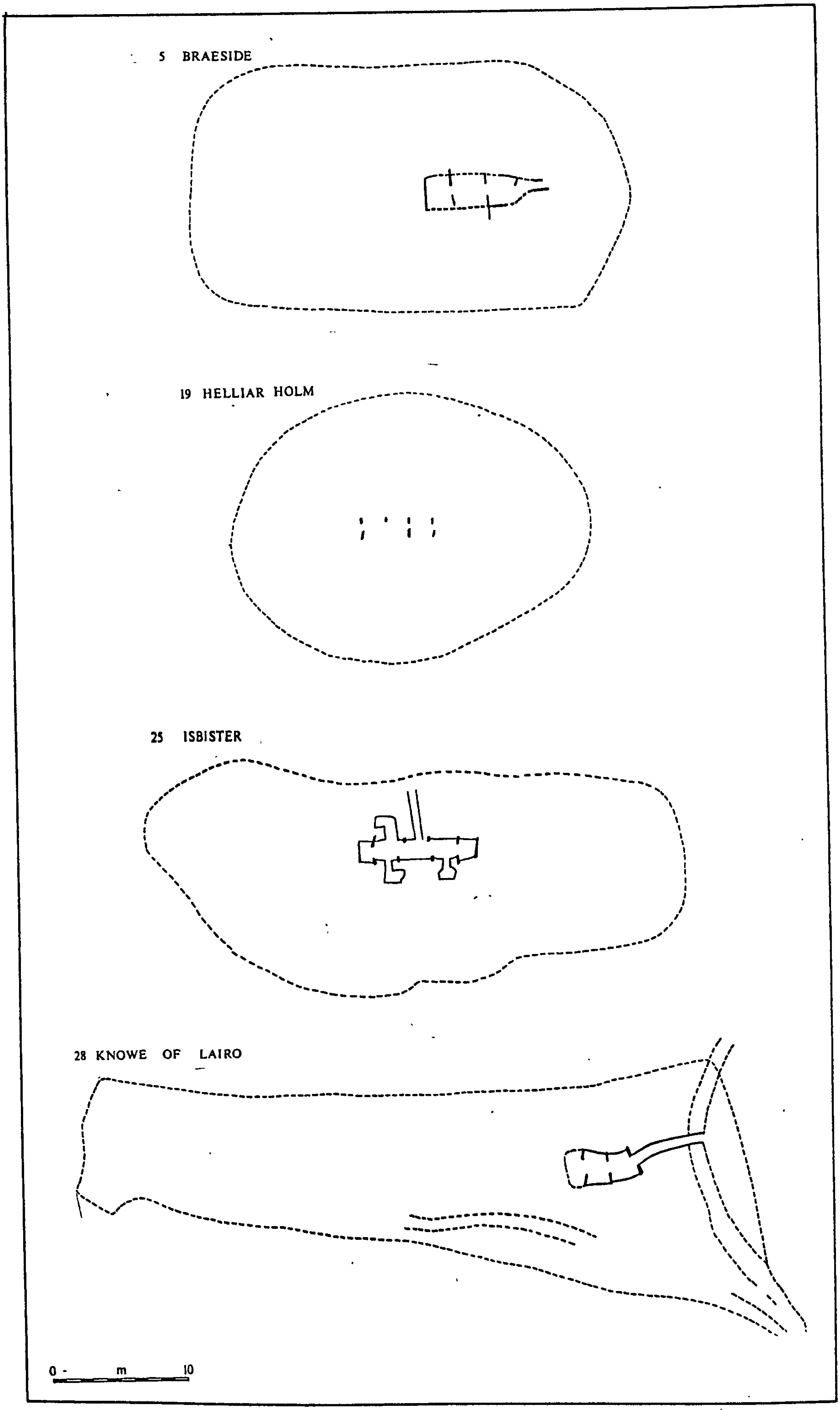


Figure 6.47. Chambered cairns of cluster II.

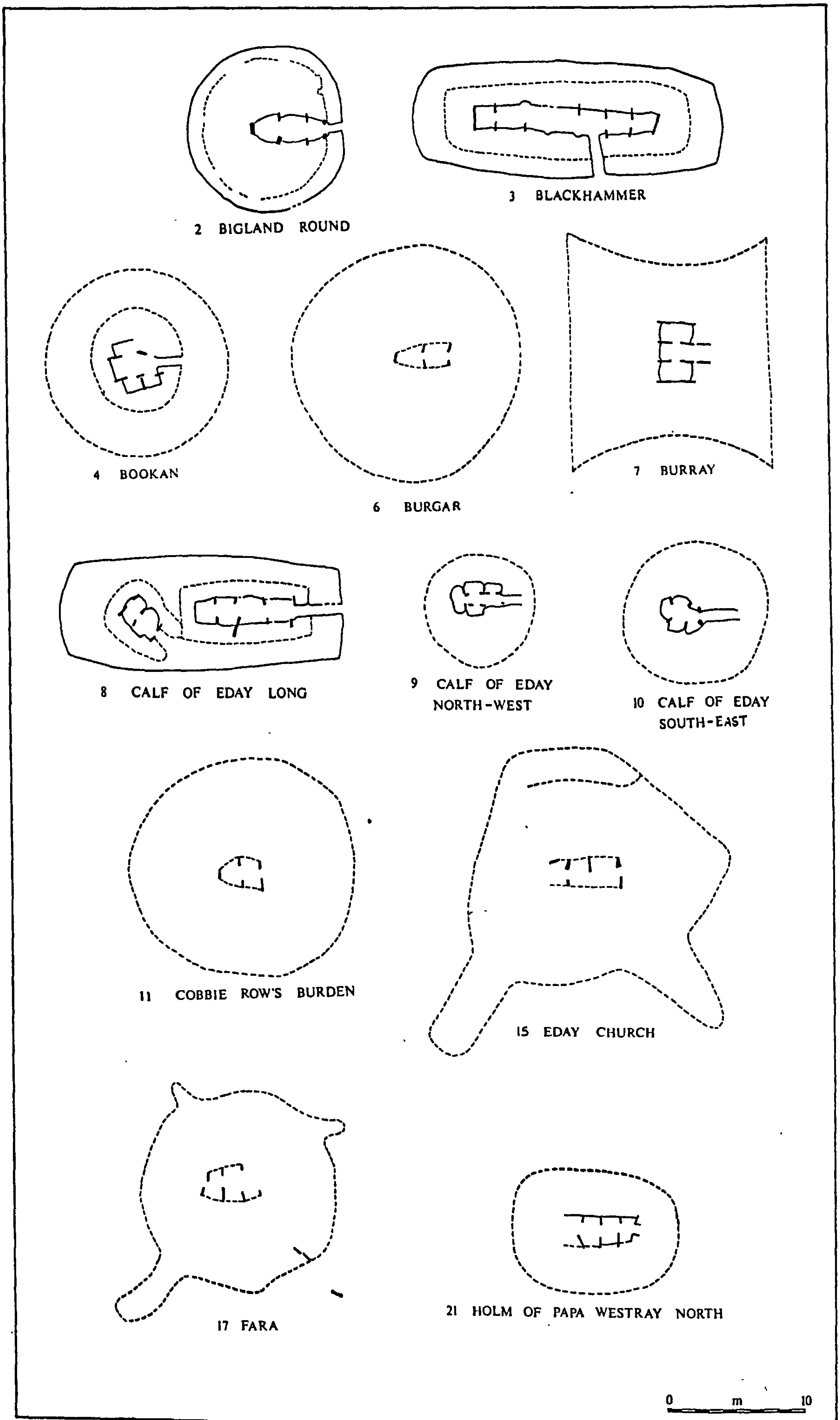


Figure 6.48. Chambered cairns of cluster III - (i).

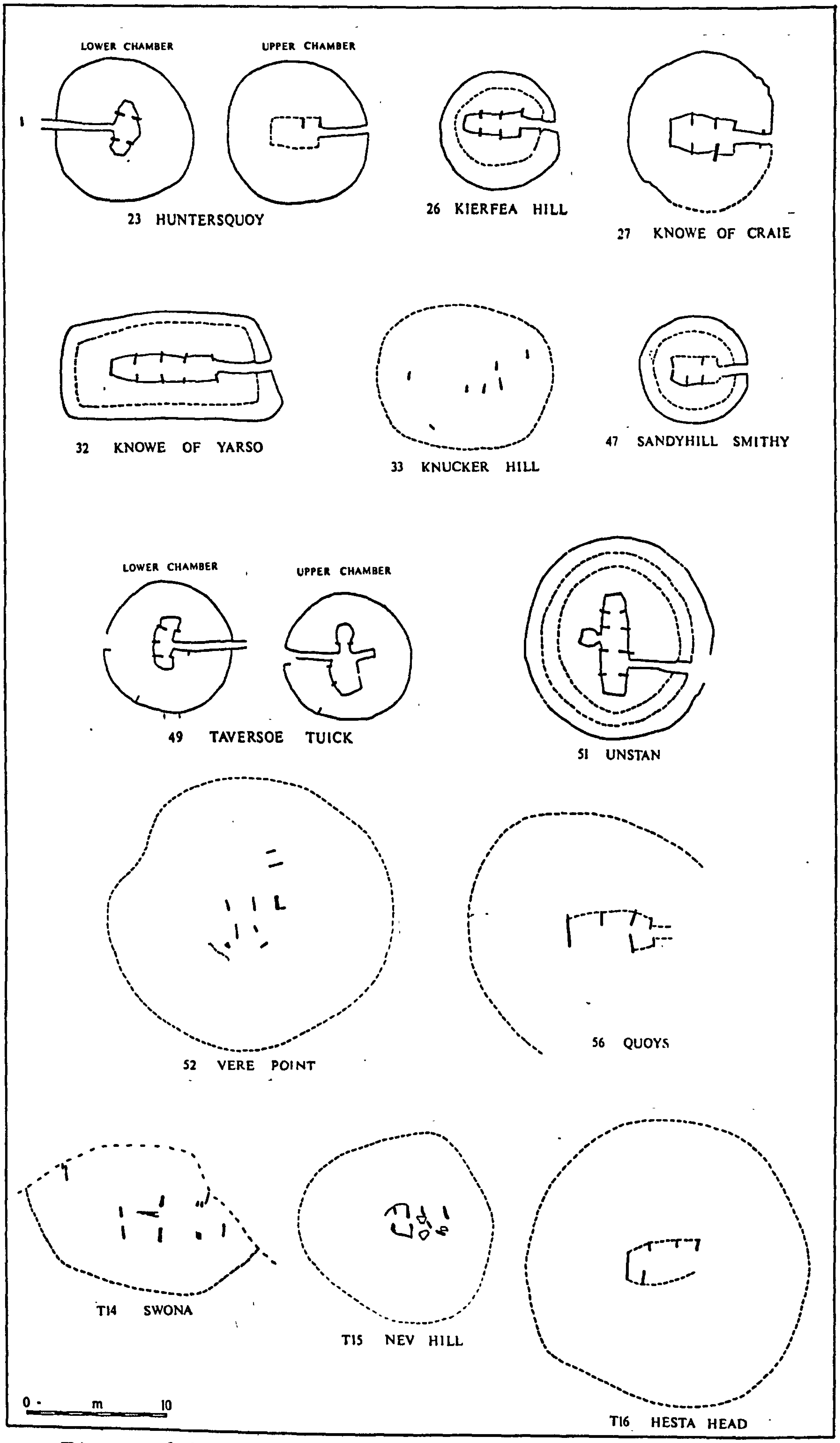


Figure 6.49. Chambered cairns of cluster III - (ii).

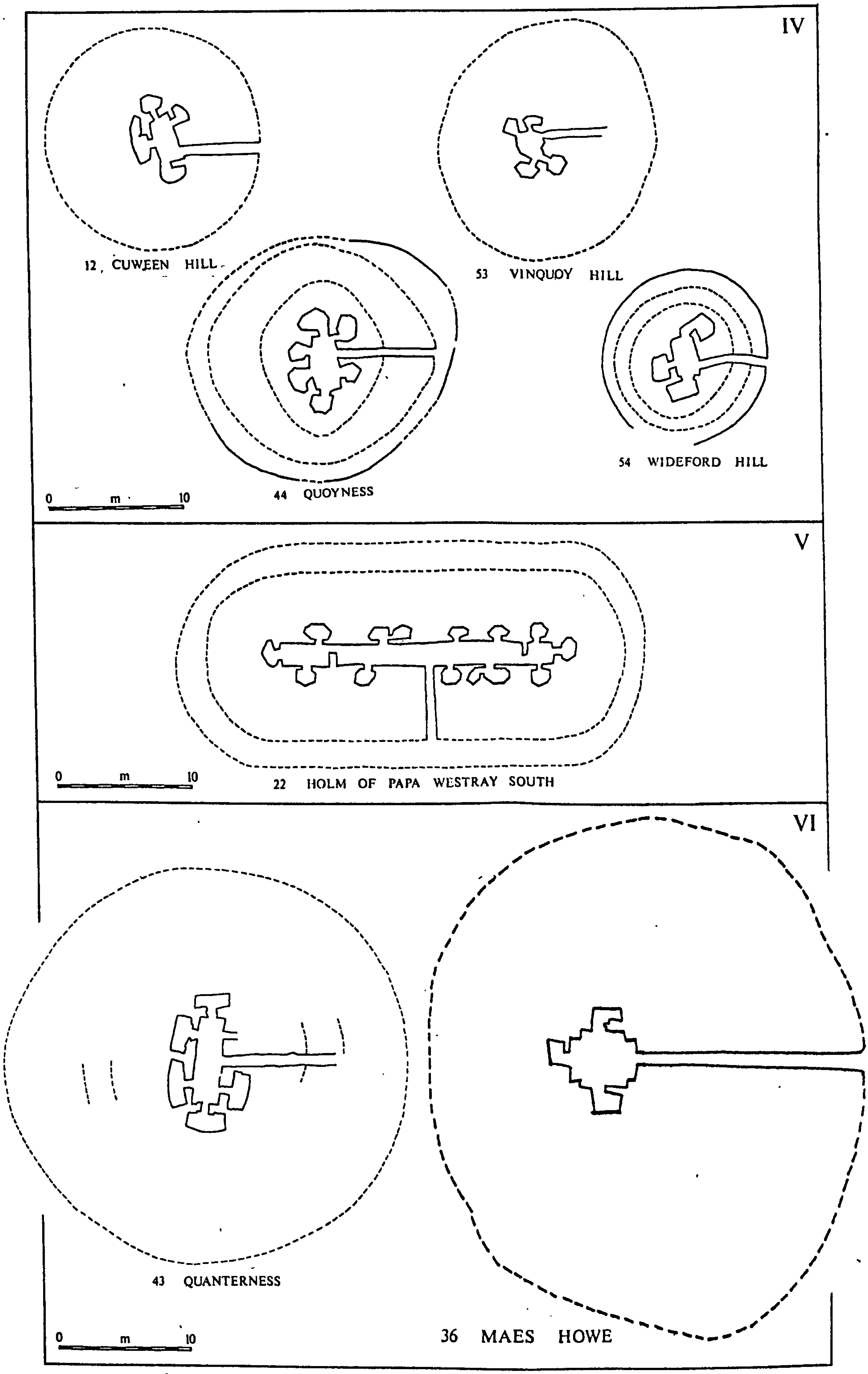


Figure 6.50. Chambered cairns of clusters IV, V, and VI.

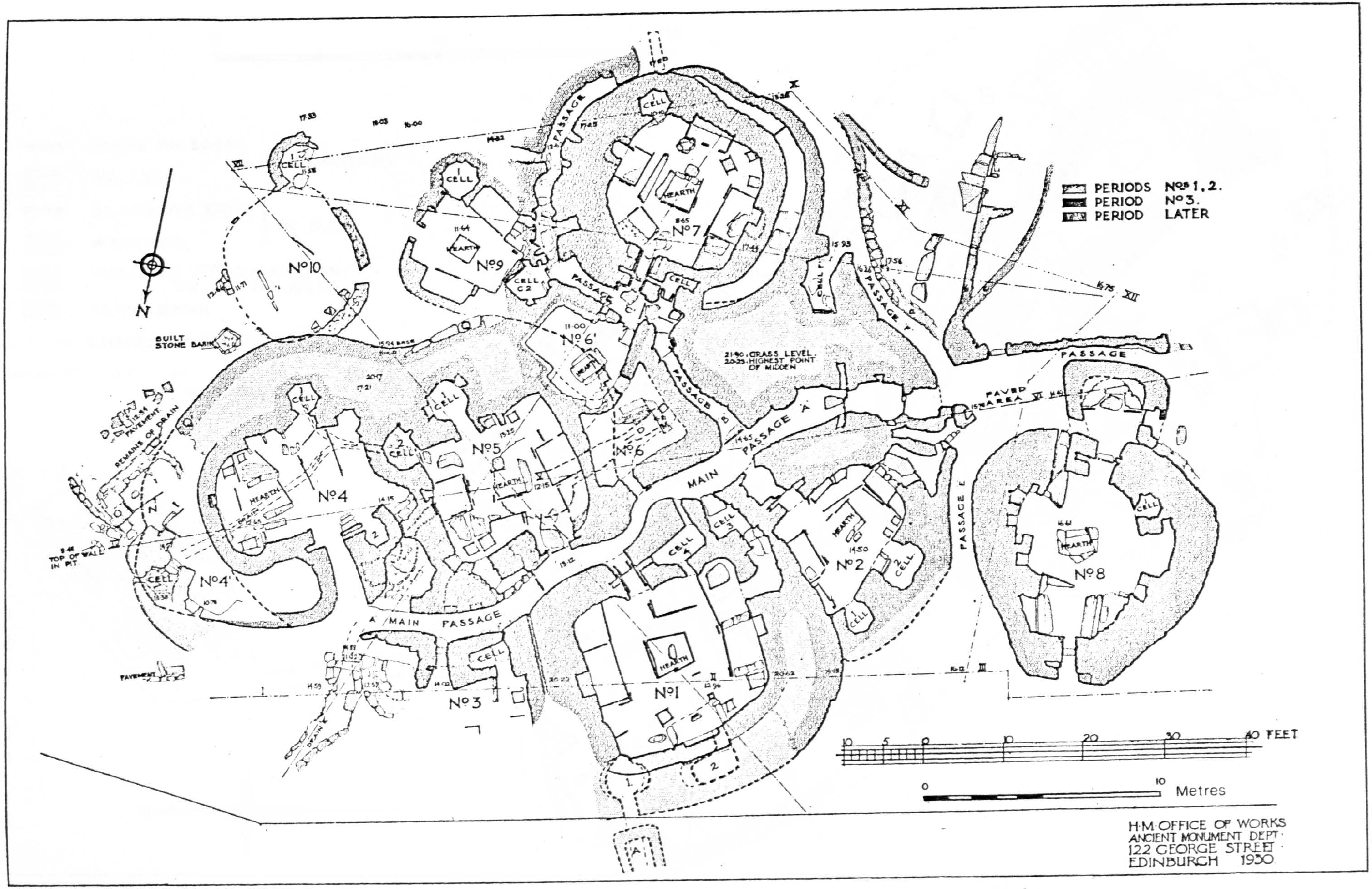


Figure 7.1. Plan of Skara Brae (from Childe, 1931).

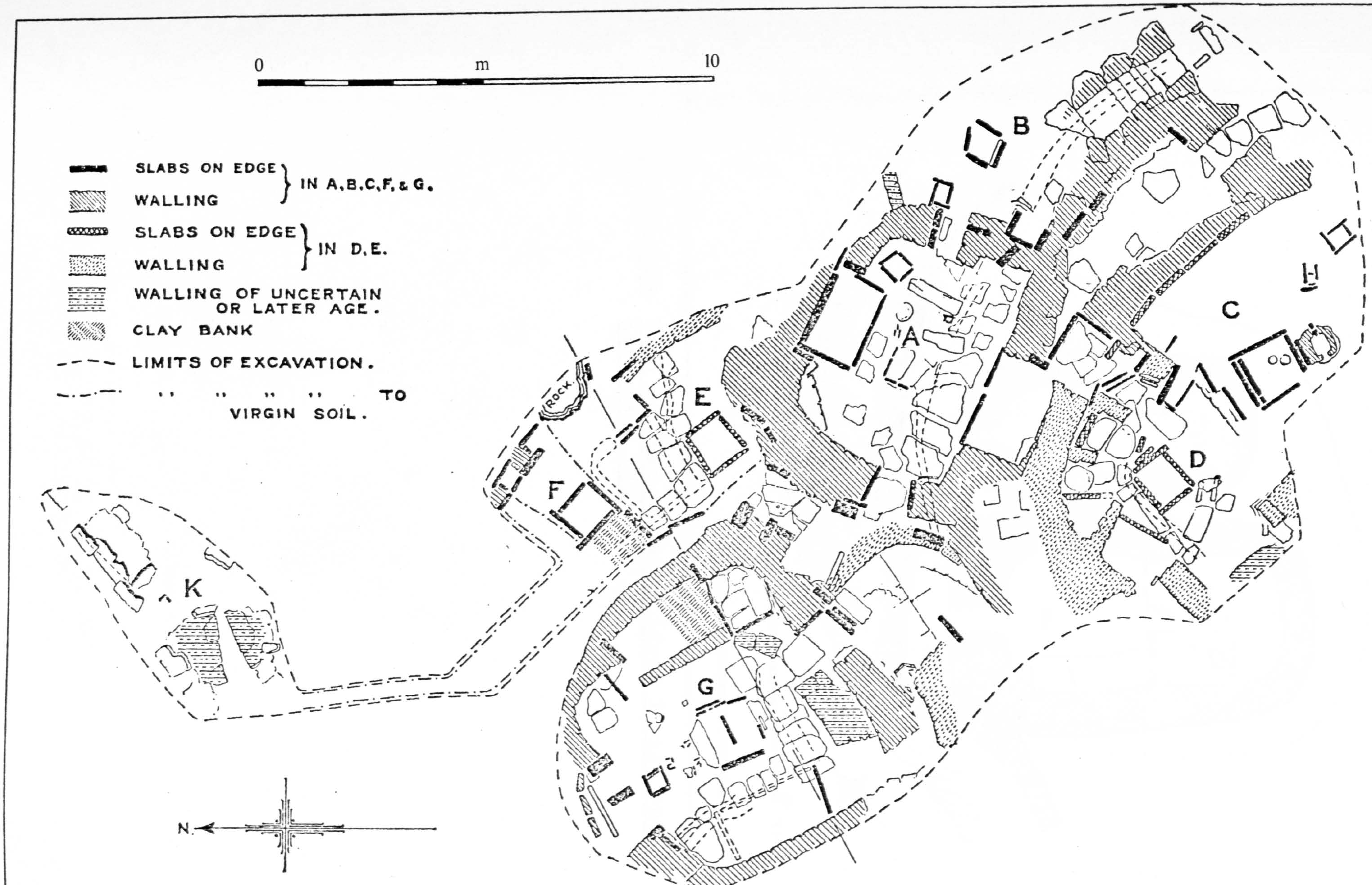


Figure 7.2. Plan of Rinyo (from Childe and Grant, 1947).

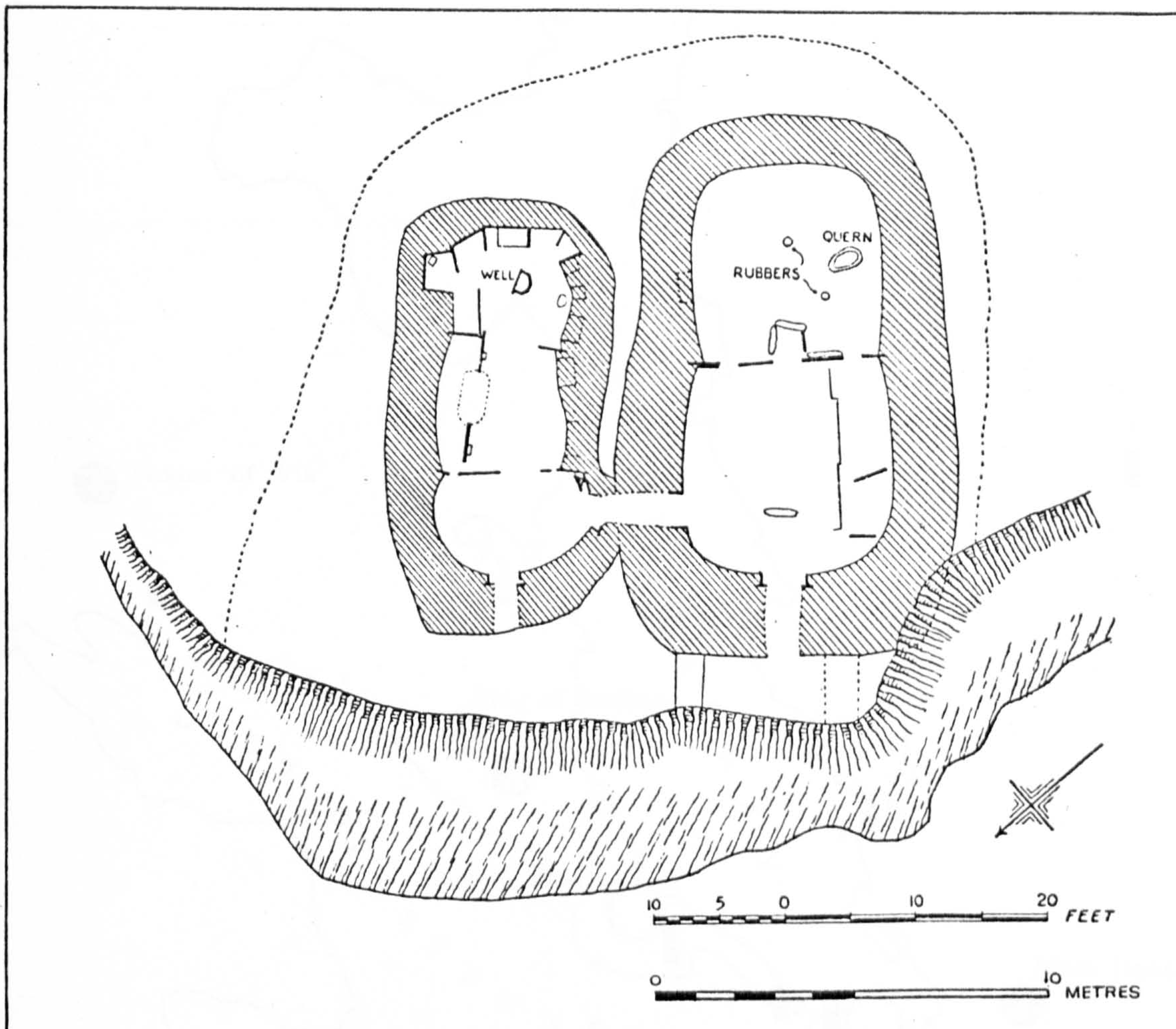


Figure 7.3. Plan of Knap of Howar (from Traill and Kirkness, 1937).

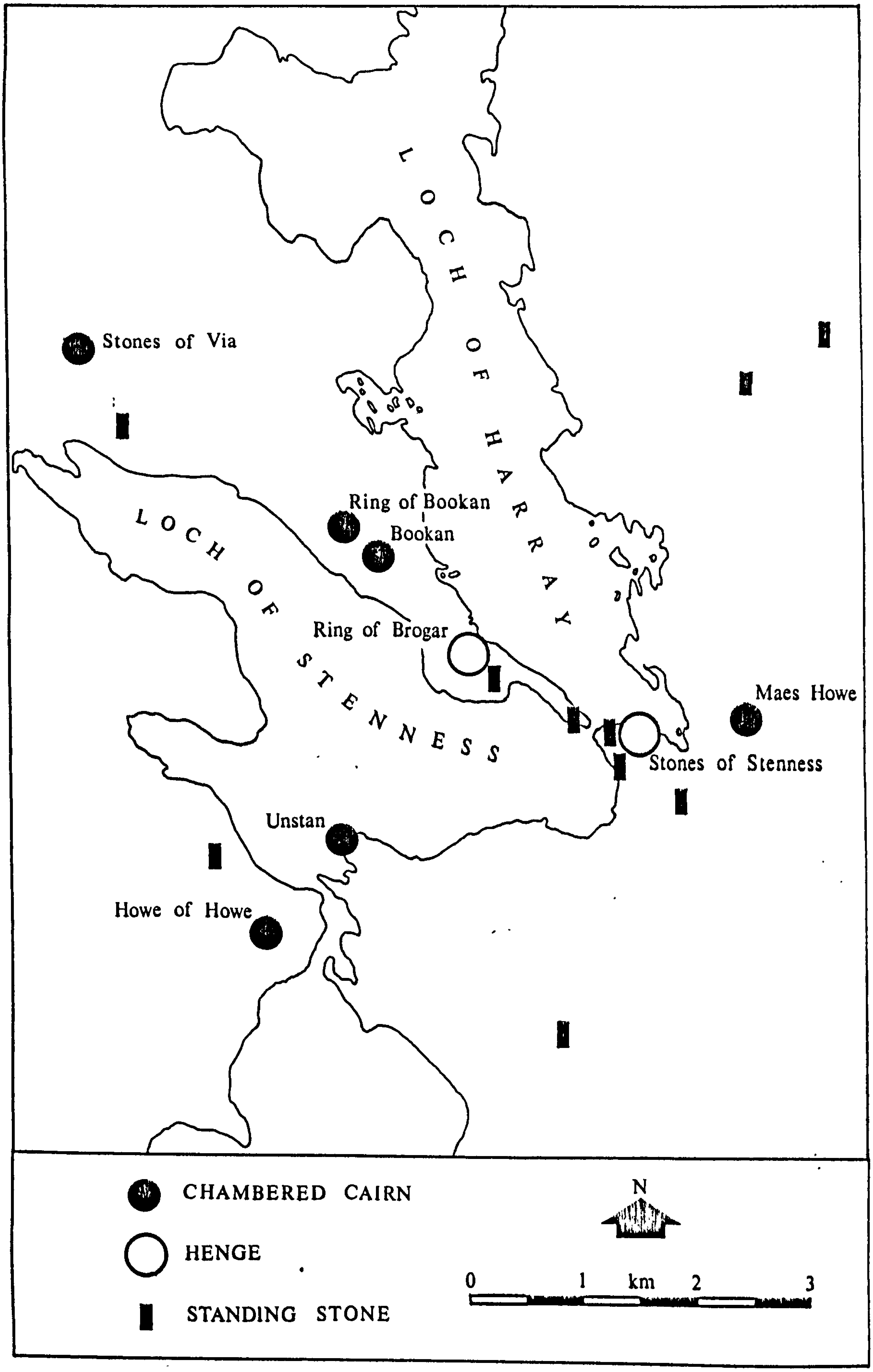


Figure 7.4. Map of concentration of prehistoric monuments in Brogar/Stenness area.

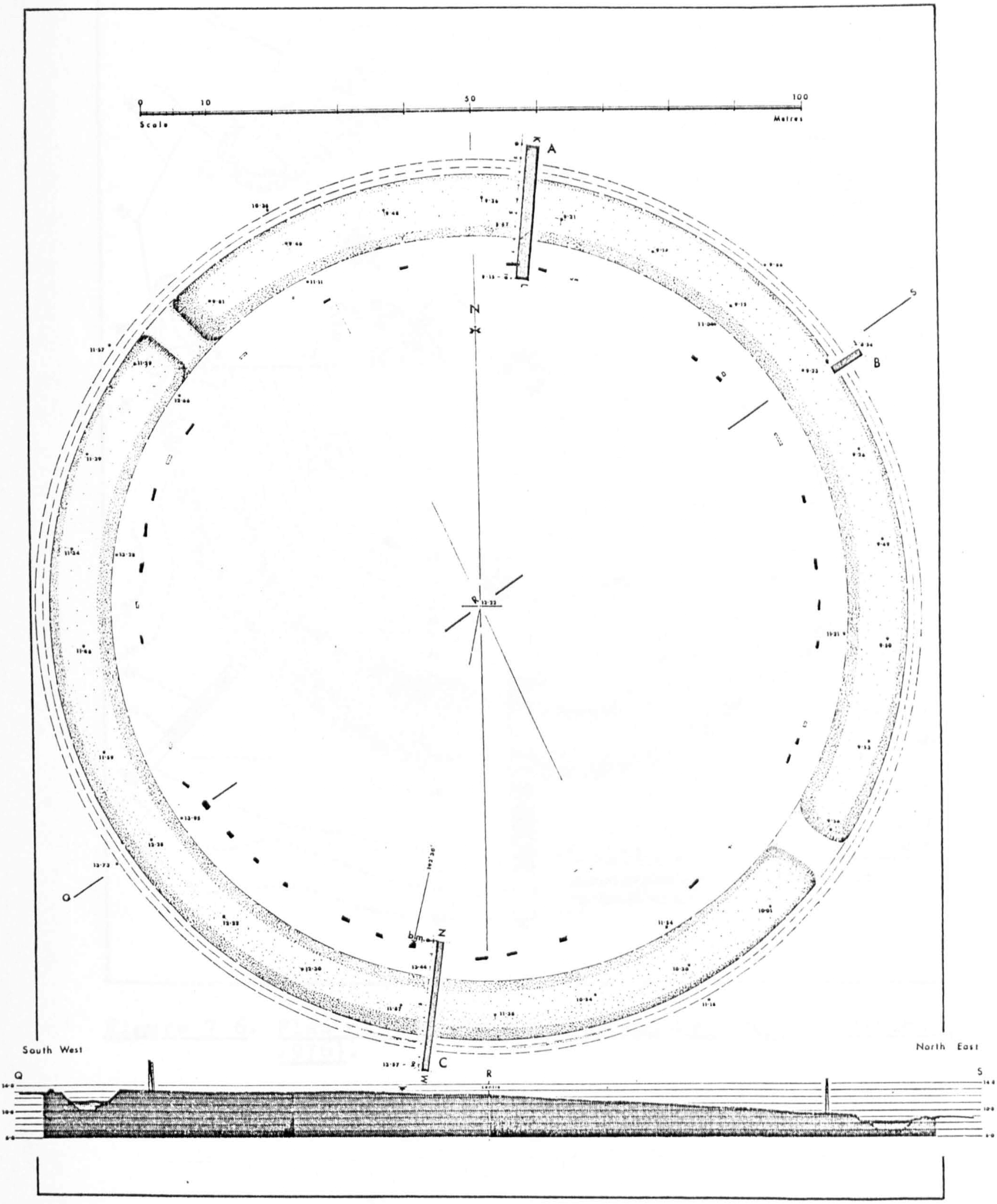


Figure 7.5. Plan of the Ring of Brogar (from Renfrew, 1979).

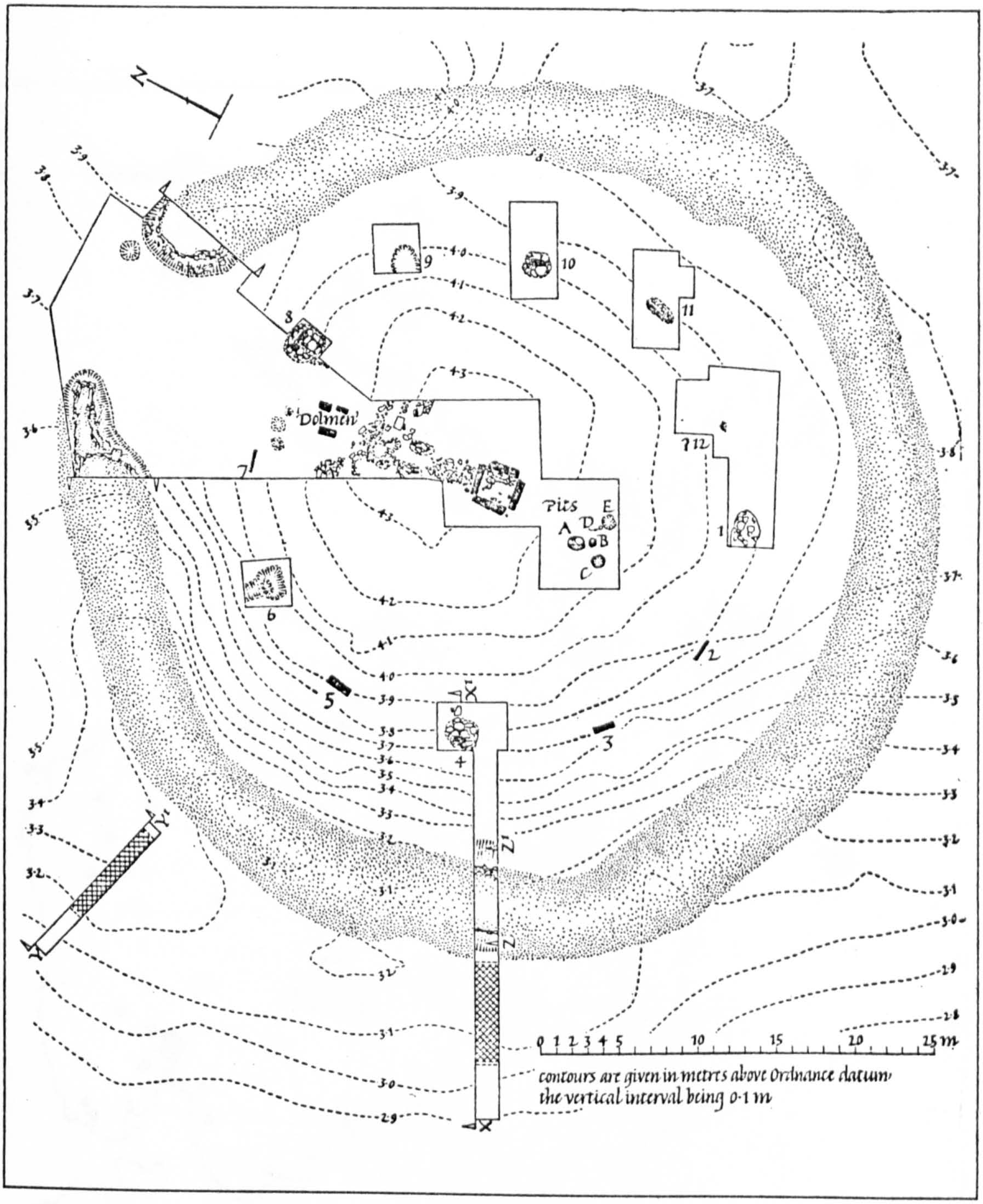


Figure 7.6. Plan of the Stones of Stenness (from G. Ritchie, 1976).

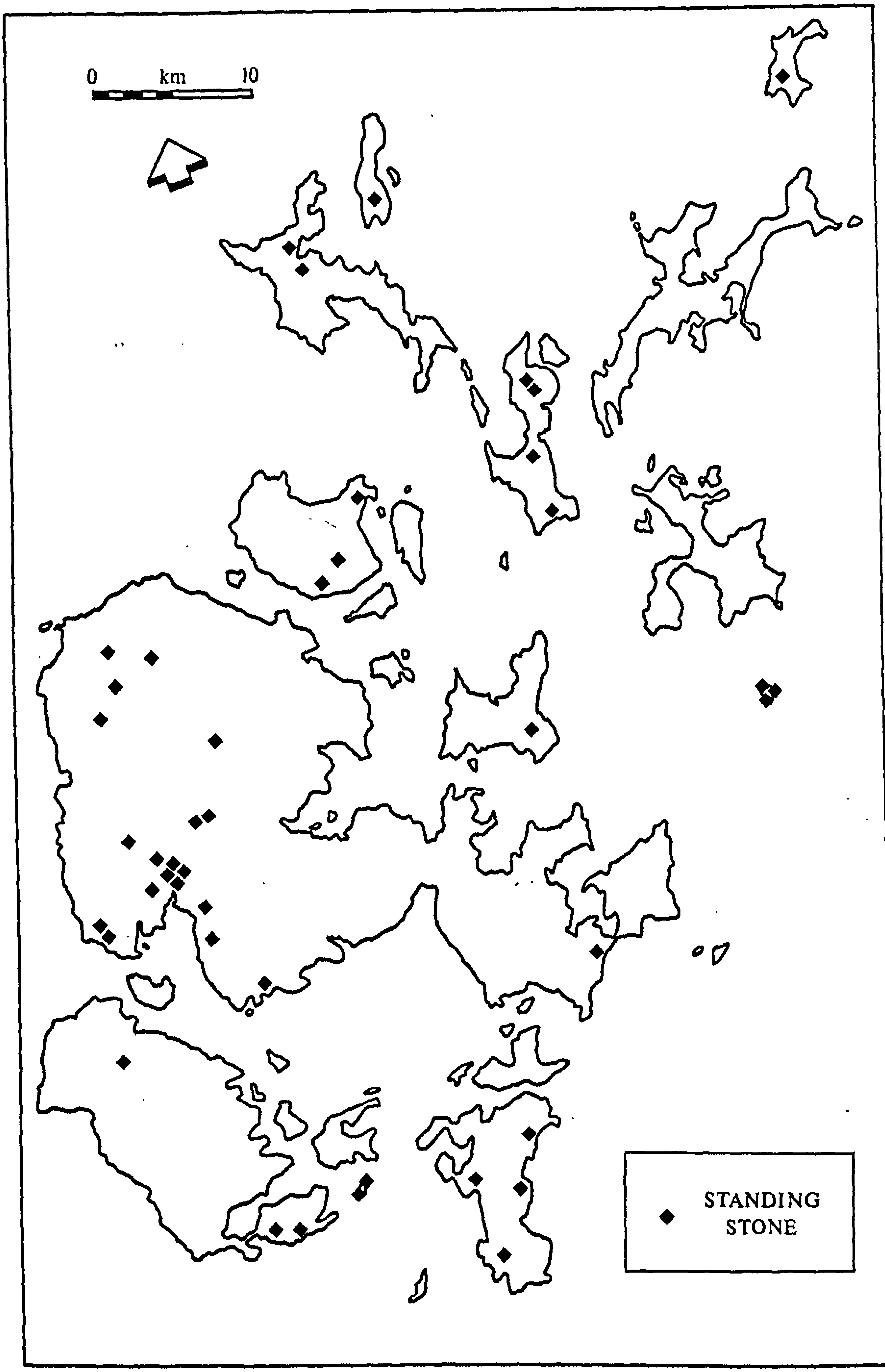


Figure 7.7. Location map of standing stones in Orkney.

		Unstan Type	Grooved Ware type
ORK 2	Bigland Round	*	
ORK 3	Blackhammer	*	
ORK 4	Bookan		
ORK 8	Calf of Eday Long	*	*
ORK 12	Cuween Hill		
ORK 16	Eday Manse		
ORK 17	Fara		
ORK 21	Holm of Papa Westray North		
ORK 23	Huntersquoy		
ORK 25	Isbister	*	
ORK 26	Kierfea Hill	*	
ORK 27	Knowe of Craie		*
ORK 28	Knowe of Lairo		
ORK 30	Knowe of Ramsay		
ORK 31	Knowe of Rowiegar	*	
ORK 32	Knowe of Yarso		
ORK 37	Midhowe	*	
ORK 43	Quanterness		*
ORK 44	Quoyness		
ORK 47	Sandyhill Smithy	*	*
ORK 49	Taversoe Tuick	*	*
ORK 51	Unstan	*	*

Table 8.1. Chambered cairns with pottery.

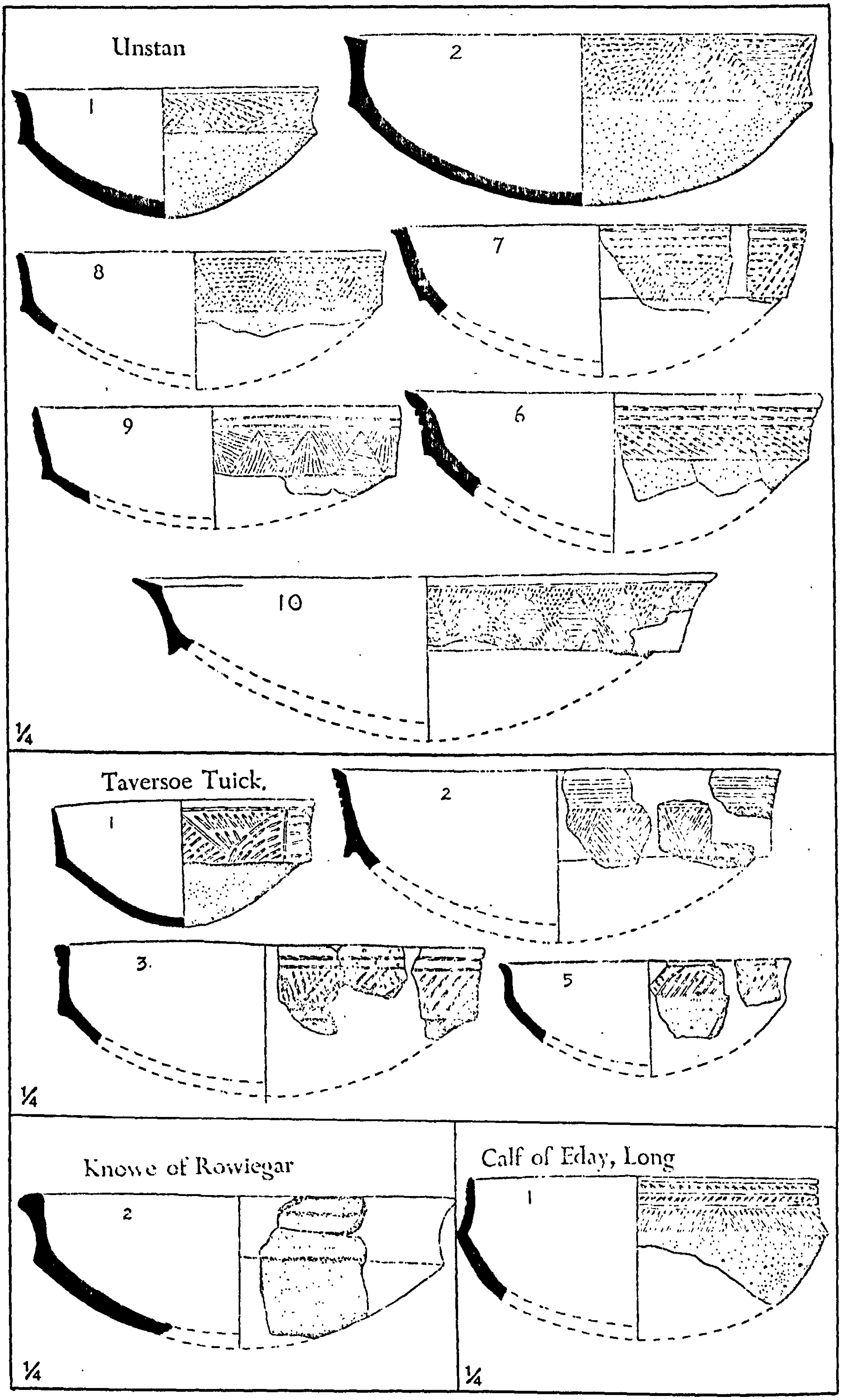


Figure 8.2. Selected examples of Unstan ware.

Figure 8.3. Selected examples of Grooved Ware.

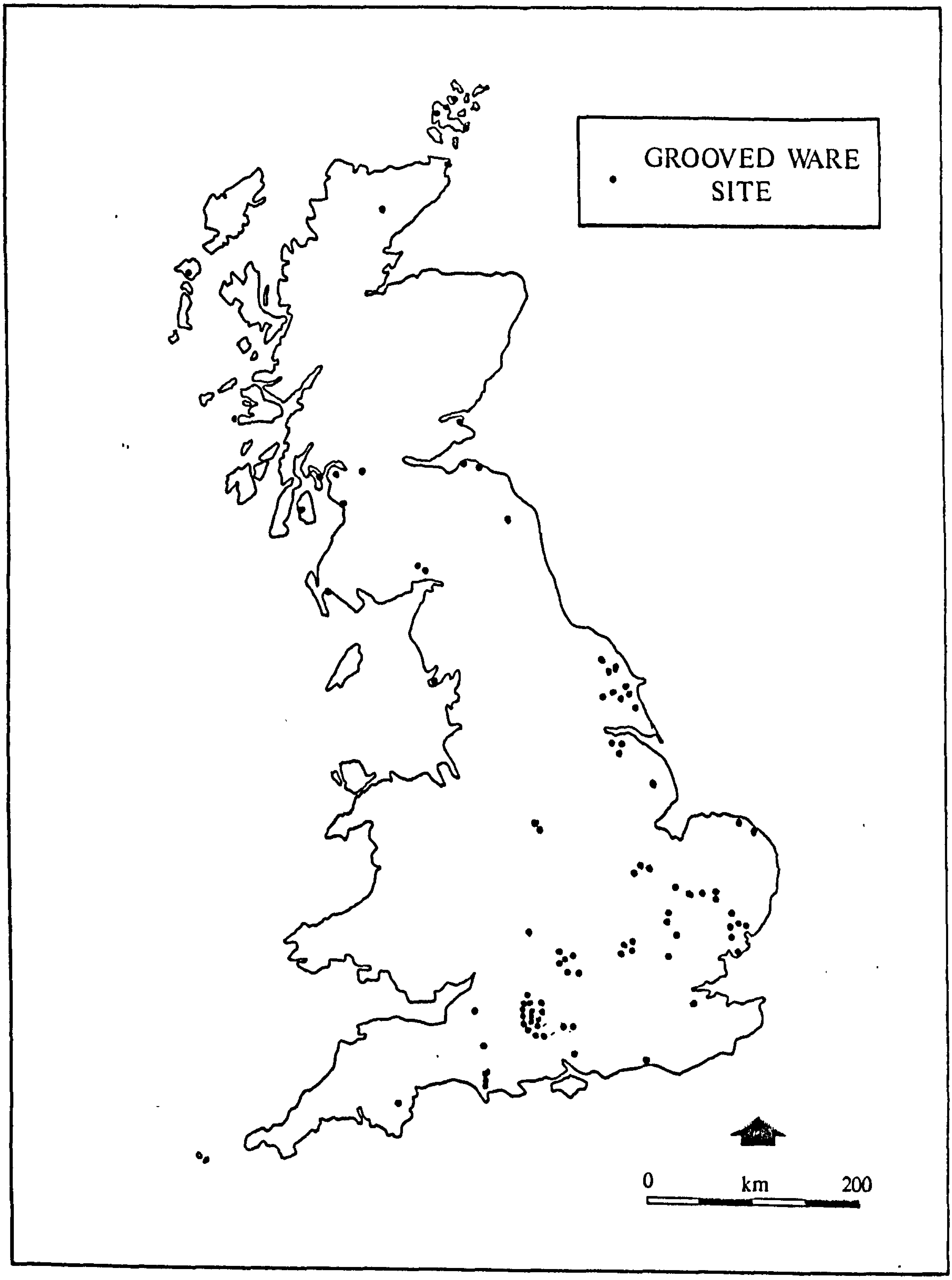


Figure 8.4. Distribution of Grooved Ware in Britain (after Wainwright with Longworth, 1971).

Chambered cairn	Pot No.	Radius mm	Depth mm	Ratio	Volume cc
ORK 2 Bigland Round	1	96	88	1.09	1643
ORK 3 Blackhammer	1	108	80	1.35	1828
ORK 8 Calf of Eday Long	1	120	108	1.11	3669
	2	96	72	1.33	1290
	3	100	76	1.32	1393
	11	160	120	1.33	6413
	14	164	116	1.41	6552
	15	152	128	1.19	5714
	16	88	188	0.47	3991
	29	140	232	0.60	11851
ORK 26 Kierfea Hill	1	88	84	1.05	1672
	2	112	96	1.17	2246
ORK 27 Knowe of Craie	1	108	80	1.35	1828
	2	120	192	0.63	6059
ORK 31 Knowe of Rowiegar	1	144	72	2.00	1859
	2	144	96	1.50	3918
ORK 37 Midhowe	1	120	76	1.58	2143
	2	112	68	1.68	1453
	5	124	140	0.89	3423
ORK 43 Quanterness	3	90	114	0.79	2531
ORK 47 Sandyhill Smithy	1	96	80	1.20	1178
	2	64	100	0.64	810
ORK 49 Taversoe Tuick	1	92	76	1.21	1115
	2	152	108	1.41	5040
	3	148	196	0.76	4318
	5	100	76	1.32	1478
	6	88	76	1.16	1448
	7	160	84	1.90	3392
	19	112	84	1.33	1432
	20	72	96	0.75	869
	21	60	104	0.58	988
	22	116	144	0.81	3773
	23	100	124	0.81	2603
	29	56	96	0.58	742
ORK 51 Unstan	1	100	72	1.39	1972
	2	156	112	1.39	5701
	3	136	100	1.36	4097
	4	160	136	1.18	6572
	6	144	96	1.50	3467
	7	140	96	1.46	3523
	8	120	84	1.43	2487
	9	124	64	1.55	2521
	10	200	70	2.00	7015
	11	192	84	1.45	7604
	12	108	96	1.13	2206
	13	108	84	1.29	2111
	18	108	64	1.69	1548
	19	88	70	1.26	1279
	20	156	84	1.86	4022
	22	80	168	0.48	1659
	23	80	200	0.40	3345
	24	72	132	0.55	1706
	32	108	104	1.04	2736

Table 8.5. Metrical analysis of pottery from chambered cairns.

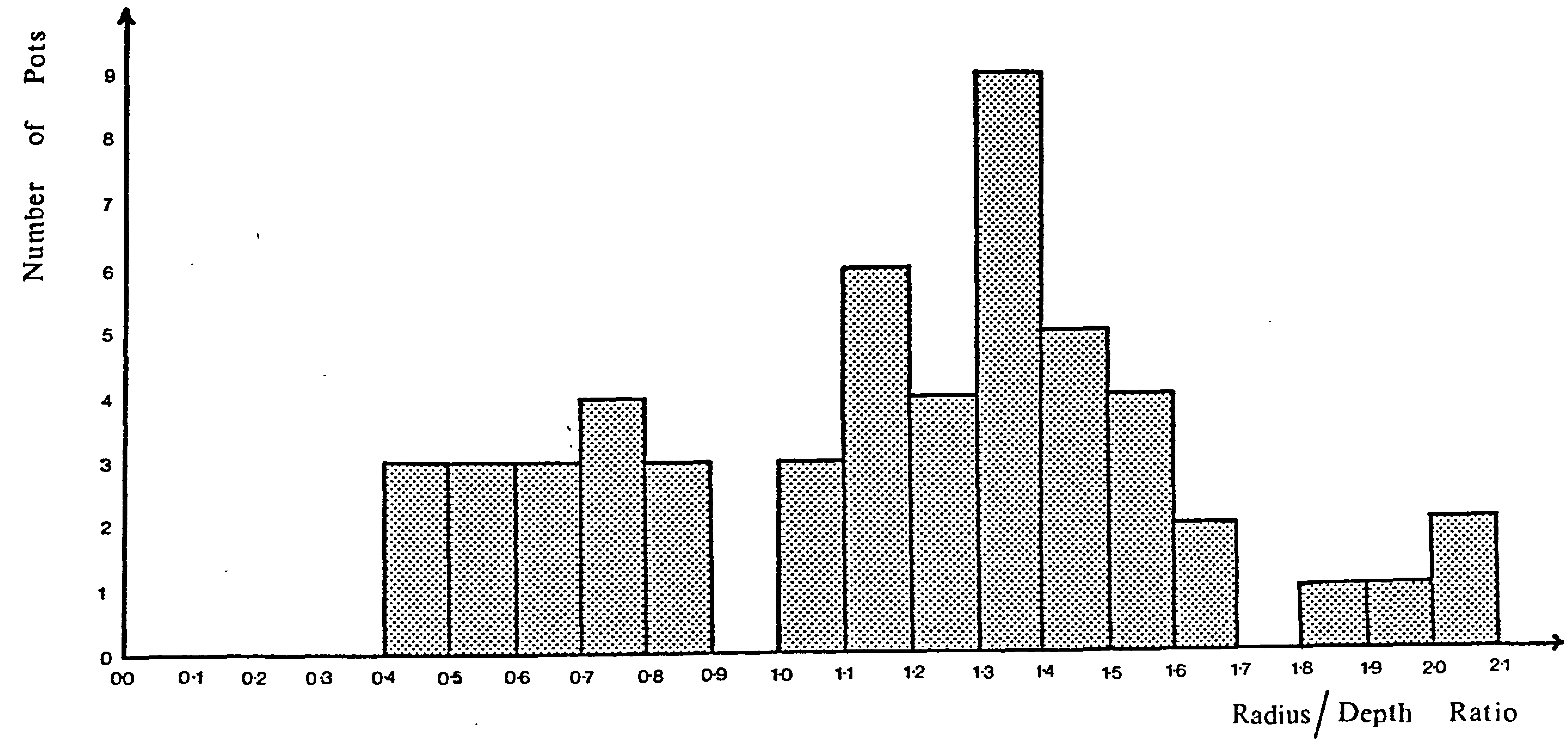


Figure 8.6. Radius/depth ratio of reconstructed pots from chambered cairns.

Figure 8.7. Volume of reconstructed pots from chambered cairns.

	Chambered cairns							Other sites		
	3	25	31	32	43	44	51	SB	R	KH
Piercing tools	*		*	*	*	*		*	*	*
Cutting/smoothing tools				*				*	*	
Heavy tools								*		
Tine						*				
Perforation			*							
Bead/pendant		*			*			*		
Unspecified						*	*			*

Table 8.8. Sites with objects of worked bone (and related substances).

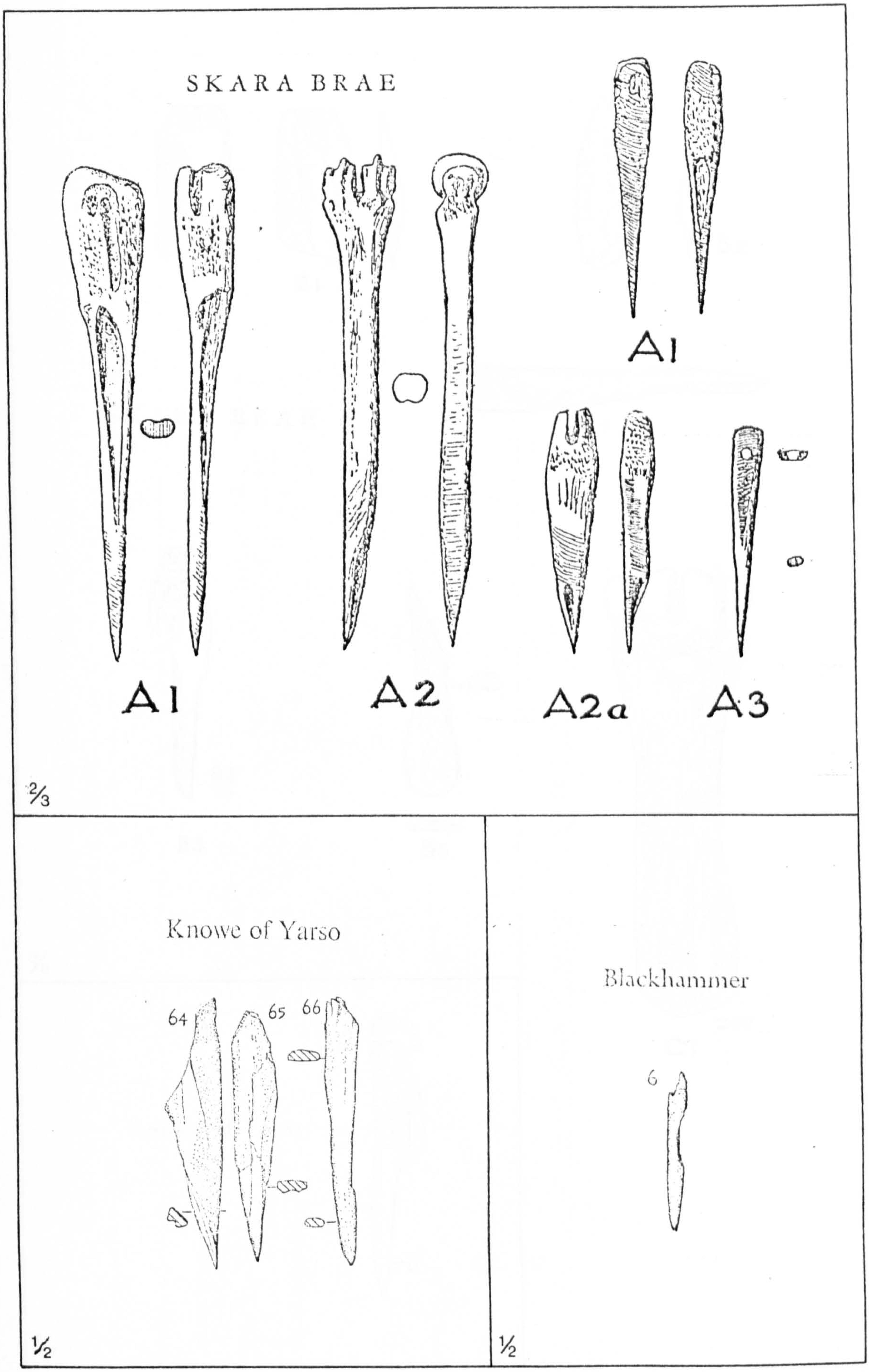


Figure 8.9. Bone artefacts of Childe's Class A (from Childe, 1931a and Henshall, 1963).

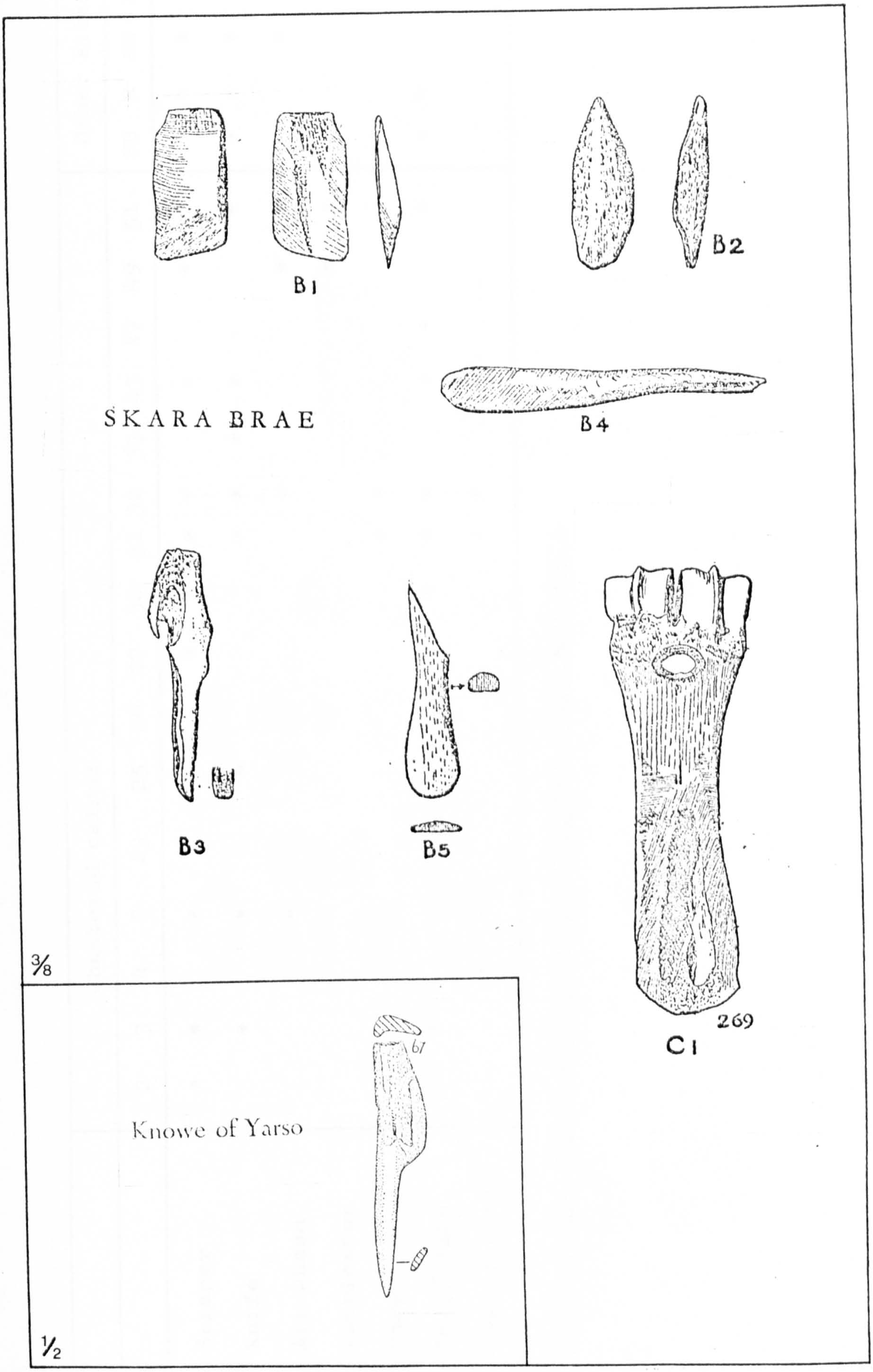


Figure 8.10. Bone artefacts of Childe's Class B and Class C (from Childe, 1931a and Henshall, 1963).

	Chambered cairns																Other sites			
	2	3	4	8	23	25	26	27	30	31	32	37	43	47	49	51	SB	R	KH	SS
Scraper	*	*		*				*	*	*	*		*		*		*	*	*	*
Knife		*		*		*				*	*	*	*			*	*	*	*	*
Arrowhead				*							*				*	*			*	
Fabricator															*	*				
Core										*	*									
Chip/flake	*	*		*	*		*	*	*	*	*		*	*		*	*	*		*
Unspecified			*	*						*	*									

Table 8.11. Sites with objects of worked flint and chert.

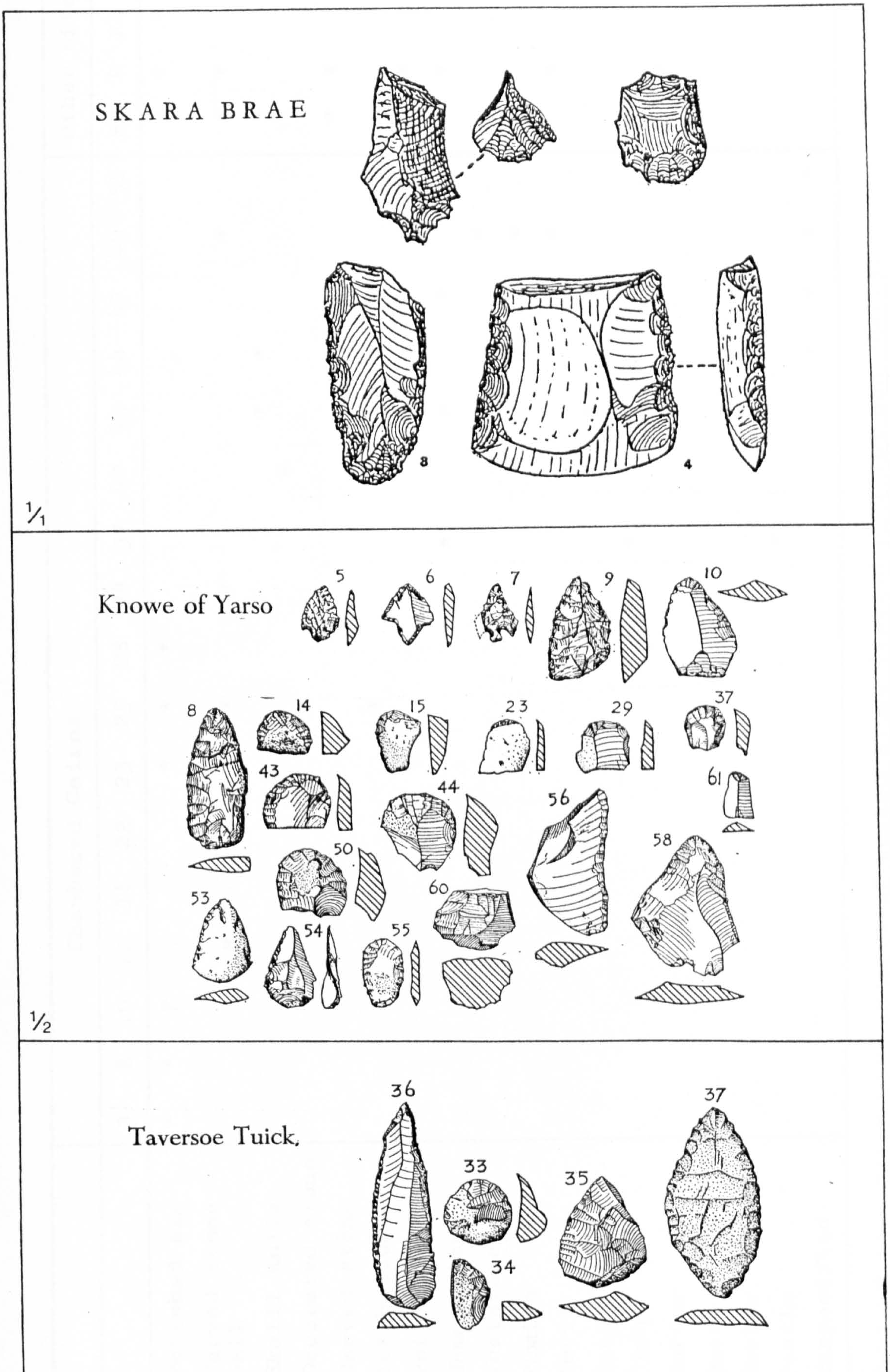


Figure 8.12. Flint and chert artefacts (from Henshall, 1963).

	Chambered Cairns																	Other sites			
	3	8	10	12	16	22	23	25	28	34	37	40	43	44	47	49	51	SB	R	KH	SS
Polished axe	*	*	*				*	*	*									*	*	*	*
Carved stone ball				*				*		*						*		*	*		
Skaill knife													*	*				*			
Decorated stone					*	*						*						*			
Carved stone														*				*	*		
Jet button								*													
Pot lid							*						*	*	*				*		*
Hammerstone											*		*		*			*	*		*
Whetstone																*					
Pumice							*							*		*					
Anvil																*			*		
Bead													*		*						
Club											*							*			
Mortar																			*		
Quern																		*			
Rubber													*								
Pestle											*										
Unspecified														*	*	*	*				

Table 8.13. Sites with objects of worked stone (excluding flint and chert).

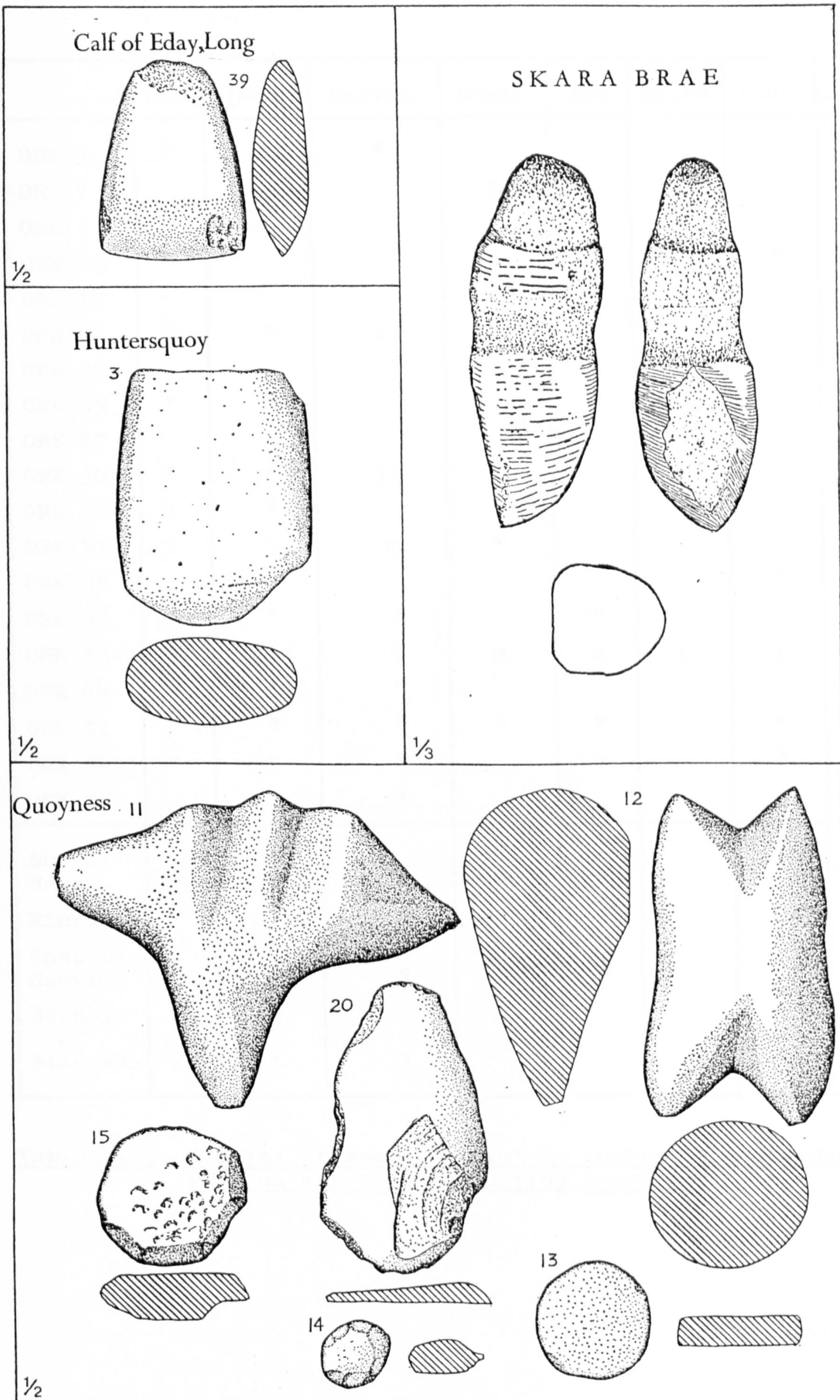


Figure 8.14. Stone artefacts (from Childe, 1931a and Henshall, 1963).

	Bos	Ovis	Cervus	Canis	Sus	Lutra	Equus	Un-specified
ORK 3	*	24	*					
ORK 7				7				*
ORK 8						1		
ORK 12	*			24			*	*
ORK 17								*
ORK 21	*	*	13		*			
ORK 22			*					*
ORK 25'	*	*						
ORK 27								*
ORK 30	*	*	14					
ORK 31	1	*						
ORK 32	1	3	35	*				
ORK 36							*	
ORK 37	*	*	*		*			
ORK 43	3	25	2	2	2	1	1	
ORK 44	*	*	*					
ORK 51	*	*	*	*	*		*	
ORK 54	*	*	*		*		*	
ORK 55			*					
Skara Brae	*	*	*	*	*			*
Rinyo	*	*	*					*
Knap of Howar	*	*	*		*			*
Stones of Stenness	6	1	3					

Table 8.15. Remains of mammals (minimum number of individuals, with an asterisk indicating presence)

	Rodents	Fish	Birds	Molluscs
ORK 3			3	
ORK 12			*	
ORK 21			*	
ORK 22				*
ORK 25			2	
ORK 30		1	9	1
ORK 37	*	2	10	*
ORK 43	2	7	38	
ORK 44				*
ORK 51			*	
Skara Brae	*	*	*	*
Knap of Howar		*		*

Table 8.16. Remains of other fauna (minimum number of species, with an asterisk indicating presence)

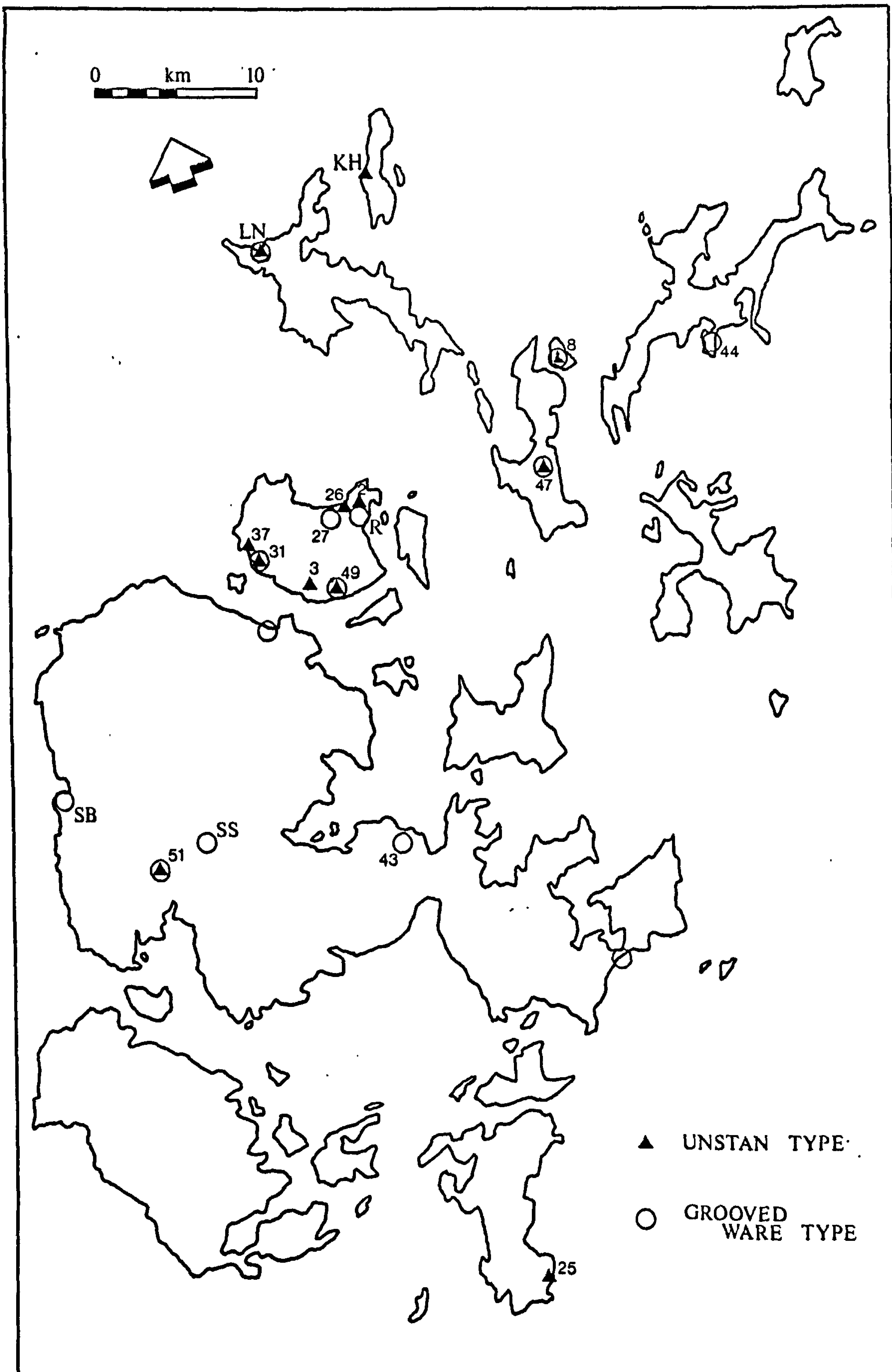


Figure 8.17. Distribution of artefacts of Unstan type and Grooved Ware type.

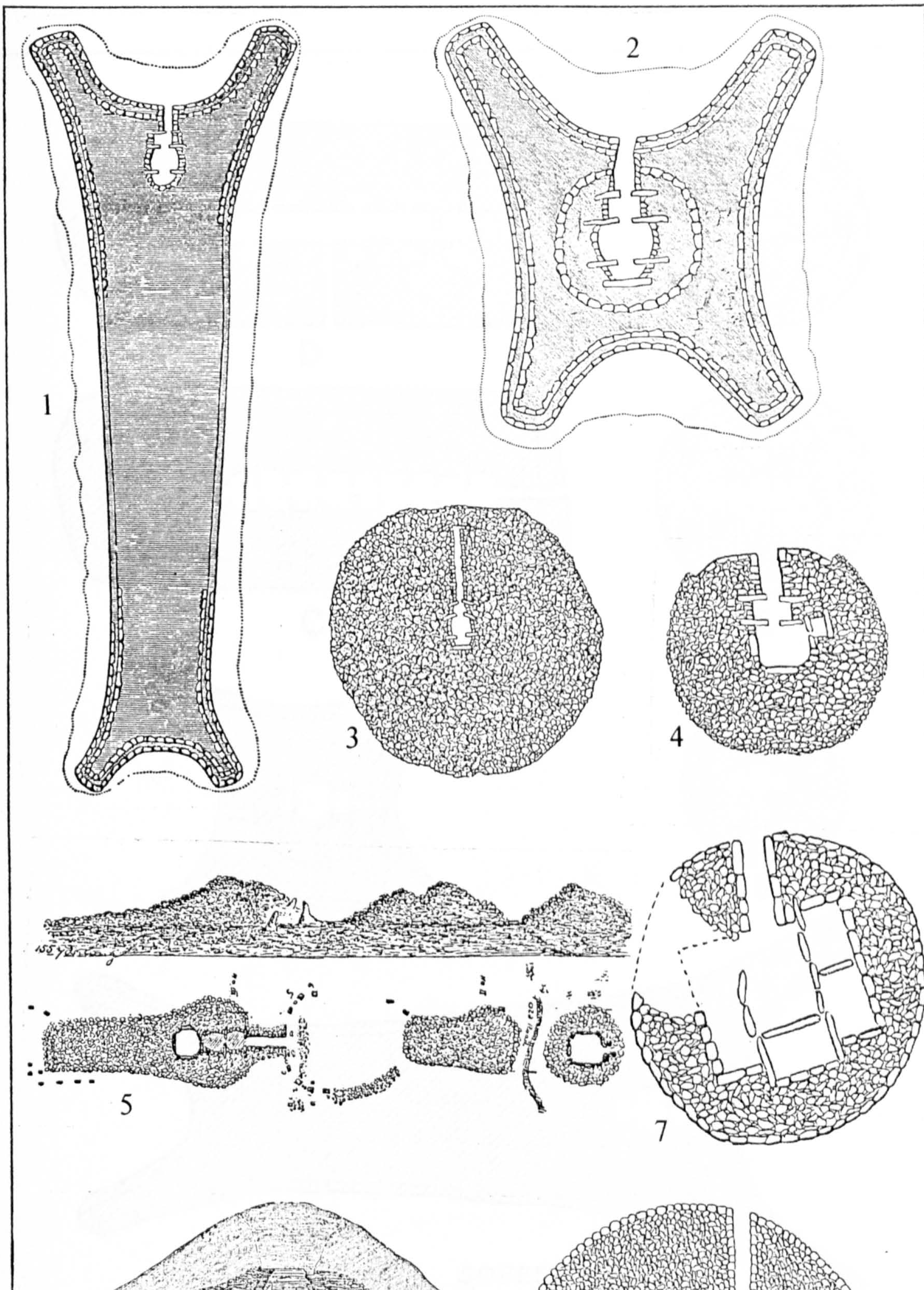


Figure 9.1. Anderson's typology.

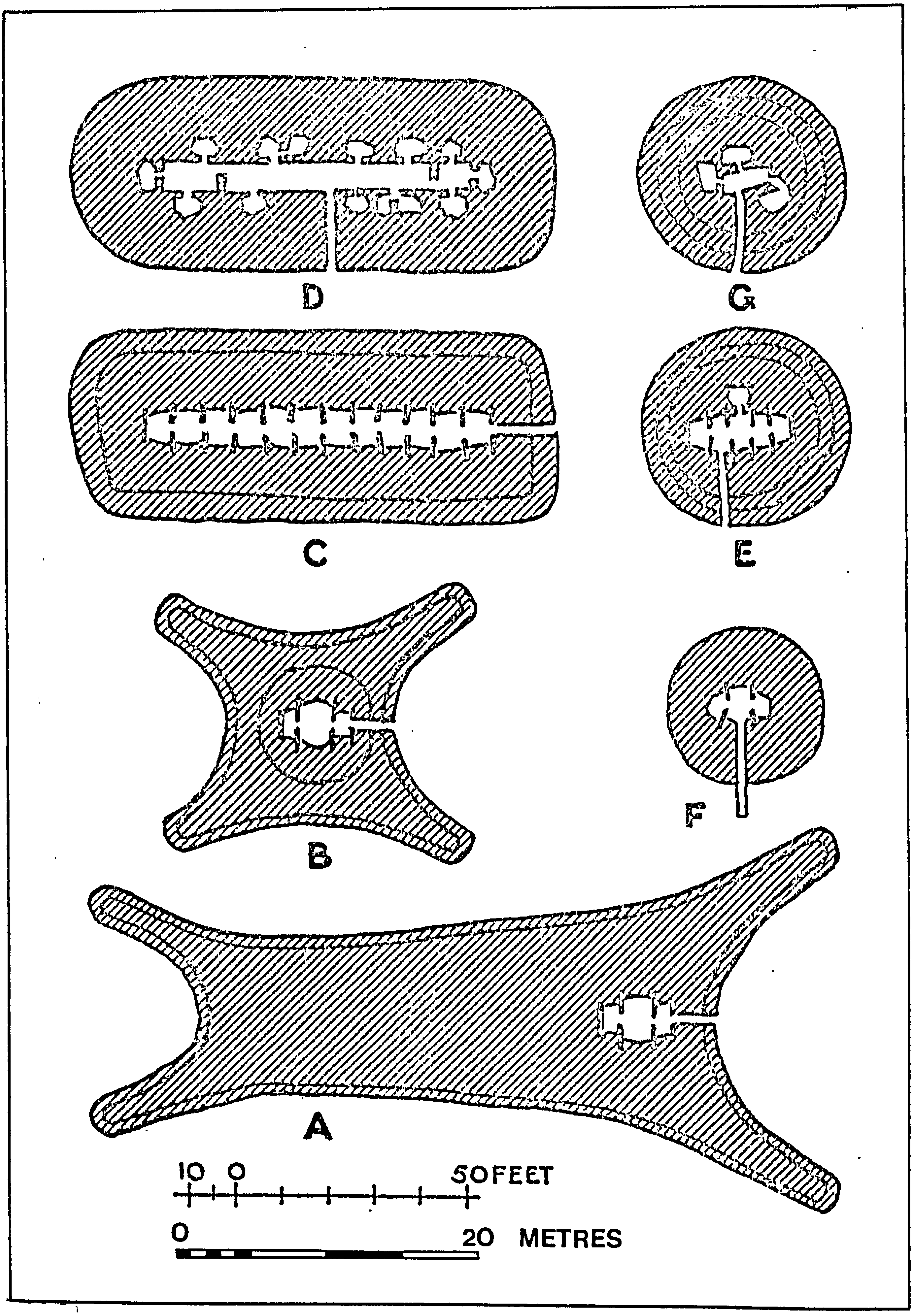


Figure 9.2. The Royal Commission's typology (from RCAMS, 1946).

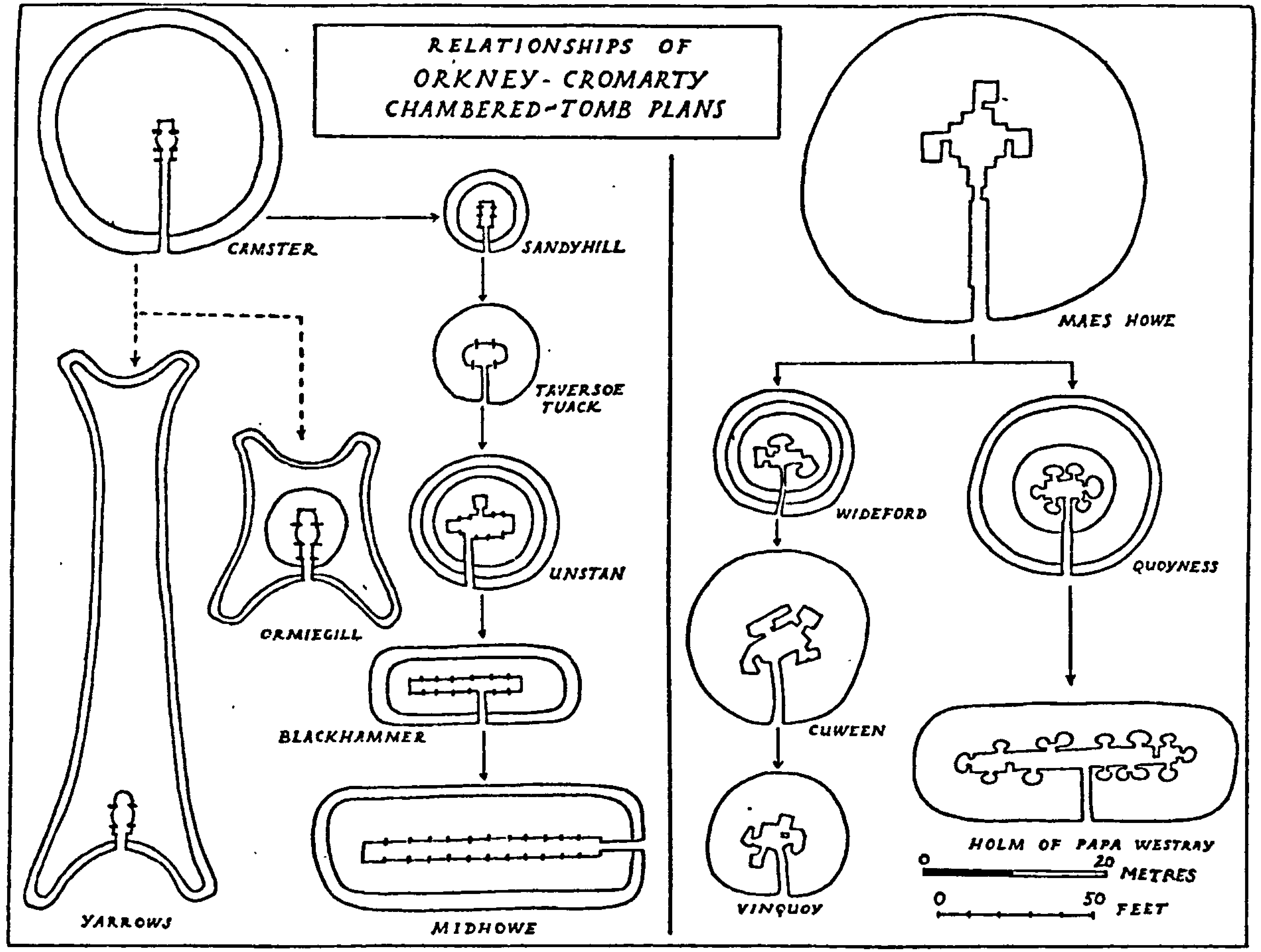


Figure 9.3. Piggott's typological seriation (from Piggott, 1954).

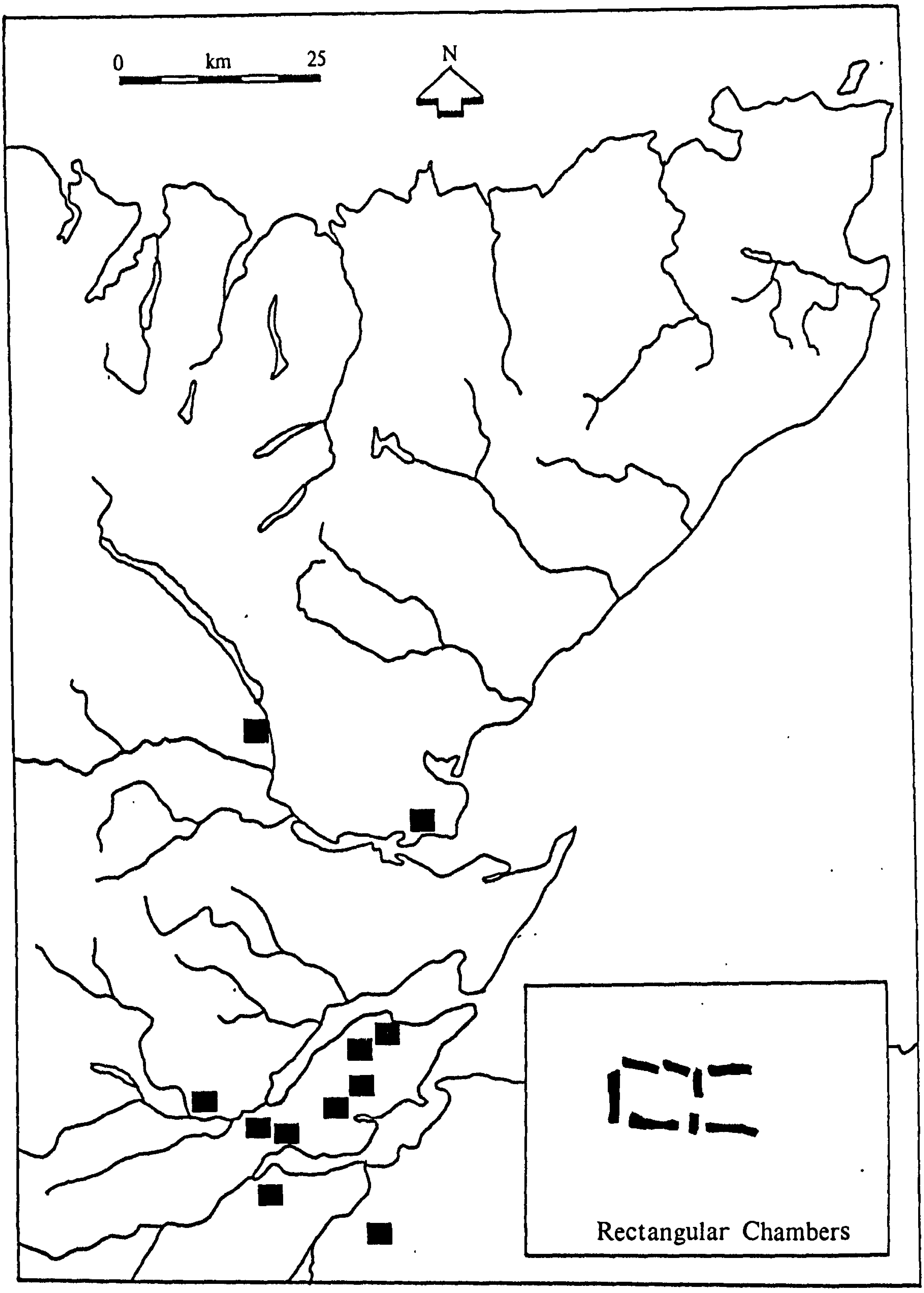


Figure 9.4. Henshall's typology: the distribution of cairns with rectangular chambers.

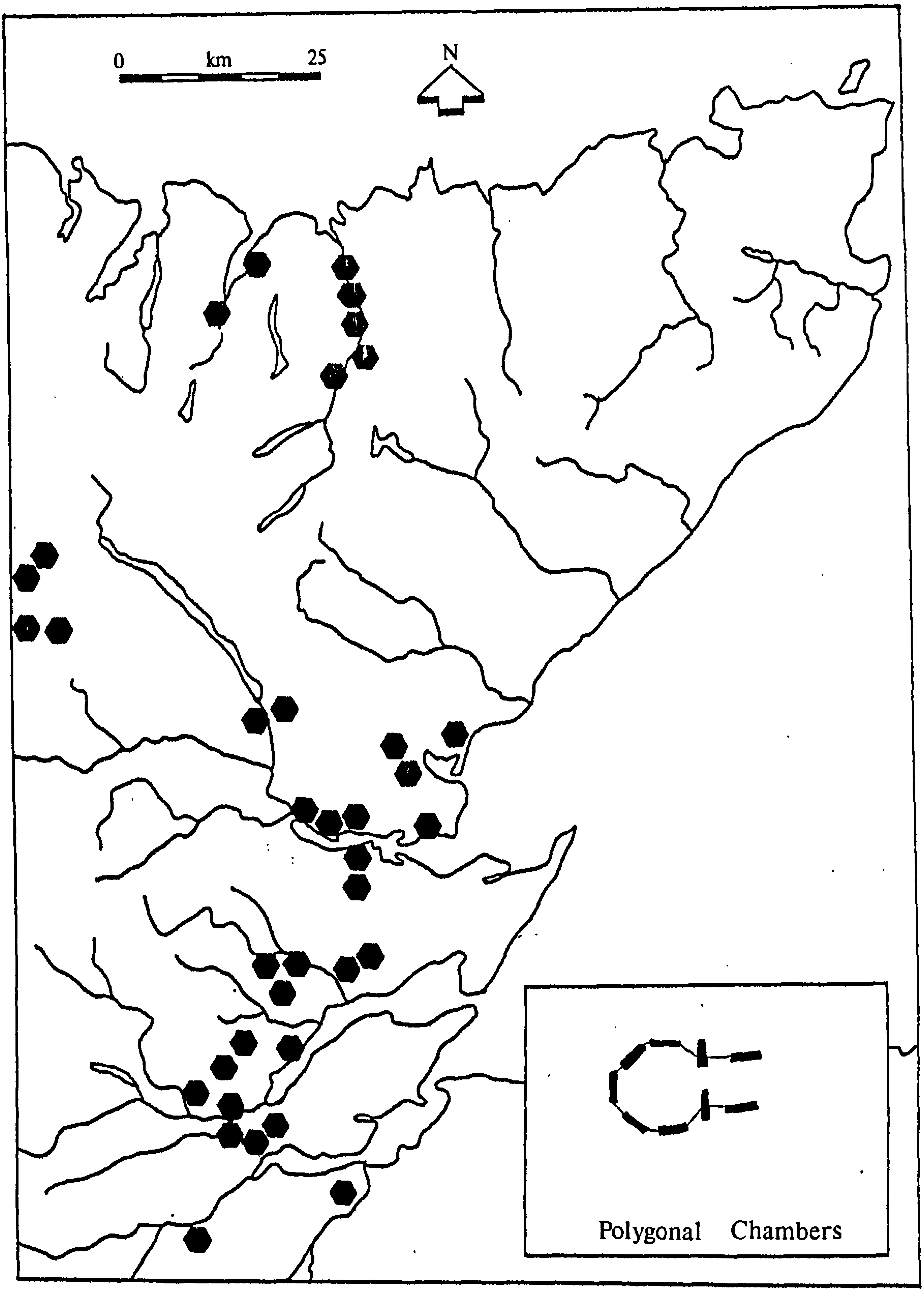


Figure 9.5. Henshall's typology: the distribution of cairns with polygonal chambers.

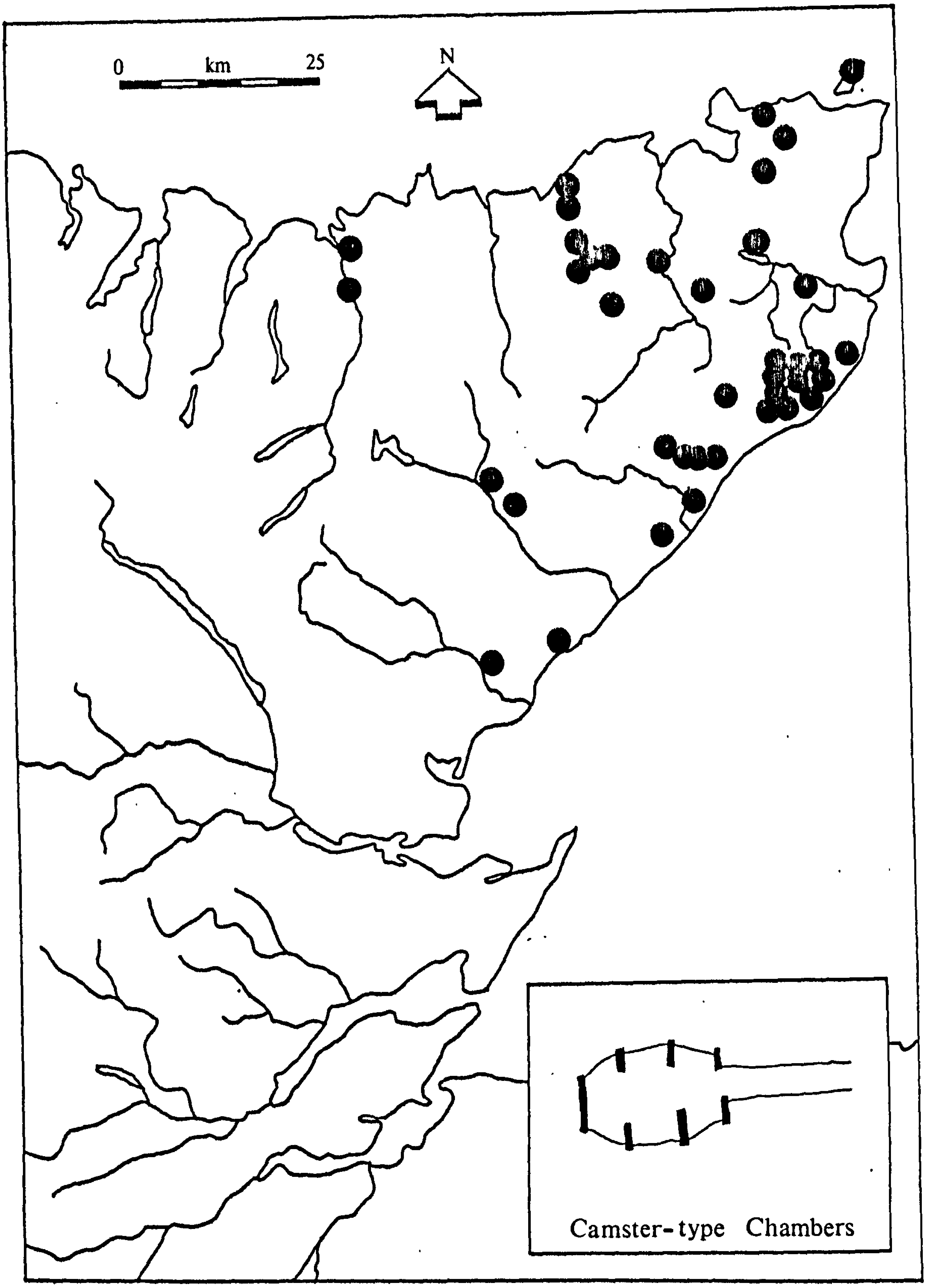


Figure 9.6. Henshall's typology: the distribution of cairns with Camster type chambers.

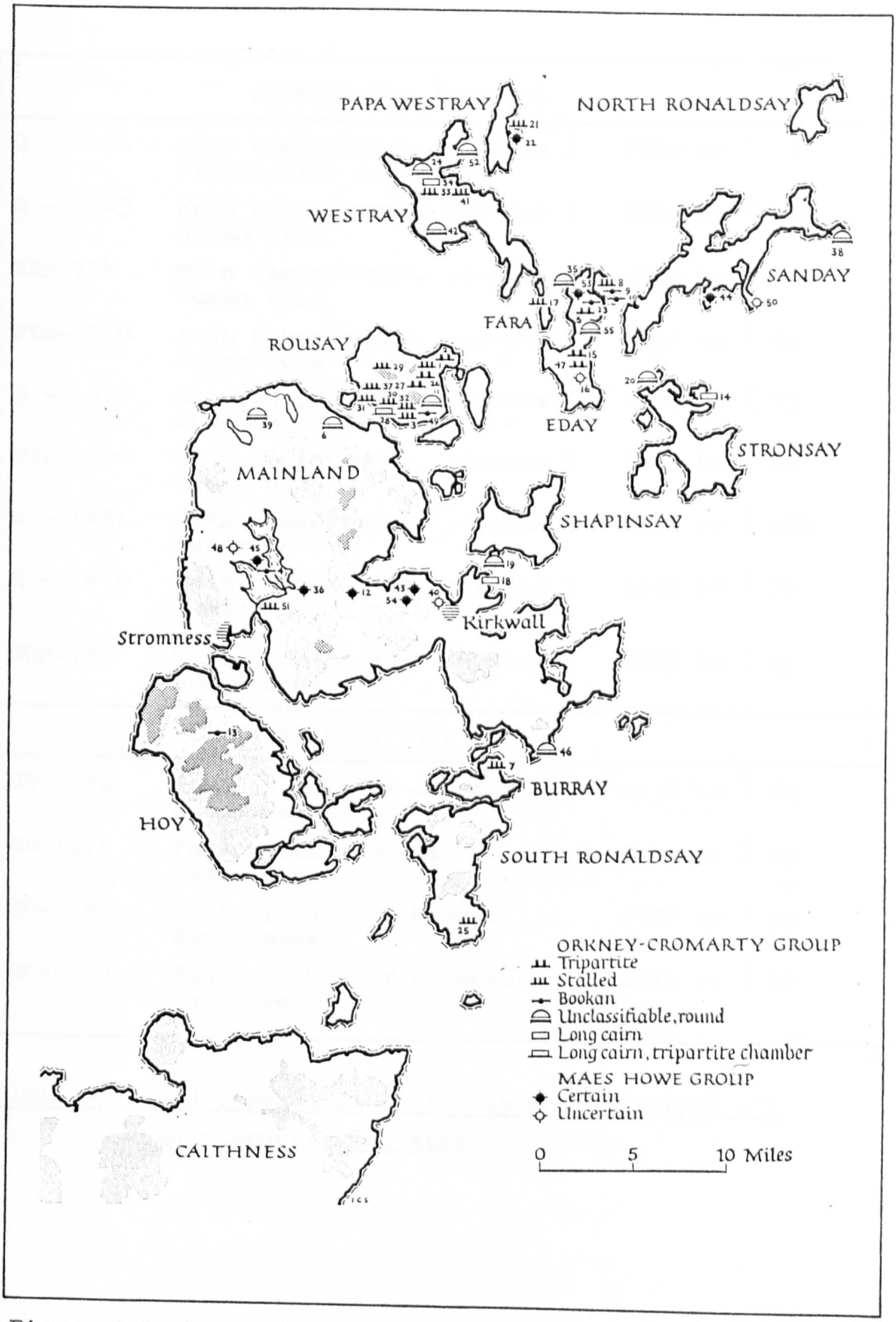


Figure 9.7. Henshall's typology: the distribution of chambered cairns within Orkney.

QUANTERNESS (ORK 43)		
Q - 1294	Main compartment, stratum 1 Organically rich soil	2640 bc ± 75
Q - 1363	Main compartment, stratum 3 Human bone	2590 bc ± 110
SRR-754	Main compartment, stratum 2 Human bone	2410 bc ± 50
Pta-1626	Main compartment, stratum 2 Human bone	2350 bc ± 60
Q - 1479	Main compartment, stratum 2 Human bone	2220 bc ± 75
Pta-1606	Main compartment, stratum 5 Human bone	2180 bc ± 60
Q - 1451	Main compartment, stratum 3 Human bone	2160 bc ± 100
Q - 1480	Main compartment, stratum 5 Human bone	1955 bc ± 70
SRR-755	Main compartment, stratum 5 Human bone	1920 bc ± 55
ISBISTER (ORK 25)		
GU-1182	Stall 5, use of chamber Human bone	2530 bc ± 80
GU-1179	Foundation deposit Human bone	2480 bc ± 55
GU-1185	Cell 3, use of chamber Human bone	2470 bc ± 95
GU-1180	Stall 4, use of chamber Human bone	2470 bc ± 90

Table 9.8. Radiocarbon dates for chambered cairns - 1
Quanterness, Isbister

ISBISTER (ORK 25) Continued		
GU-1181	Stall 4, use of chamber Human bone	2460 bc ± 130
Q - 3013	Stall 5, use of chamber Human bone	2425 bc ± 50
GU-1184	Cell 3, use of chamber Human bone	2415 bc ± 90
Q - 3016	Cell 3, use of chamber Human bone	2410 bc ± 55
Q - 3018	Horn work of cairn Deer bone	2335 bc ± 45
GU-1190	Horn work of cairn Deer bone	2310 bc ± 55
Q - 3015	Cell 3, use of chamber Human bone	2310 bc ± 55
GU-1178	Foundation deposit Human bone	2295 bc ± 100
GU-1186	Infilling of chamber Human bone	2090 bc ± 100
Q - 3017	Infilling of chamber Human bone	2080 bc ± 50
GU-1183	Stall 5, use of chamber Human bone	1960 bc ± 80
Q - 3014	Stall 5, use of chamber Human bone	1880 bc ± 50

Table 9.9. Radiocarbon dates for chambered cairns - 2 Isbister

KNOWE OF RAMSAY (ORK 30)		
Q - 1223	No context Animal bone	2390 bc ± 65
Q - 1224	No context Deer bone	2350 bc ± 60
Q - 1222	No context Animal bone	2060 bc ± 60
QUOYNESS (ORK 44)		
SRR-753	No context Human bone	2315 bc ± 50
SRR-752	No context Human bone	2240 bc ± 50
KNOWE OF ROWIEGAR (ORK 31)		
Q - 1221	No context Cattle bone	2355 bc ± 60
Q - 1227	No context Deer bone	2055 bc ± 60
KNOWE OF YARSO (ORK 32)		
Q - 1225	No context Animal bone	2275 bc ± 60
MAES HOWE (ORK 36)		
SRR-505	Base of ditch Silty peat	2185 bc ± 65
Q - 1482	Base of ditch Silty peat	2020 bc ± 70

Table 9.10. Radiocarbon dates for chambered cairns - 3
Knowe of Ramsay, Quoyness, Knowe of Rowiegar,
Knowe of Yarso, Maes Howe

KNAP OF HOWAR		
Birm-816	Lower midden pre-dating houses 1 and 2 Mixed animal bone	2820 bc ± 180
SRR-348	Upper midden contemporary with houses 1 and 2 Mixed animal bone	2815 bc ± 70
Birm-814	Occupation deposit on floor of house 2 Mixed animal bone	2740 bc ± 130
SRR-346	Occupation deposit on floor of house 1 Mixed animal bone	2582 bc ± 70
SRR-344	Upper midden contemporary with houses 1 and 2 Mixed animal bone	2501 bc ± 70
SRR-349	Lower midden pre-dating houses 1 and 2 Mixed animal bone	2472 bc ± 70
SRR-345	Occupation deposit on floor of house 1 Mixed animal bone	2398 bc ± 70
Birm-813	Midden filling wall of house 2 Mixed animal bone	2320 bc ± 100
Birm-815	Upper midden contemporary with houses 1 and 2 Mixed animal bone	2300 bc ± 130
SRR-452	Midden filling wall of house 1 Mixed animal bone	2131 bc ± 65

Table 9.11. Radiocarbon dates for settlements - 1 Knap of Howar.

SKARA BRAE		
Birm-638	Trench I, earliest midden Mixed animal bone	2480 bc ± 120
Birm-637	Trench I, earliest midden Mixed animal bone	2480 bc ± 100
Birm-639	Trench I, earliest midden Mixed animal bone	2450 bc ± 100
Birm-636	Trench I, earliest midden Mixed animal bone	2400 bc ± 130
Birm-480	Trench II, occupation on old land surface Mixed animal bone	2370 bc ± 100
Birm-438	Trench II, top of midden Mixed animal bone	2190 bc ± 120
Birm-436	Trench I, midden under passage Mixed animal bone	2090 bc ± 110
Birm-434	Trench I, midden over passage Mixed animal bone	2070 bc ± 110
Birm-477	Trench II, bottom of midden Mixed animal bone	2000 bc ± 100
Birm-435	Trench I, midden under passage Mixed animal bone	1920 bc ± 100
Birm-478	Trench II, bottom of midden Mixed animal bone	1900 bc ± 140
Birm-433	Trench I, midden over passage Mixed animal bone	1880 bc ± 110
Birm-437	Trench II, top of midden Mixed animal bone	1830 bc ± 110

Table 9.12. Radiocarbon dates for settlements - 2 Skara Brae.

LINKS OF NOLTLAND		
GU-1429	West midden, square FR 88, layer 5 Animal bone	2265 bc ± 65
GU-1428	West midden, square FQ 89, layer 8 Animal bone	2190 bc ± 65
GU-1431	West midden, square FR 89, layer 3 Animal bone	2000 bc ± 65
GU-1430	West midden, square FQ 83, layer 2 Animal bone	1910 bc ± 60
GU-1433	Structure at Grobust, square HP 90, layer 29 Animal bone	1890 bc ± 60
GU-1432	Central midden, square GZ69, layer 7 Animal bone	1772 bc ± 60
RINYO		
Q-1226	No context Animal bone	1900 bc ± 70
STONES OF STENNESS		
SRR-350	Base of main ditch, organic layer Animal bone	2356 bc ± 65
SRR-351	Central feature Wood charcoal	2238 bc ± 70

Table 9.13. Radiocarbon dates for settlements - 3
Links of Noltland, Rinyo
Radiocarbon dates for henge
Stones of Stenness

Burial Location	Lab. Ref.	Date BC	Random Error (years)	Average date for context and reference
<u>Main chamber</u>				
SF 540 (III square N2, layer 67, stratum 3)	a1	2410	306	
SF 550 (III square L2, layer 73, stratum 2)	a5	2435	308	
SF 574 (III, layer 65, stratum 5/6)	a6	3260	410	2370 BC (± 185 ± 250) OxTL 189a)
SF 574 (III, layer 65, stratum 5/6)	a7	2490	225	
SF 4611 (V, layer 58, stratum 5b)	a13	1725	440	
SF 287 (II, layer 25, stratum 2)	a14	2015	340	
<u>Entrance passage</u>				
SF 5025 (ZA, layer 4)	a16	2010	200	

<u>Table 9.14.</u> <u>Thermoluminescent dates for Quanterness.</u>

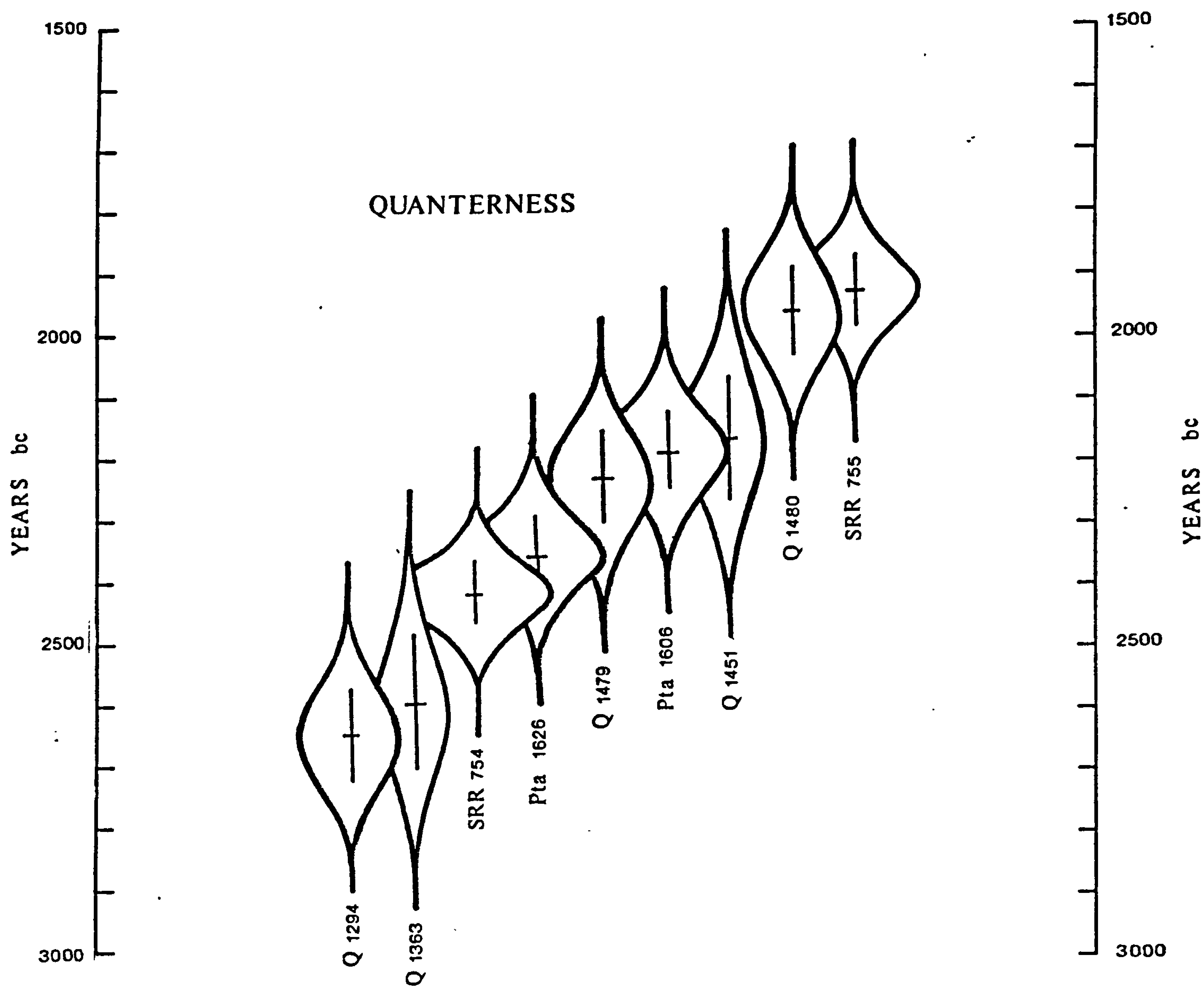


Figure 9.15. Radiocarbon dates for chambered cairns - 1.

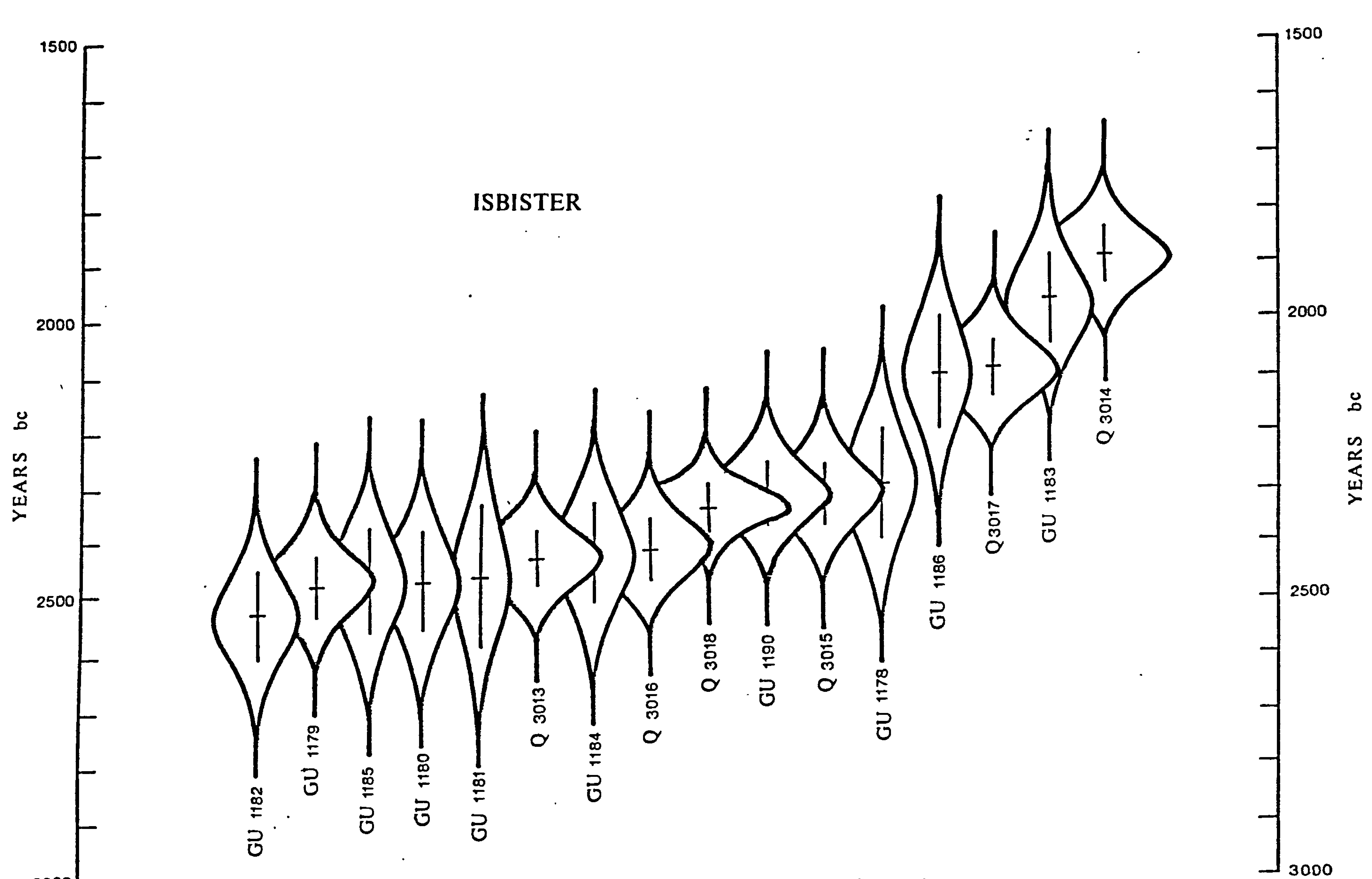


Figure 9.16. Radiocarbon dates for chambered cairns - 2.

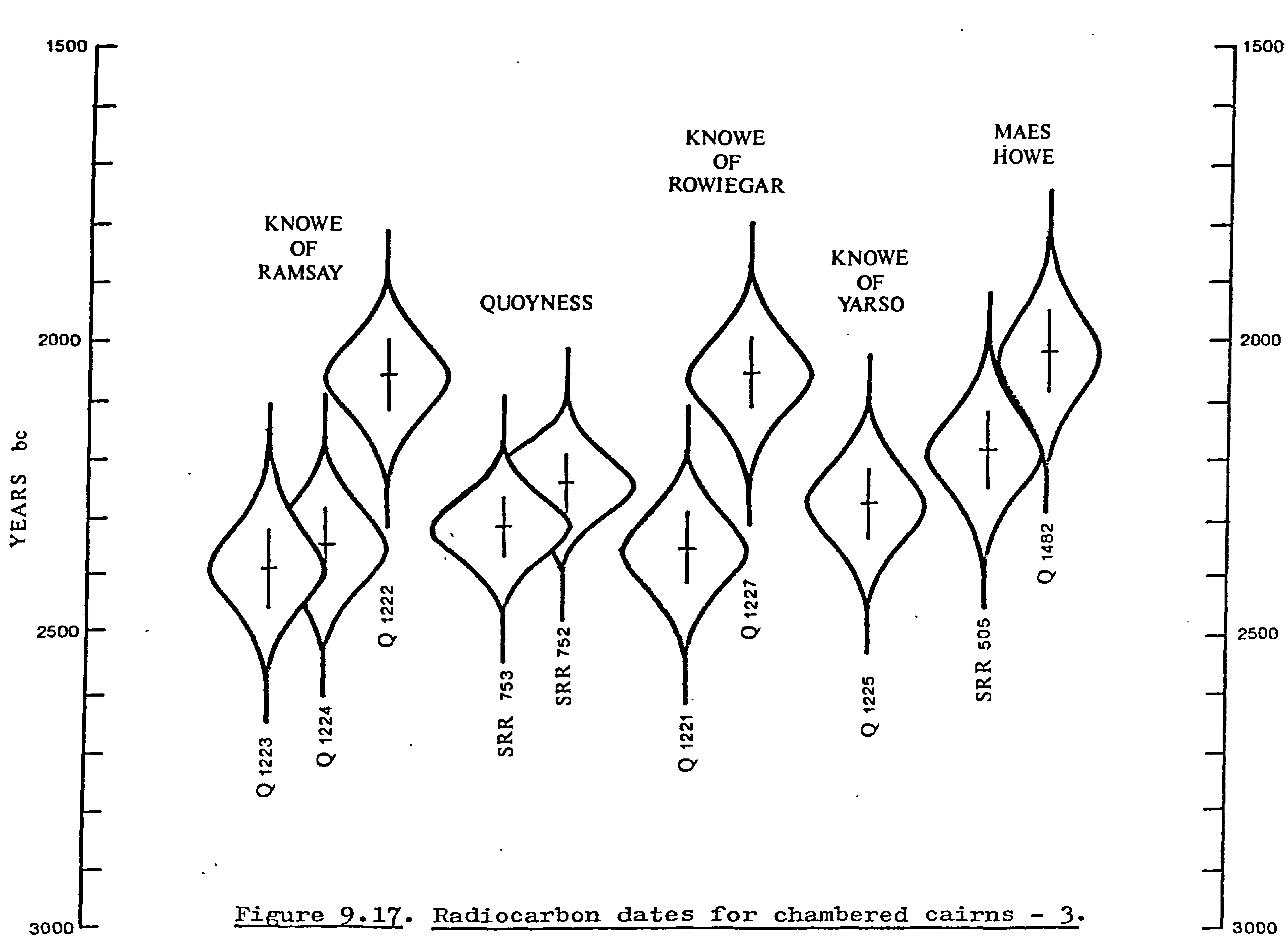


Figure 9.17. Radiocarbon dates for chambered cairns - 3.

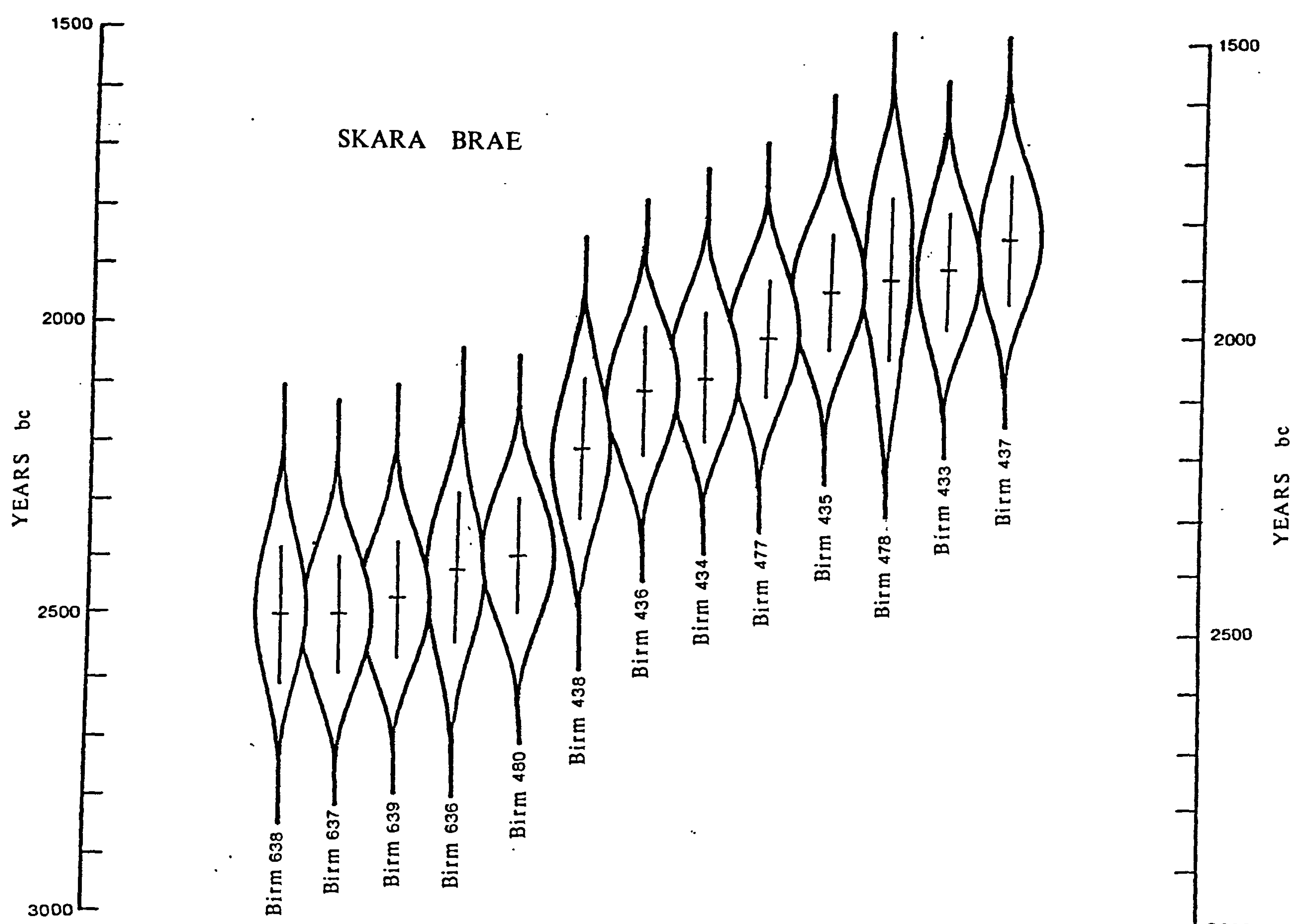


Figure 9.18. Radiocarbon dates for settlements - 1.

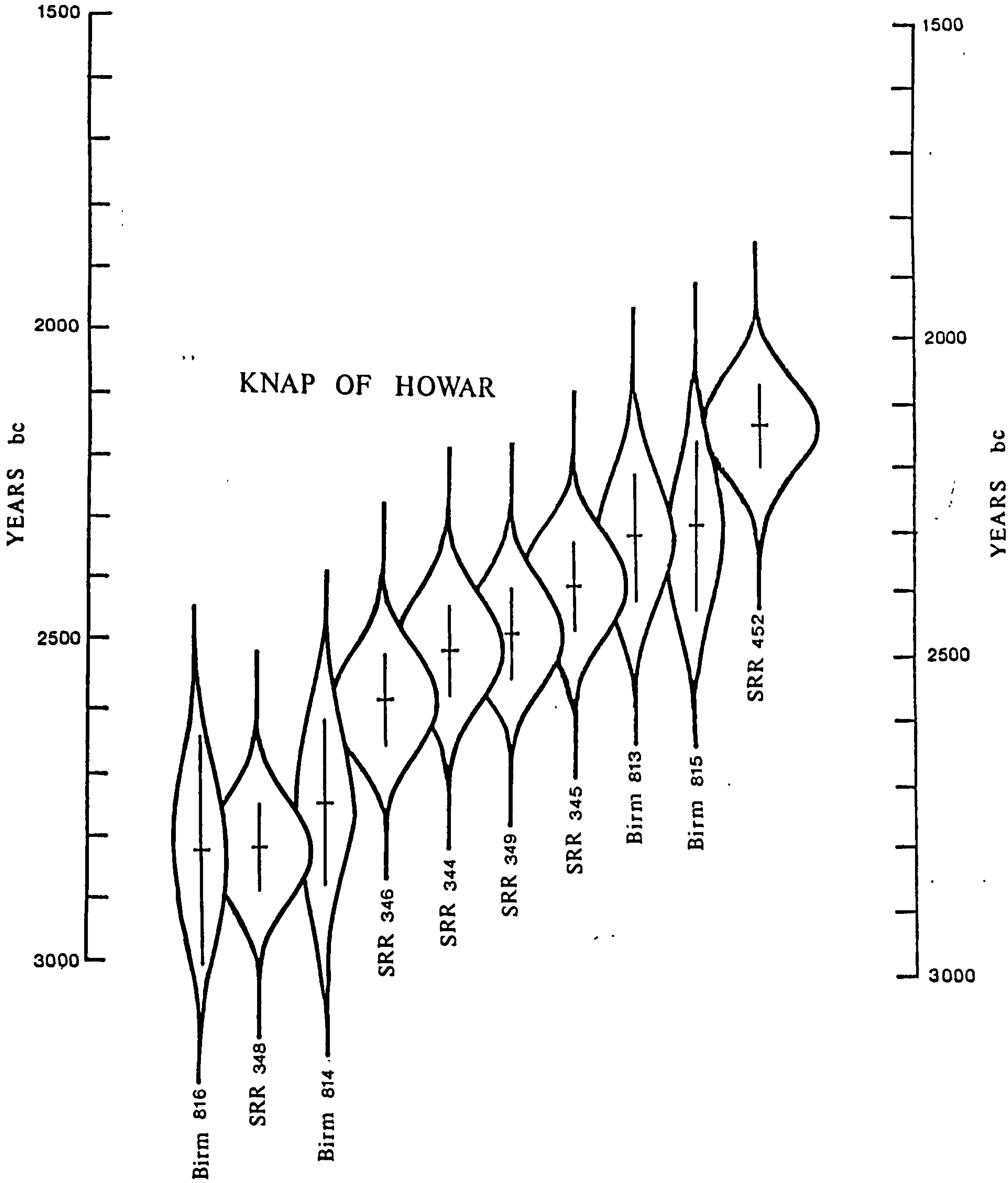


Figure 9.19. Radiocarbon dates for settlements - 2.

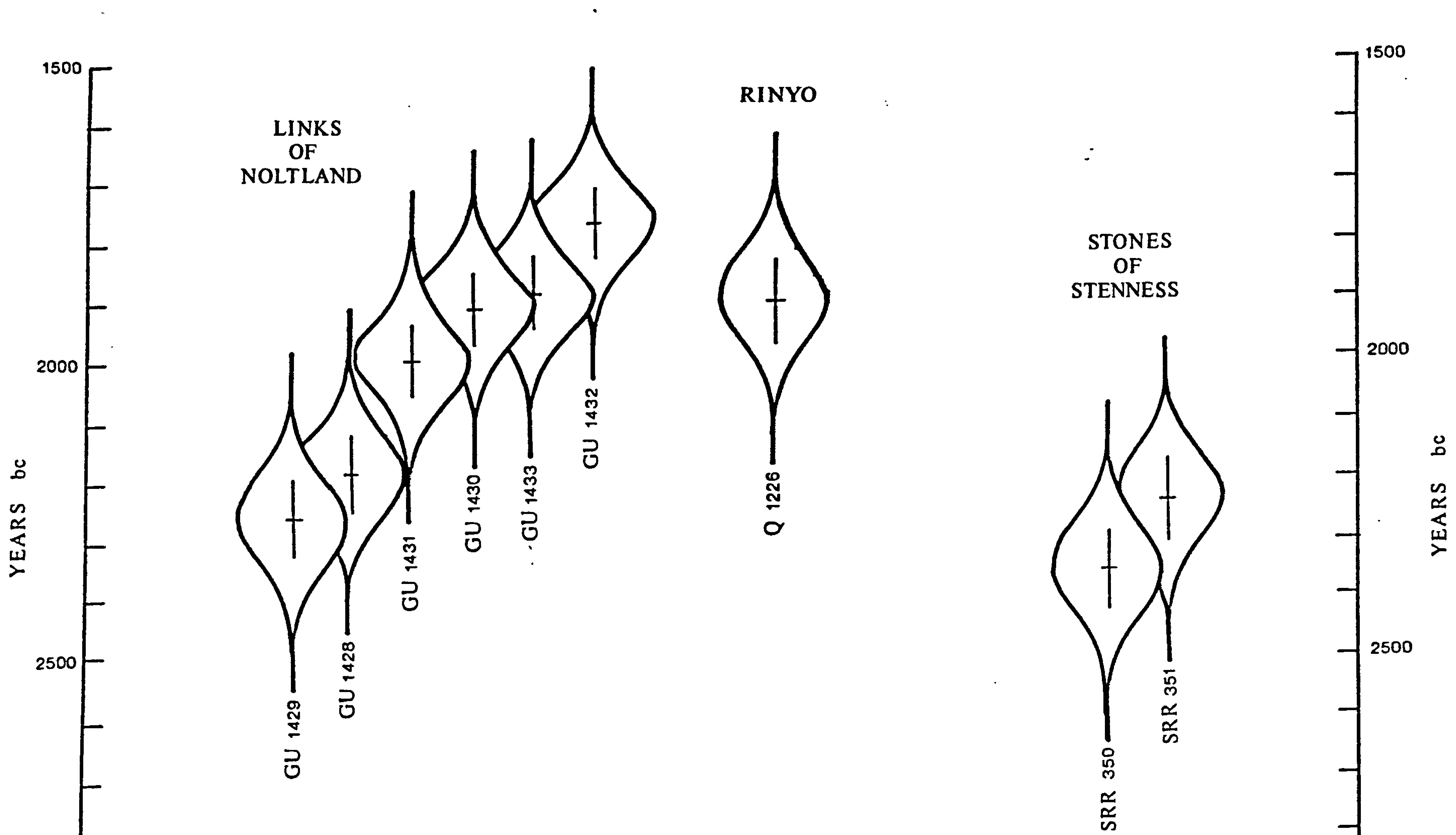


Figure 9.20. Radiocarbon dates for settlements - 3.
Radiocarbon dates for henge.

Figure 9.21.

Summary of all radiocarbon dates. (Dark bar is mean of date. Upper limit of box is latest date minus two standard deviations and lower limit of box is earliest date plus two standard deviations).

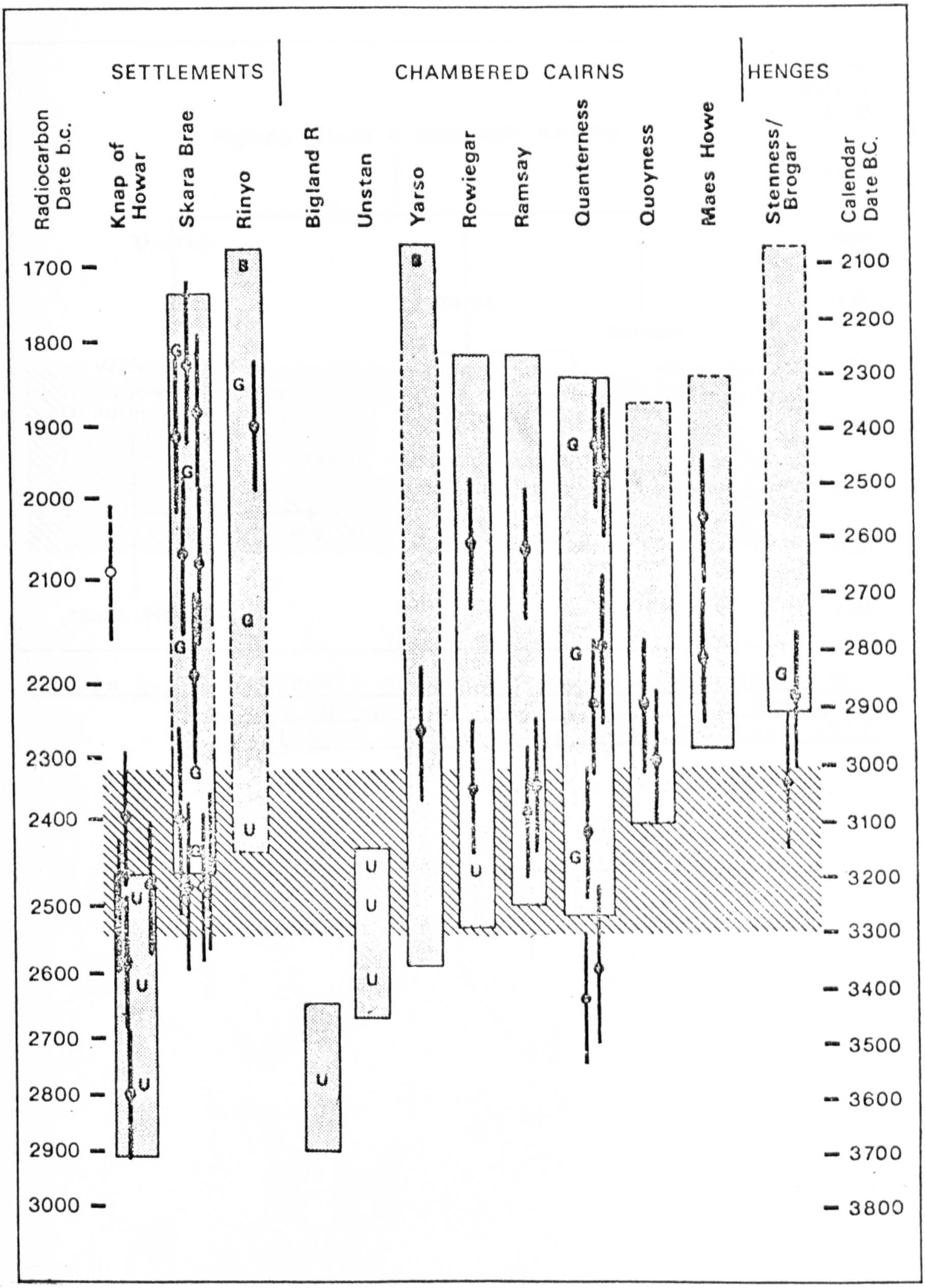


Figure 9.22. Renfrew's Unstan ware/Grooved Ware transition. U indicates the occurrence of Unstan ware, G of Grooved Ware and B of a Beaker sherd. (from Renfrew, 1979).

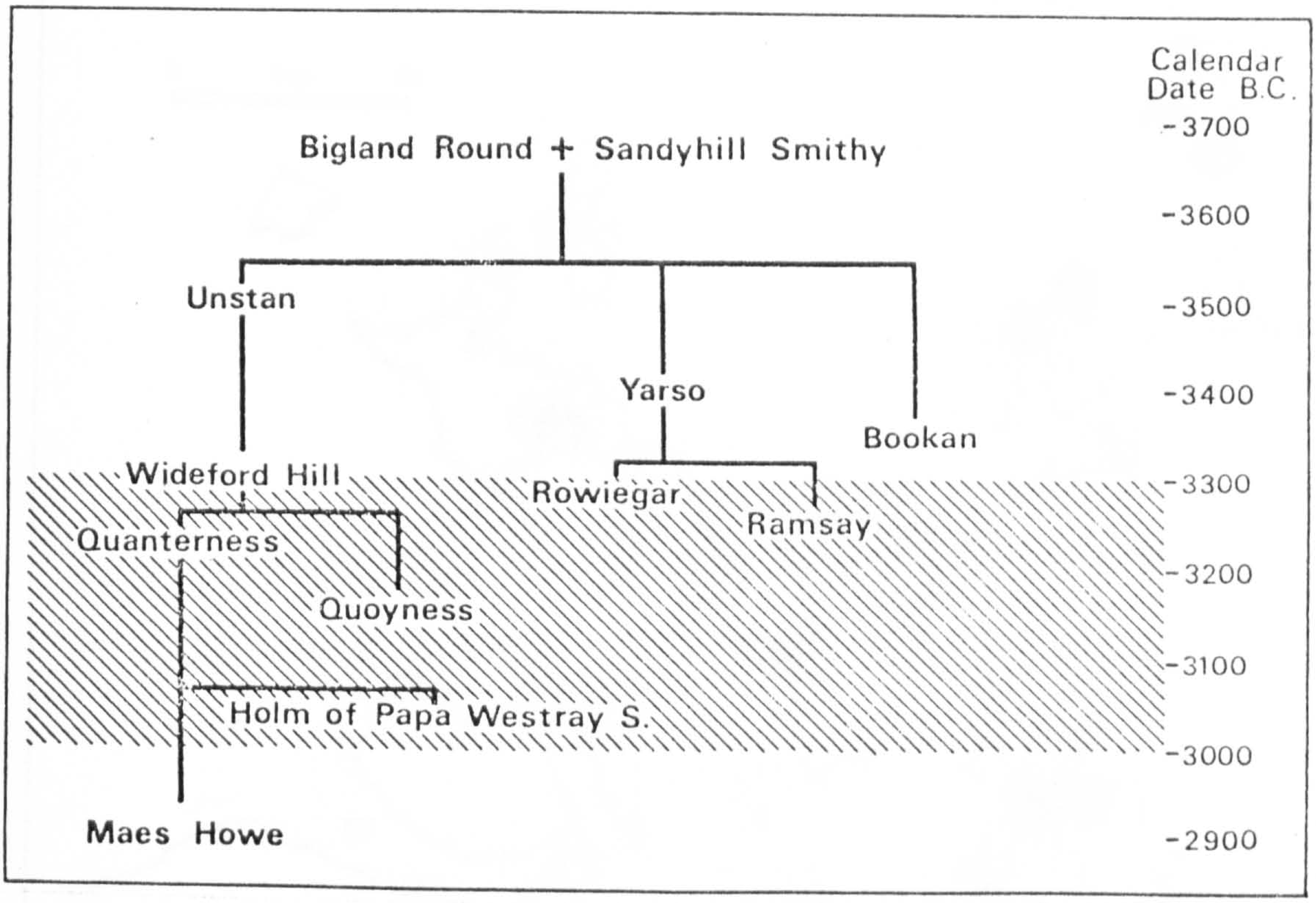


Figure 9.23. Renfrew's suggested evolutionary sequence, with the Unstan ware/Grooved Ware transition indicated by hatching. (from Renfrew, 1979).

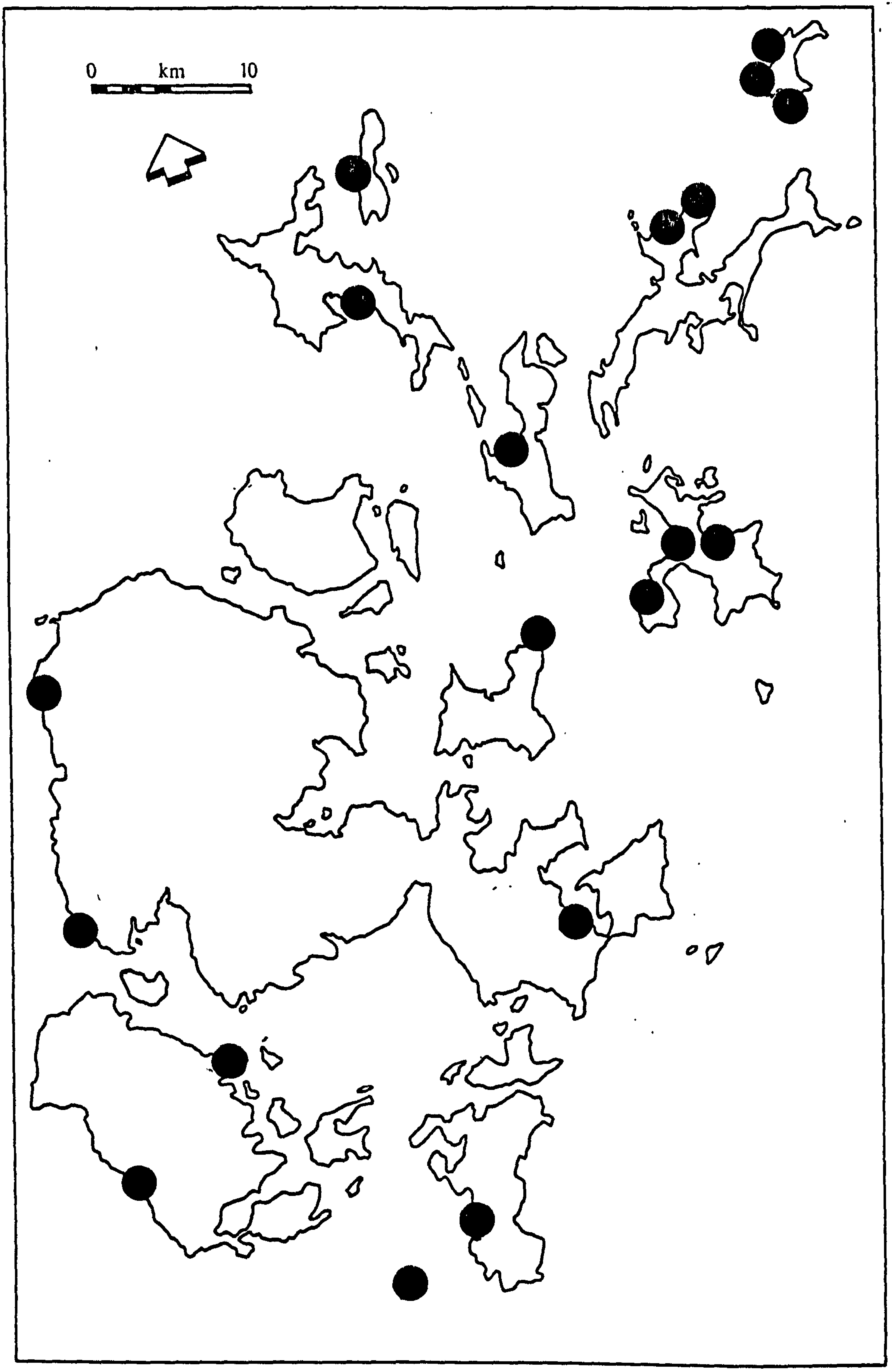


Figure 10.1. Flint and chert sources (after Wickham-Jones and Collins, 1978 and Rae, 1976).

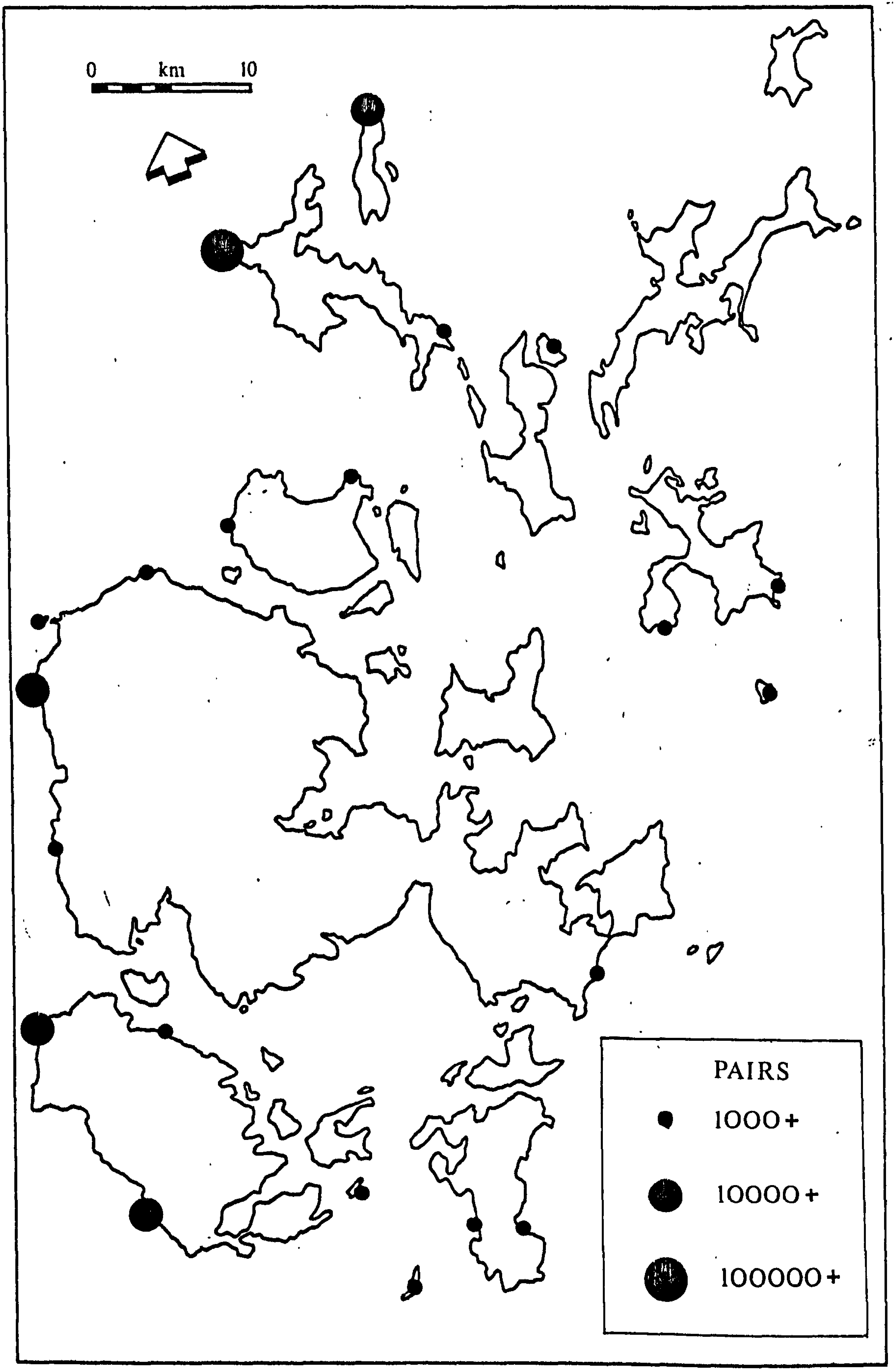


Figure 10.2. Major sea-bird colonies (after Lea and Bourne, 1975).

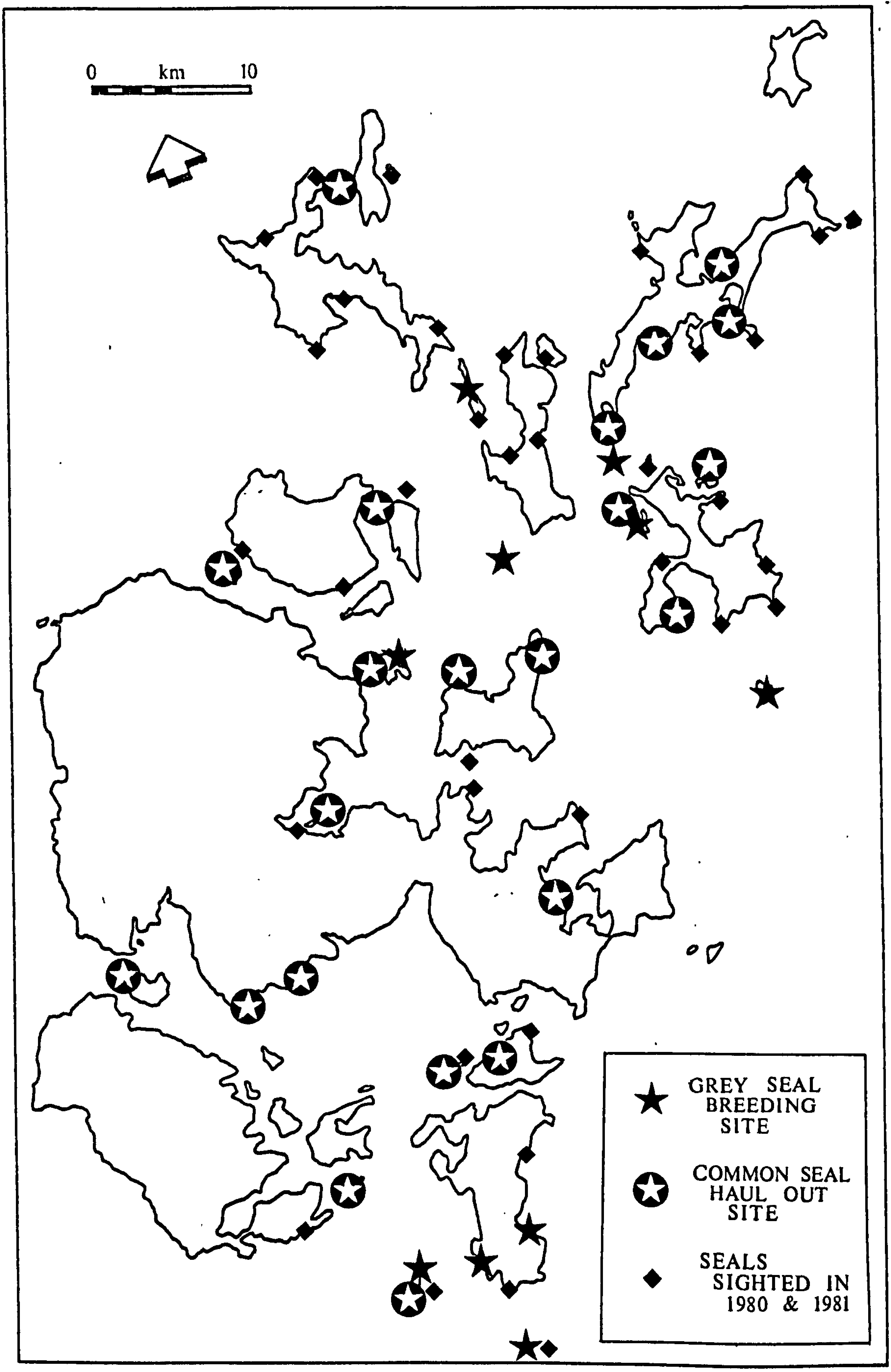


Figure 10.3. Breeding sites of grey seals, haul out sites of common seals (after Vaughan, 1975), and seals sighted in 1980 and 1981.

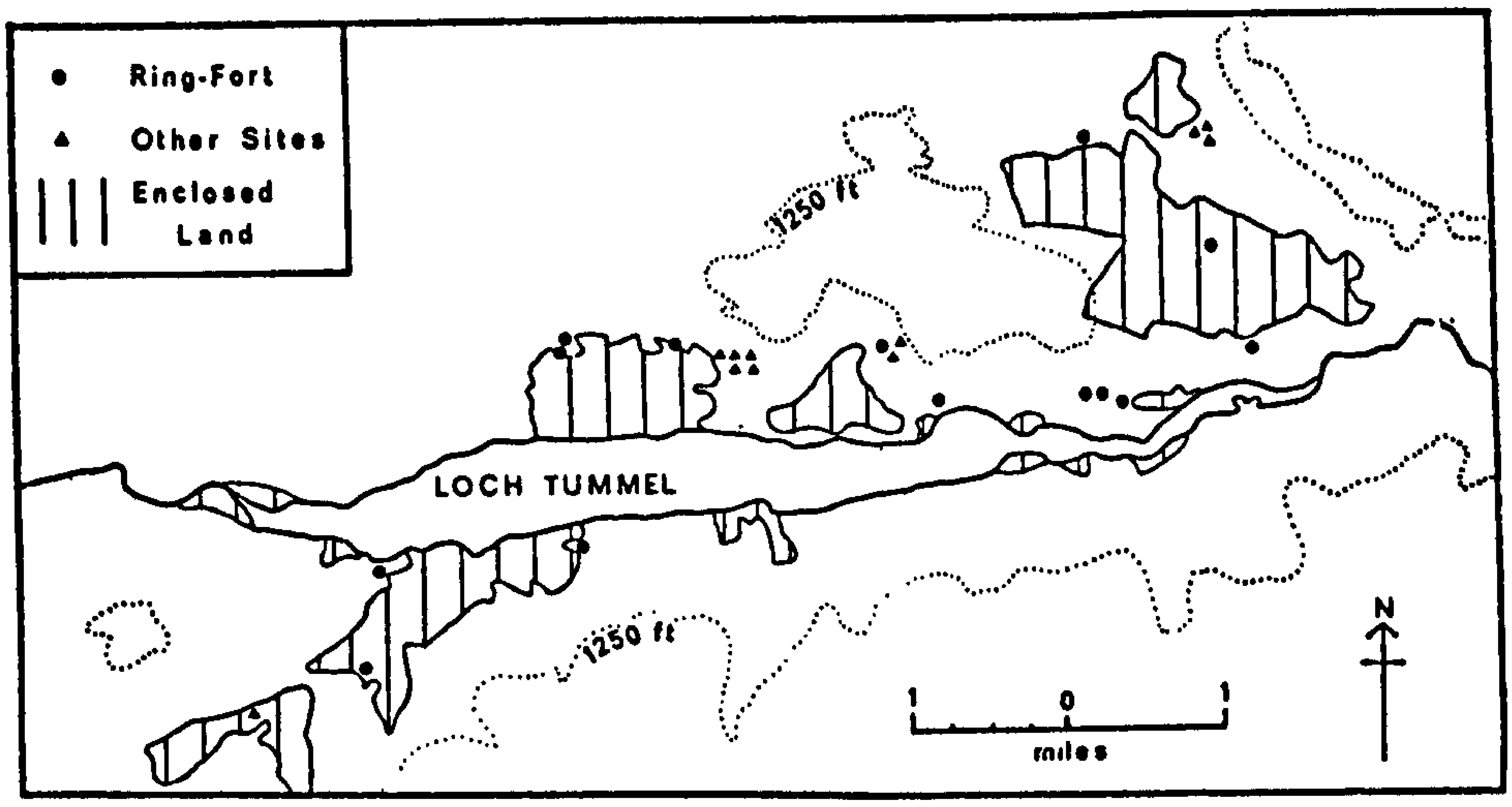


Figure 11.1. Surviving monuments and improved land in Tummelside (from Stevenson, 1975).

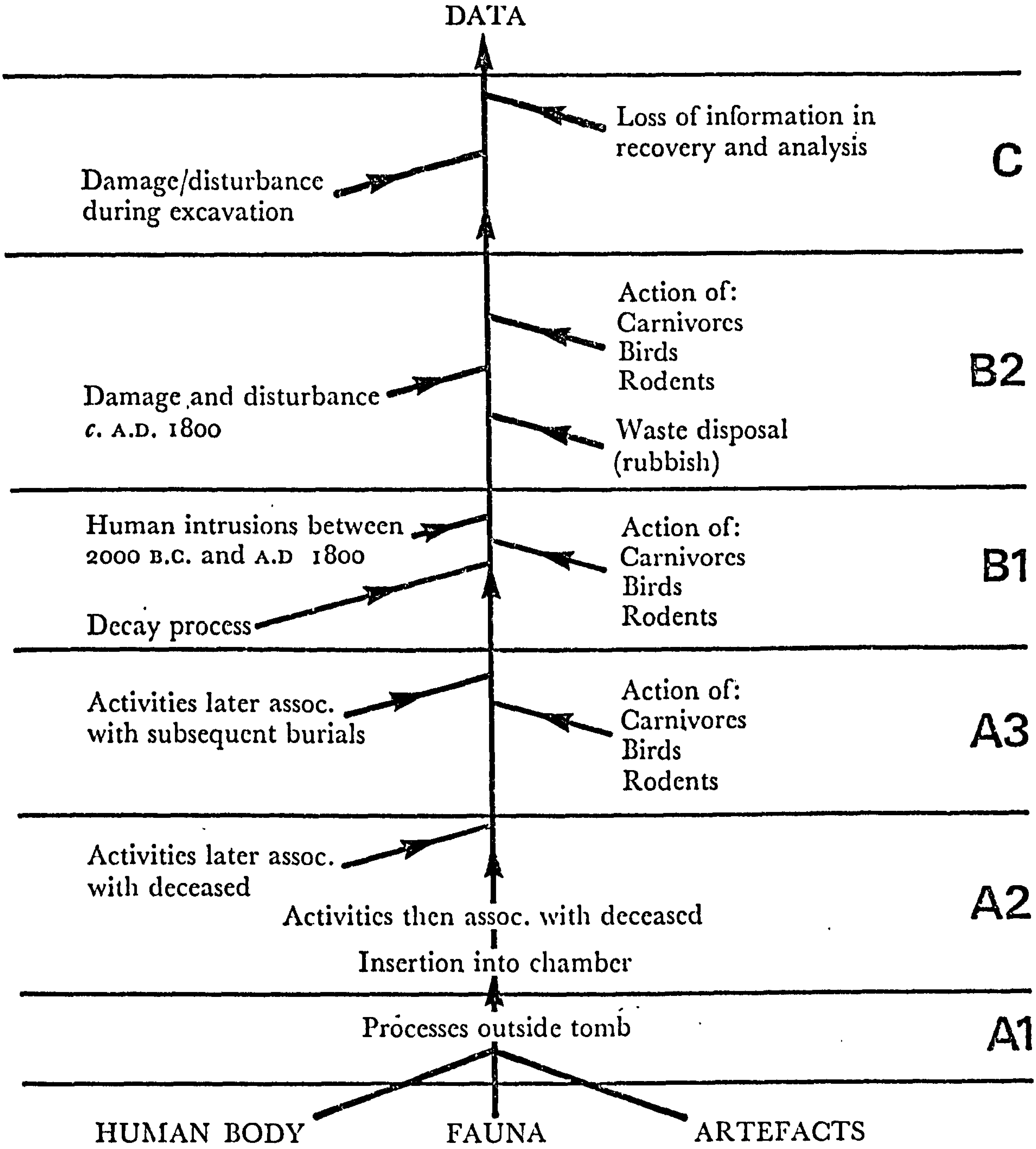


Figure 11.2. Formation processes for archaeological remains (from Renfrew, 1979).

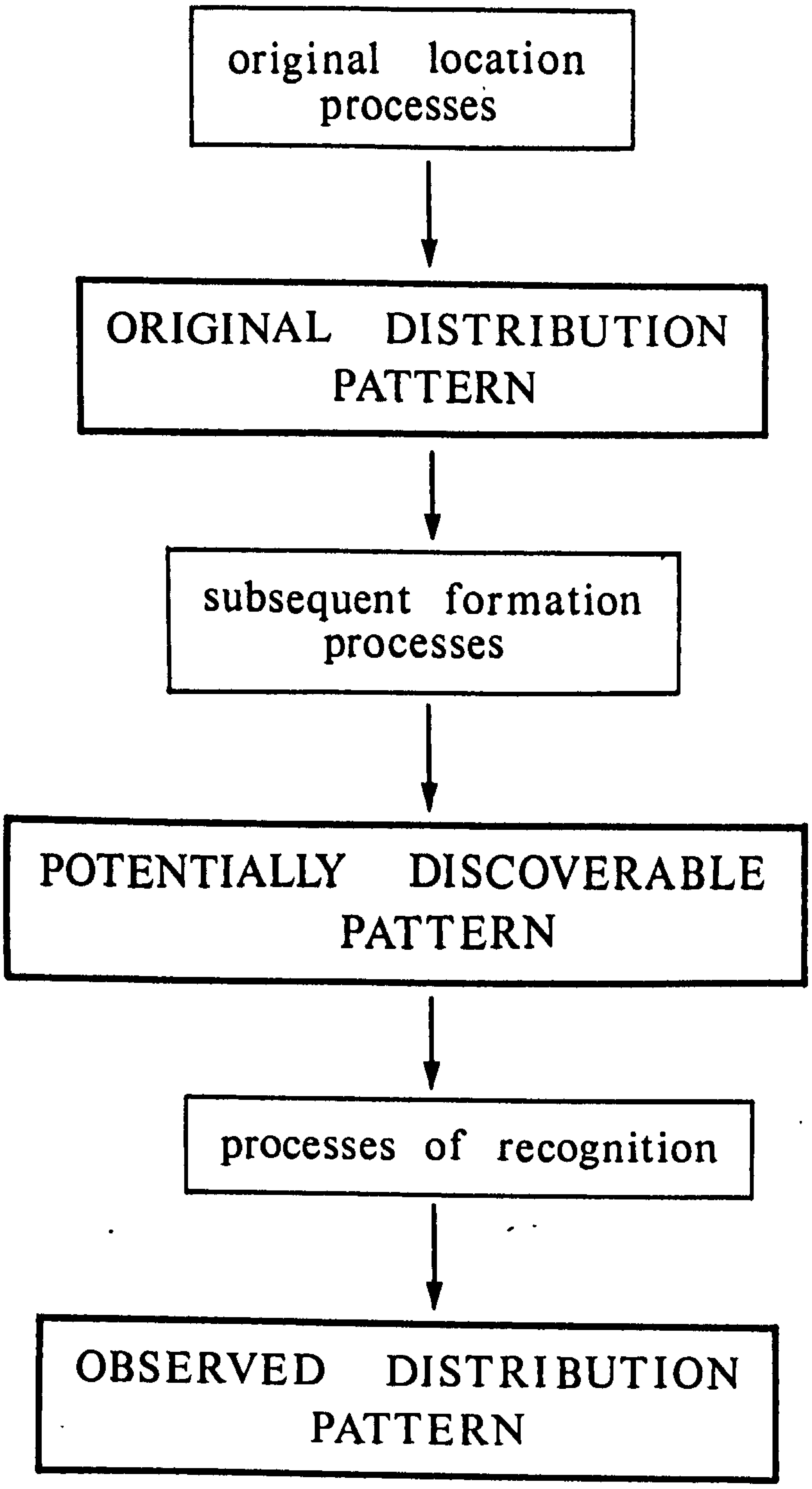


Figure 11.3. The nature of archaeological distribution patterns.

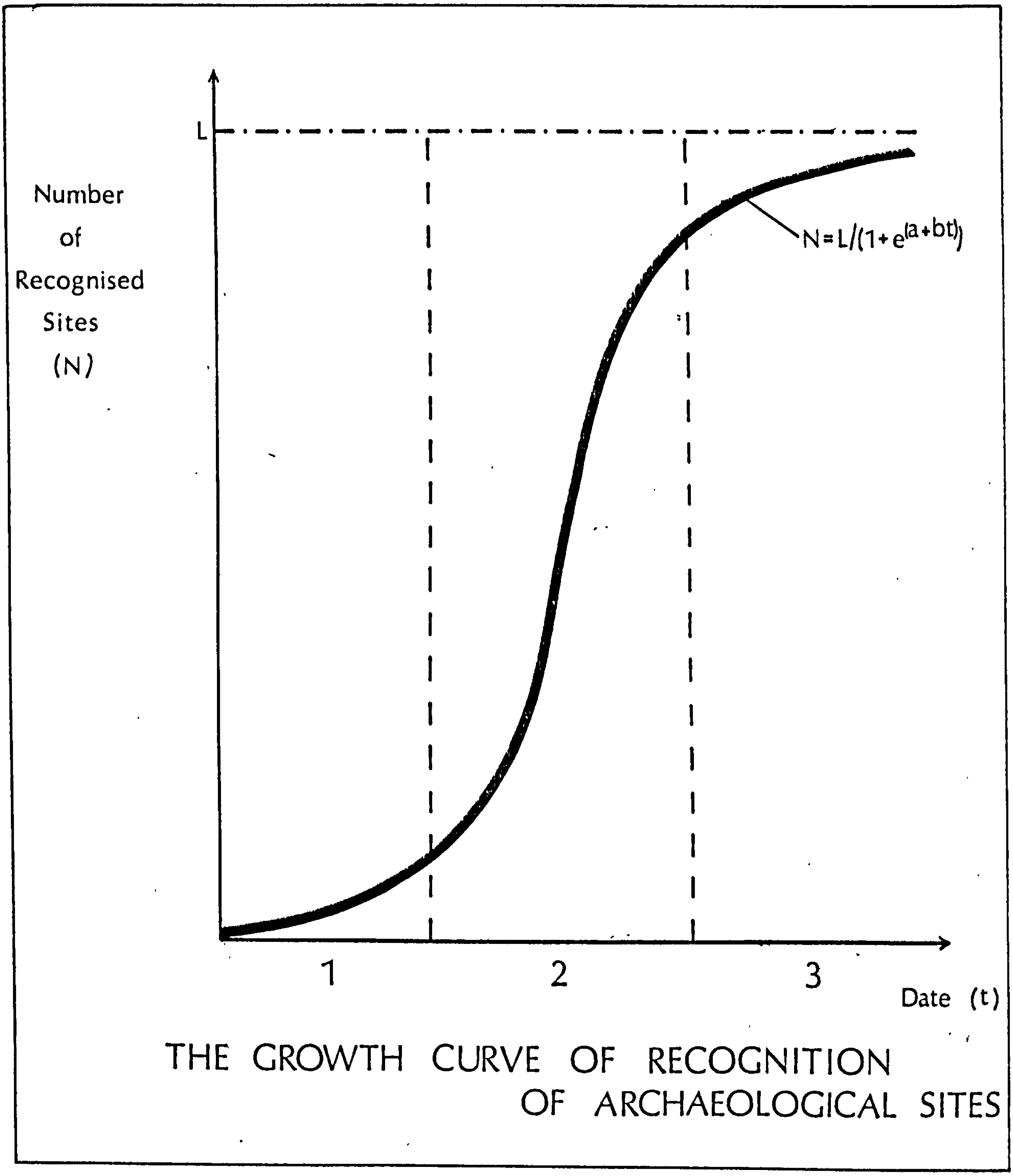


Figure 11.4. The growth curve of recognition of archaeological sites (after Fojut and Fraser, forthcoming).

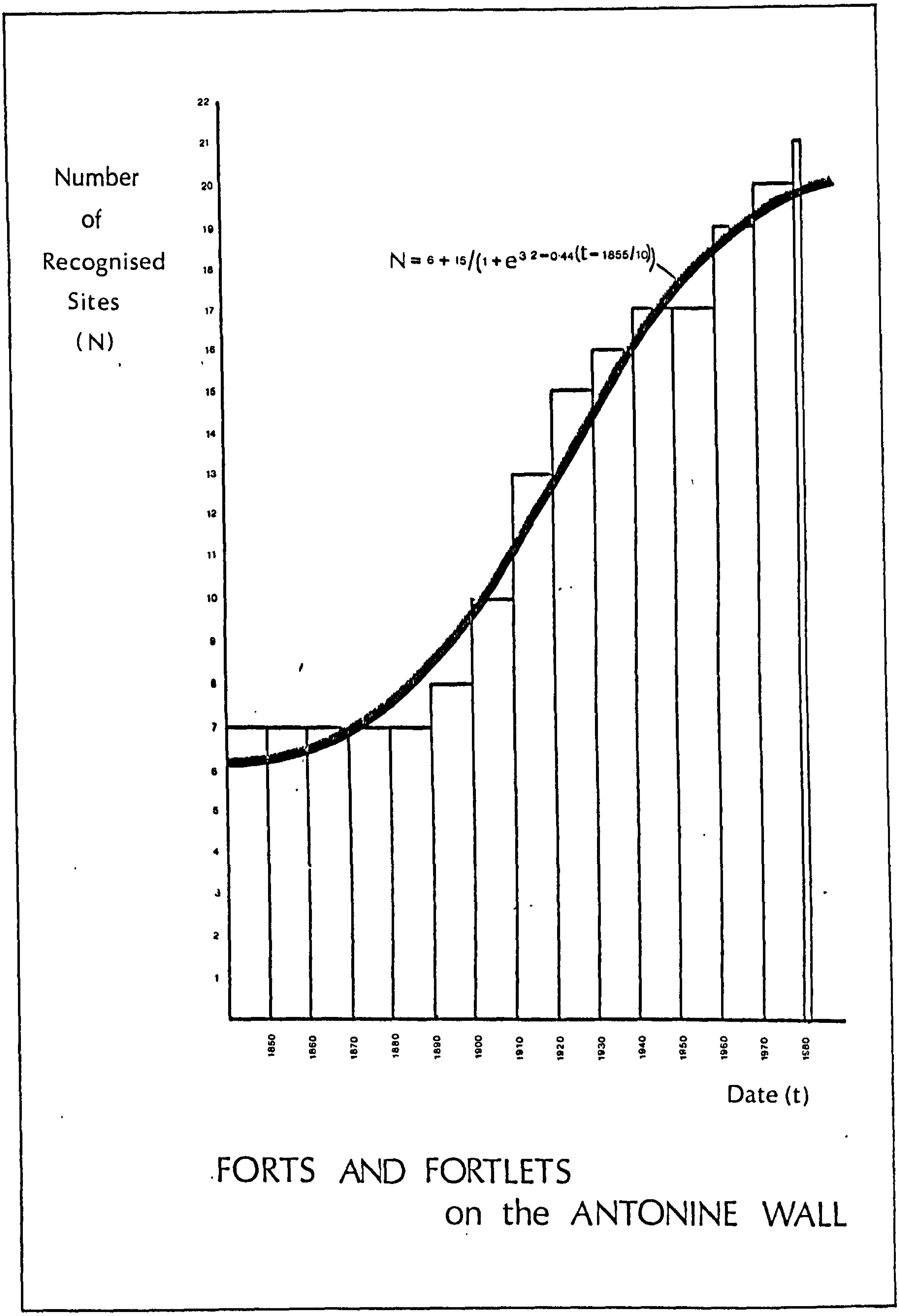


Figure 11.5. Growth curve of recognition: forts and fortlets on the Antonine Wall (after Fojut and Fraser, forthcoming).

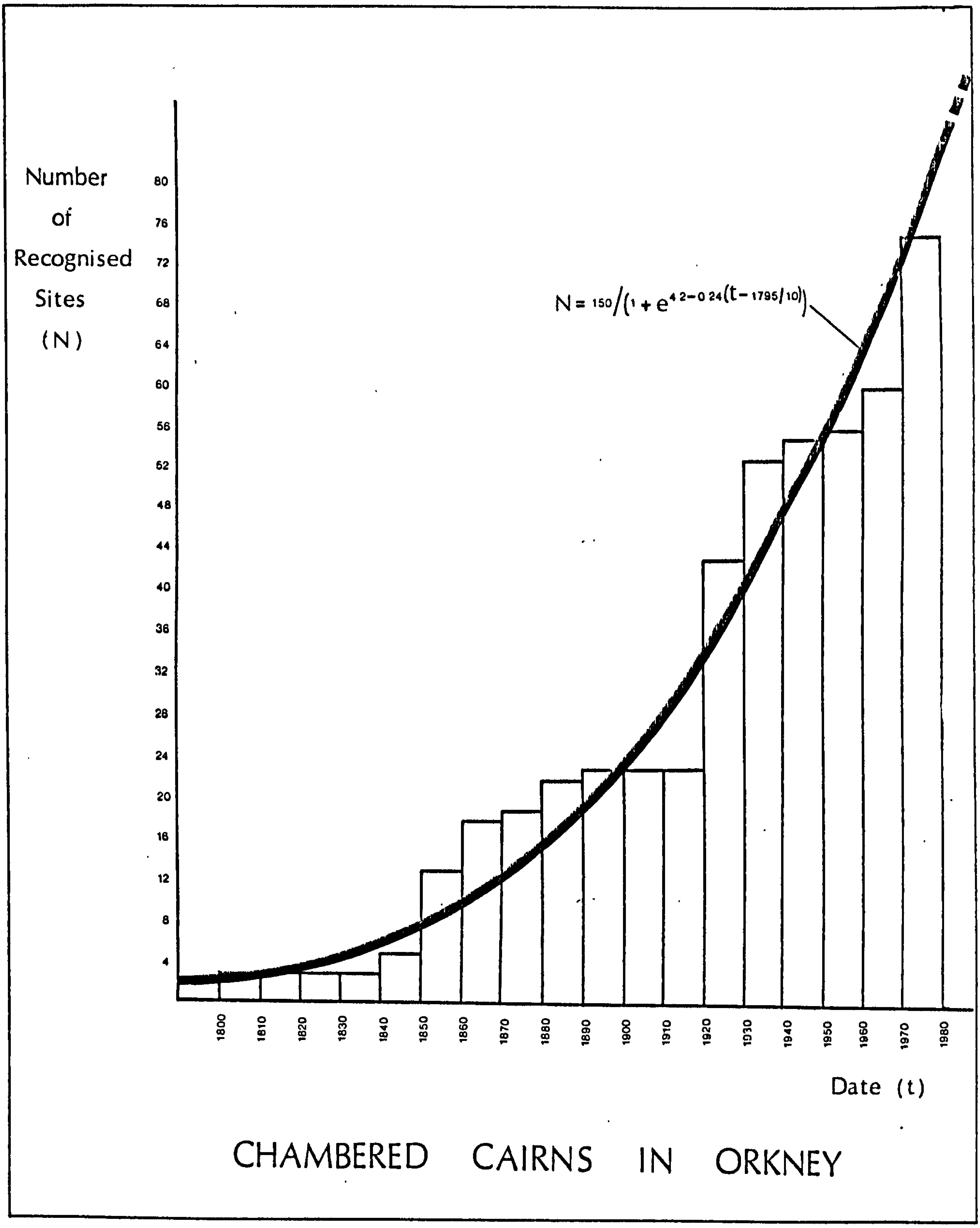


Figure 11.6. Growth curve of recognition: chambered cairns of Orkney (after Fojut and Fraser, forthcoming).

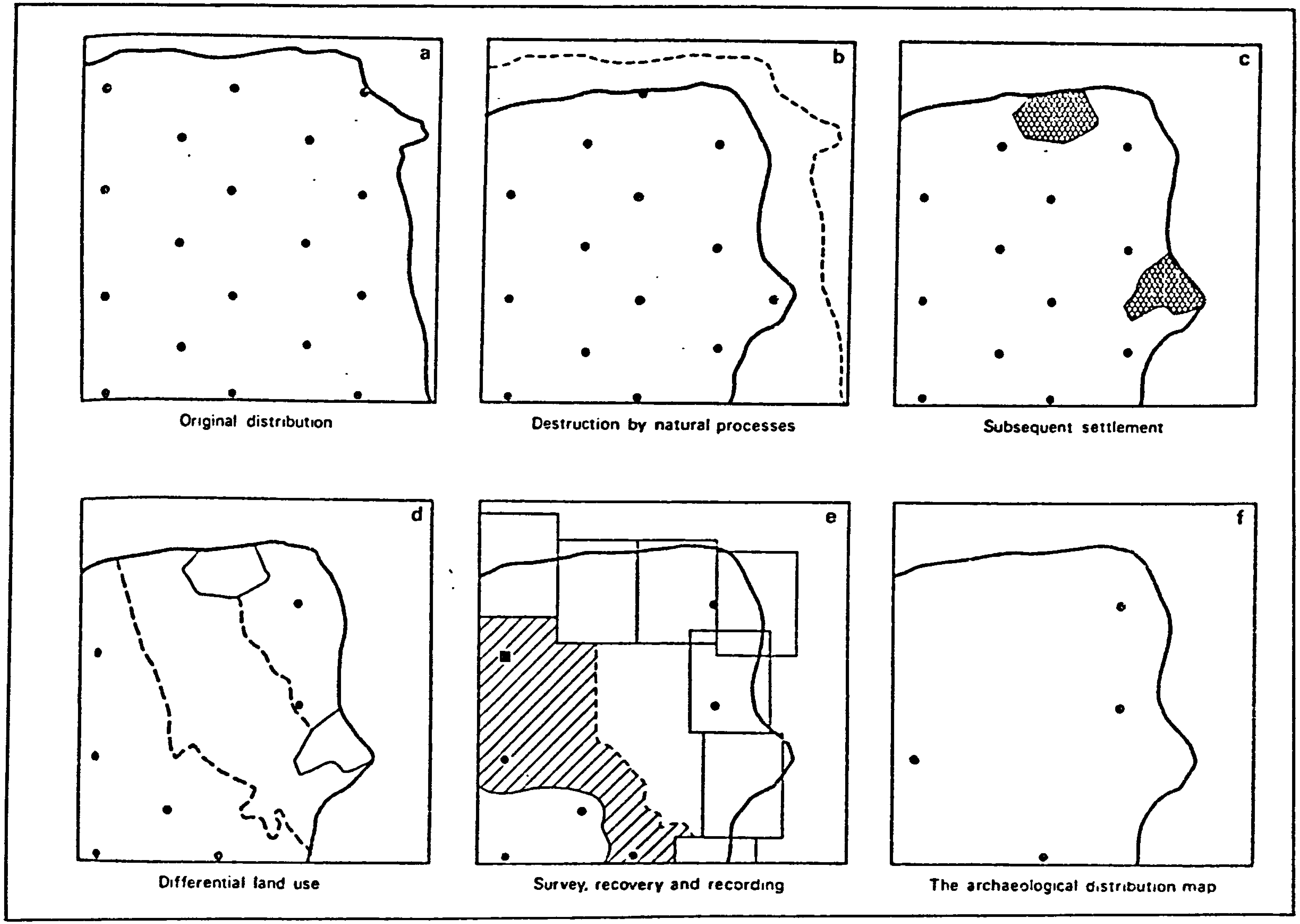


Figure 11.7. Alteration of a prehistoric settlement pattern (after Martlew, 1981).

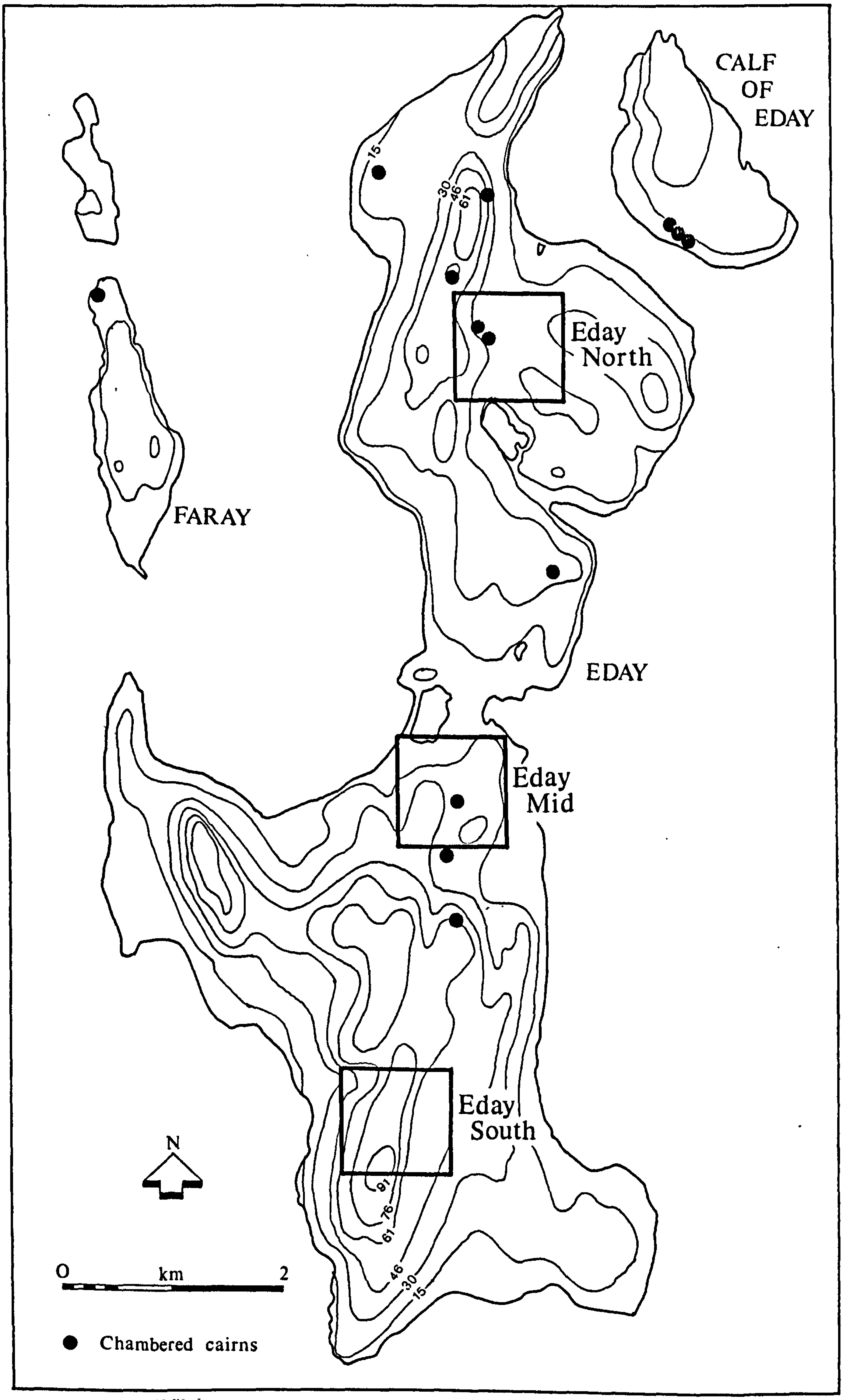


Figure 11.8. The island of Eday, showing areas of study.

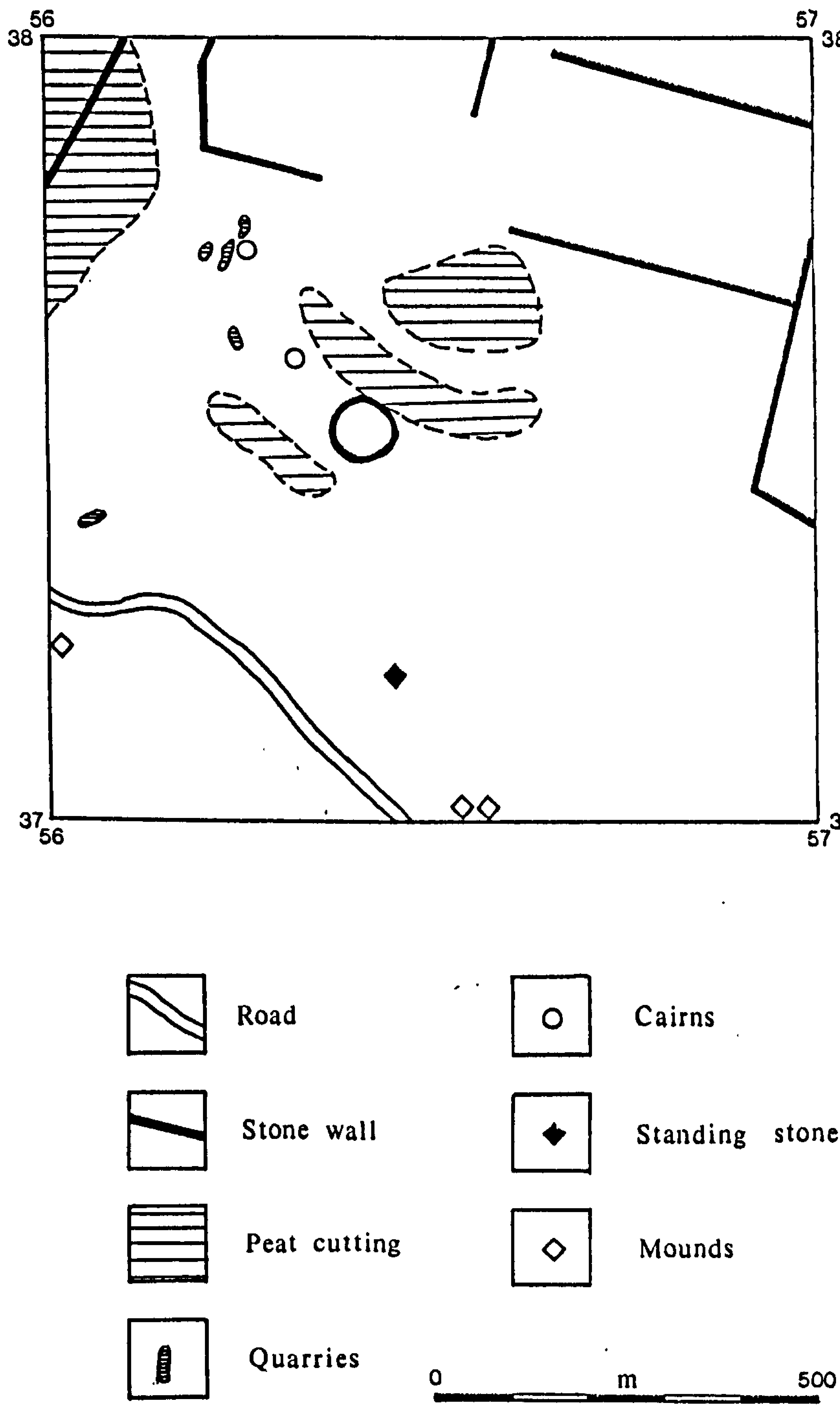


Figure 11.9. Subsequent formation processes: Eday North.

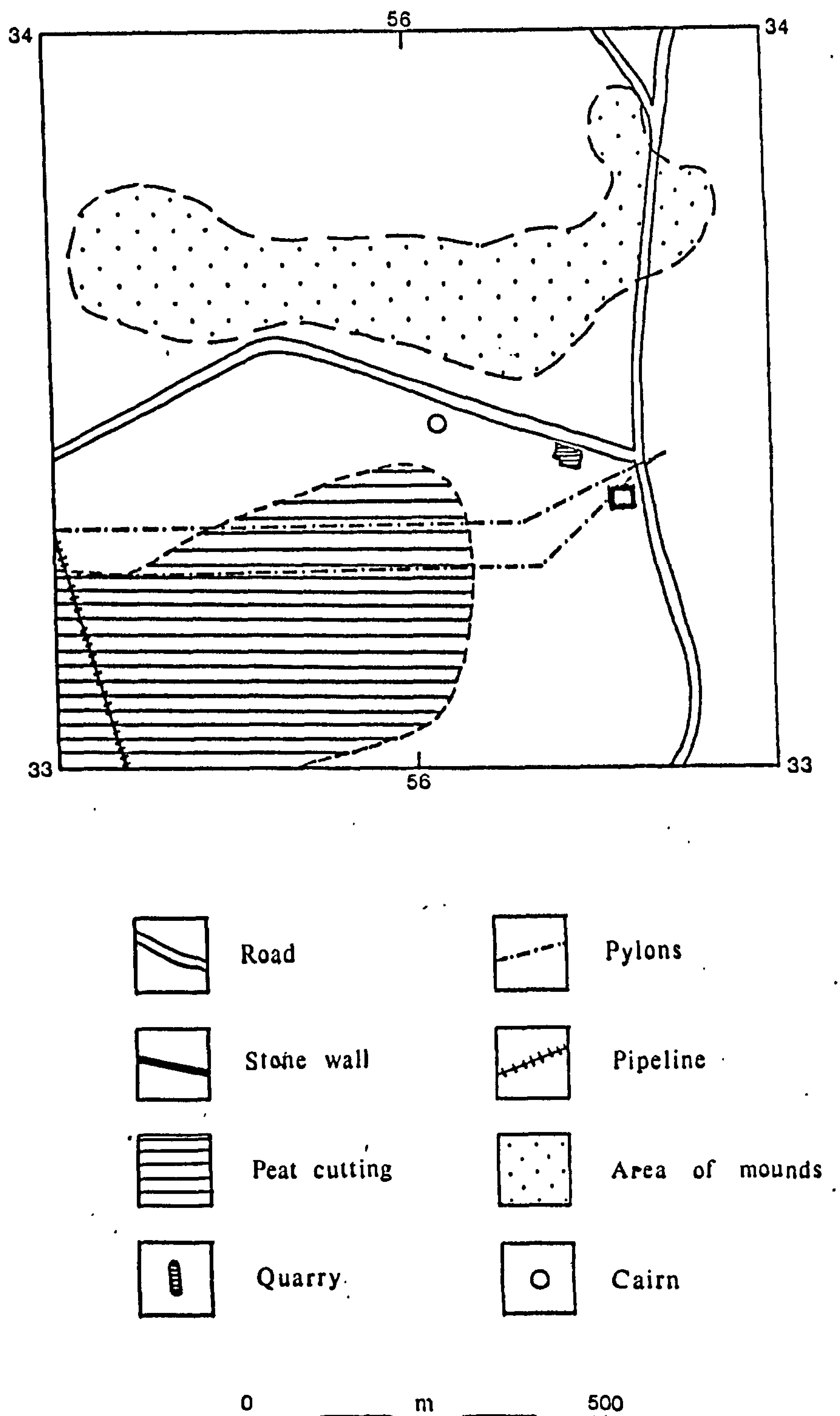


Figure 11.10. Subsequent formation processes: Eday Mid.

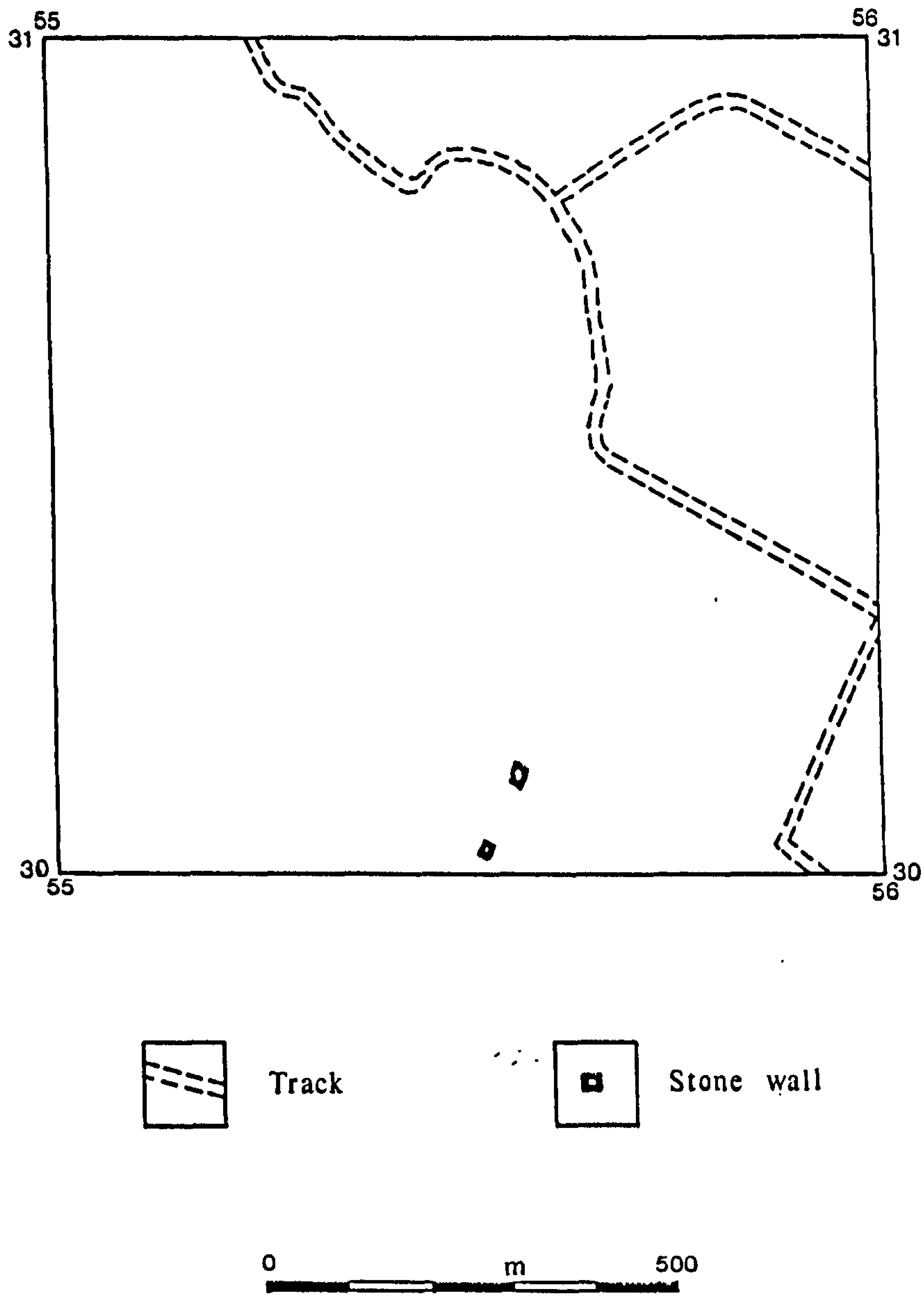


Figure 11.11. Subsequent formation processes: Eday South.

Natural processes	Cultural processes
1. Coastal changes	1. Agricultural activity
a. sea-level changes	a. plant domestication
b. erosion	b. animal domestication
c. deposition	2. Obscuration
2. Climatic and vegetational changes	a. roads
a. growth of peat	b. buildings
	3. Supply of building materials
	4. Cultural attitudes

Table 11.12. List of subsequent formation processes applying in Orkney.

	Westray group	Eday group	Sanday group	Stronsay group	Rousay group	Shap. group	Main-land group	Hoy group	South Ronaldsay group	Totals (%)
Sandstone	40	27	34	12	28	9	139	73	15	377 (39.1)
Peat	0	4	0	2	12	0	91	63	0	172 (17.9)
Boulder Clay	11	4	2	18	15	14	228	21	44	357 (37.1)
Miscellaneous	7	0	19	2	0	1	21	6	1	57 (5.9)
Totals	58	35	55	34	55	24	479	163	60	963 (100.0)

Table 12.1. Geology of Orkney: areal summary by island group (in sq km).

	Cluster I	Cluster II	Cluster III	Clusters IV–VI	Unclustered	Totals	(%)
Sandstone	4	4	24	5	28	65	(85.5)
Peat	0	0	0	1	1	2	(2.6)
Boulder Clay	0	0	1	1	5	7	(9.2)
Miscellaneous	1	0	0	0	1	2	(2.6)
Totals	5	4	25	7	35	76	(99.9)

Table 12.2. Geology: distribution of chambered cairns by cluster.

	Cluster I	Cluster II	Cluster III	Clusters IV-VI	Unclustered	Total	(%)
Sandstone	319	170	1027	204	1359	3079	(64.6)
Peat	7	7	245	88	70	417	(8.7)
Boulder Clay	42	54	279	200	520	1095	(23.0)
Miscellaneous	15	0	71	0	90	176	(3.7)
Totals	383	231	1622	492	2039	4767	(100.0)

Table 12.3. Geology: distribution by inexact classes of chambered cairns by cluster.

Class	Soil Type	Series/Complex
PODZOLS	Podzols	Bilbster Ocklester Boyndie
	Oroarctic podzols	Knitchen Trowieglen
	Peaty podzols	Stromness Millfield Camster Warth Flaughton Dunnet Rackwick
PODZOLIC COMPLEXES		Croval Sordale Ulbster Frotoft Warehouse Cuilags Scarsa Whitefowl Hill Vow Randie Ford of Hoy
GLEYS	Noncalcareous gleys	Midgarth Thurso Ness Tresdale Hunster Gaira
	Calcareous gley	Whitelinks
	Saline gleys	Fletts Mousland Gessan
	Peaty gleys	Lynedardy Olrig Canisbay Dalespot
GLEYIC COMPLEXES		Eskishold Huntis Aglath Heilen
PEAT	Basin and valley peat Blanket peat	
MISCELLANEOUS	Brown calcareous soil	Fraserburgh
	Peaty brown soil	Tomtain
	Skeletal soils	Thurso Dunnet Fraserburgh
	Alluvial soils	Innes Lochside Peat-alluvium Alluvium
	Links	Dornoch Eigie Morrich

Table 12.4. Soils of Orkney: classification by series and complex

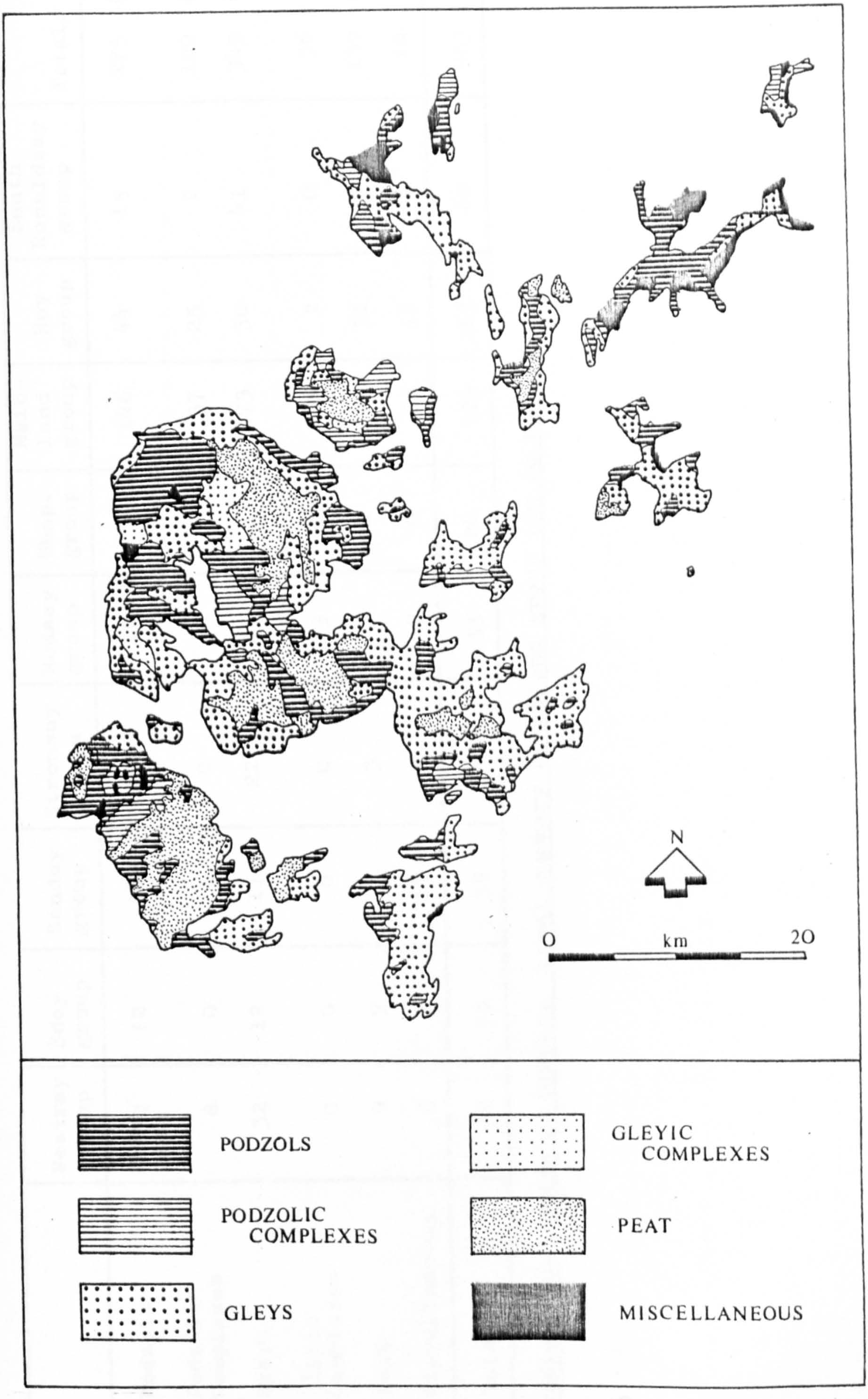


Figure 12.5. Soils of Orkney: distribution of soil groups.

	Westray group	Eday group	Sanday group	Stronsay group	Rousay group	Shap. group	Main-land group	Hoy group	South Ronaldsay group	Totals	(%)
Podzols	12	12	26	7	10	3	146	44	15	275	(28.6
Podzolic Complexes	8	0	1	0	19	8	37	25	2	100	(10.4
Gleys	32	12	11	22	15	13	173	30	41	349	(36.3
Gleyic Complexes	0	0	0	0	3	0	31	2	0	36	(3.7
Peat	0	9	0	3	8	0	67	51	1	139	(14.4
Miscellaneous	6	2	17	2	0	0	25	11	1	64	(6.6
Totals	58	35	55	34	55	24	479	163	60	963	(100.0

Table 12.6. Soils of Orkney: areal summary by island group (in sq km).

	Cluster I	Cluster II	Cluster III	Clusters IV-VI	Unclustered	Totals	(%)
Podzols	1	1	12	5	18	37	(48.7)
Podzolic complexes	3	1	7	1	6	18	(23.7)
Gleys	1	2	5	1	9	18	(23.7)
Gleyic complexes	0	0	0	0	1	1	(1.3)
Peat	0	0	1	0	1	2	(2.6)
Miscellaneous	0	0	0	0	0	0	(0.0)
Totals	5	4	25	7	35	963	(100.0)

Table 12.7. Soils: distribution of chambered cairns by cluster.

	Cluster I	Cluster II	Cluster III	Clusters IV-VI	Unclustered	Totals	(%)
Podzols	69	74	506	233	692	1574	(32.9)
Podzolic complexes	232	58	325	99	345	1059	(22.1)
Gleys	66	92	399	124	664	1345	(28.1)
Gleyic complexes	8	4	80	0	144	236	(4.9)
Peat	4	3	269	52	119	447	(9.4)
Miscellaneous	3	0	42	0	78	123	(2.6)
Totals	382	231	1621	508	2042	4784	(100.0)

Table 12.8. Soils: distribution by inexact classes of chambered cairns by cluster.

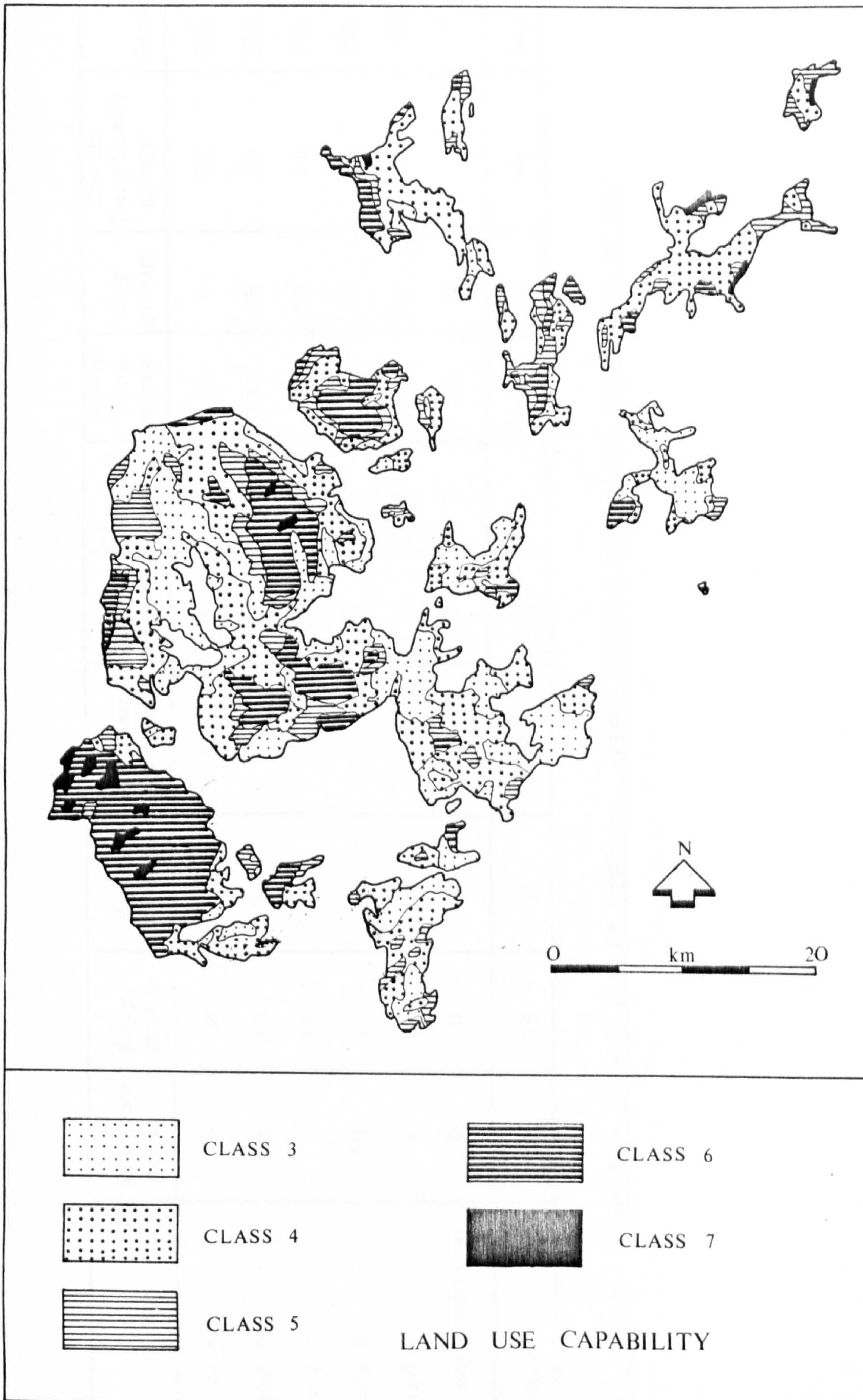


Figure 12.9. Land Use Capability of Orkney: distribution of classes

	Westray group	Eday group	Sanday group	Stronsay group	Rousay group	Shap. group	Main-land group	Hoy group	South Ronaldsay group	Totals	(%)
Class 3	6	2	0	20	4	9	159	6	18	224	(23.3)
Class 4	33	10	37	6	14	12	151	26	29	318	(33.0)
Class 5	8	11	11	5	15	1	71	12	11	145	(15.1)
Class 6	10	11	3	3	20	2	83	104	1	237	(24.6)
Class 7	1	1	4	0	2	0	4	11	1	24	(2.5)
No information	0	0	0	0	0	0	11	4	0	15	(1.5)
Totals	58	35	55	34	55	24	479	163	60	963	(100.0)

Table 12.10. Land Use Capability of Orkney: areal summary by island group (in sq km).

	Cluster I	Cluster II	Cluster III	Clusters IV-VI	Unclustered	Totals	(%)
Class 3	0	0	5	1	5	11	(14.5)
Class 4	4	1	6	2	12	25	(32.9)
Class 5	0	3	8	3	10	24	(31.6)
Class 6	1	0	6	1	8	16	(21.0)
Class 7	0	0	0	0	0	0	(0.0)
No information	0	0	0	0	0	0	(0.0)
Totals	5	4	25	7	35	76	(100.0)

Table 12.11. Land Use Capability: distribution of chambered cairns by cluster.

	Cluster I	Cluster II	Cluster III	Clusters IV-VI	Unclustered	Totals	(%)
Class 3	35	32	237	163	375	842	(17.6)
Class 4	132	69	407	142	779	1529	(32.0)
Class 5	95	59	354	133	529	1170	(24.5)
Class 6	121	70	599	70	360	1220	(25.5)
Class 7	0	2	17	0	6	23	(0.4)
No information	0	0	0	0	0	0	(0.0)
Totals	383	230	1614	508	2049	4784	(100.0)

Table 12.12. Land Use Capability: distribution by inexact classes of chambered cairns by cluster.

	Cluster I	Cluster II	Cluster III	Clusters IV-VI	Unclustered	Totals	(%)
Valley bottom	2	1	4	1	2	10	(13.2)
Coastal plain	2	1	7	0	8	18	(23.7)
Terrace edge	1	1	3	0	5	10	(13.2)
Small island/ peninsula	0	1	4	2	6	13	(17.1)
Hill slope	0	0	4	3	8	15	(19.7)
Hill top	0	0	1	1	4	6	(7.9)
Ridge top	0	0	0	0	2	2	(2.6)
Promontory end	0	0	2	0	0	2	(2.6)
Totals	5	4	25	7	35	76	(100.0)

Table 12.13. Topography: distribution of chambered cairns by cluster.

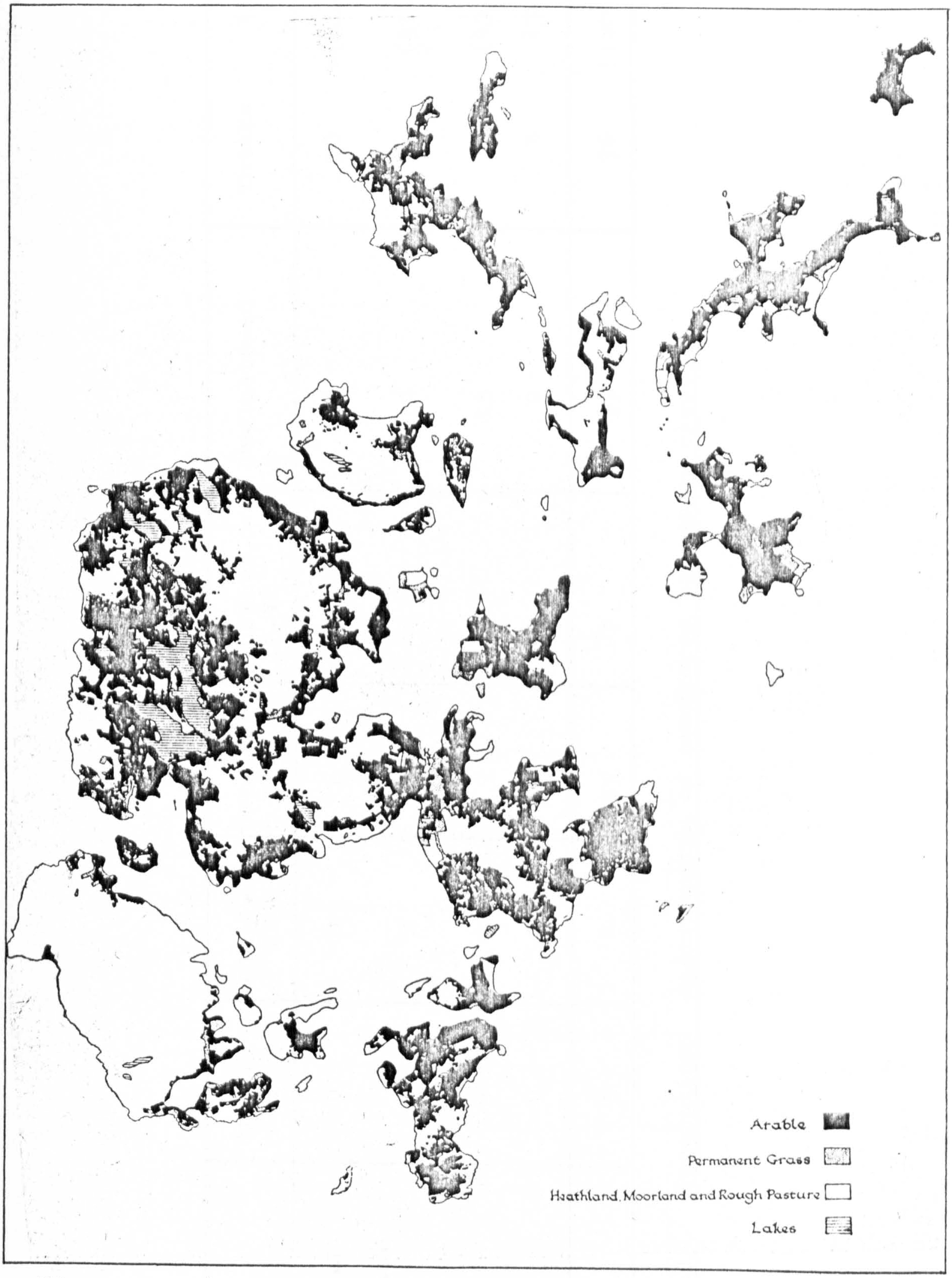


Figure 12.14. Improved land in Orkney (from O'Dell, 1939).

	Cluster I	Cluster II	Cluster III	Clusters IV–VI	Unclustered	Totals	(%)
Heathland	0	0	6	2	8	16	(21.1)
Unimproved pasture	1	2	9	2	10	24	(31.6)
Improved pasture	4	2	9	3	15	33	(43.4)
Arable	0	0	1	0	2	3	(3.9)
Totals	5	4	25	7	35	76	(100.0)

Table 12.15. Vegetation: distribution of chambered cairns by cluster.

Altitude (m)	Westray group	Eday group	Sanday group	Stronsay group	Rousay group	Shap. group	Main-land group	Hoy group	South Ronaldsay group	Totals	(%)
0-46	49	28	55	34	25	23	276	63	45	598	(62.1)
47-91	6	7	0	0	9	1	126	26	15	190	(19.7)
92-137	2	0	0	0	10	0	54	17	0	83	(8.6)
138-183	1	0	0	0	6	0	21	17	0	45	(4.7)
184-229	0	0	0	0	4	0	2	14	0	20	(2.1)
230-274	0	0	0	0	1	0	0	11	0	12	(1.2)
275-320	0	0	0	0	0	0	0	9	0	9	(0.7)
321-366	0	0	0	0	0	0	0	4	0	4	(0.4)
367+	0	0	0	0	0	0	0	2	0	2	(0.2)
Totals	58	35	55	34	55	24	479	163	60	963	(99.9)

Table 12.16. Absolute altitude of Orkney: areal summary by island group (in sq km).

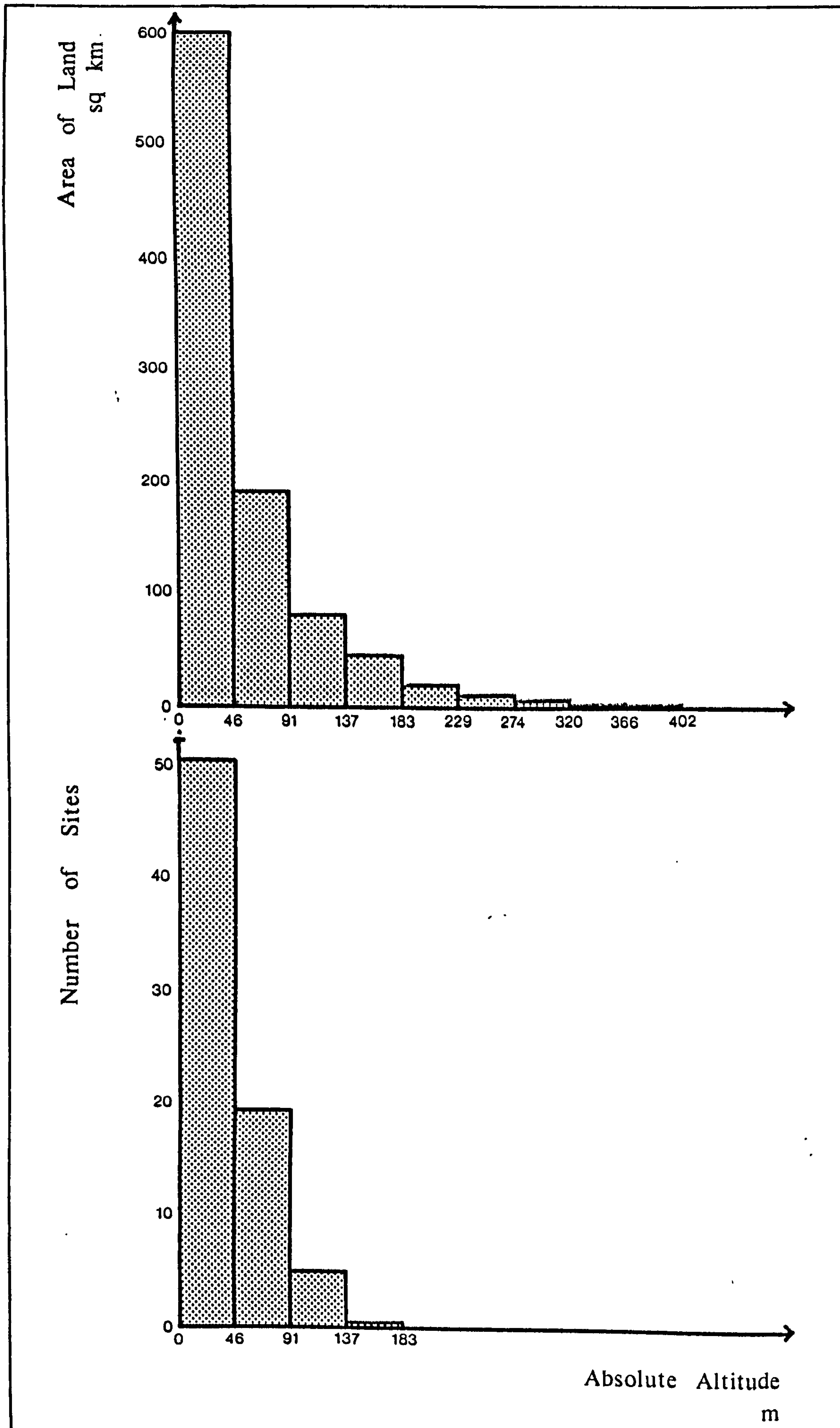


Figure 12.17. Absolute altitude: distribution of altitude classes and distribution of chambered cairns.

	Minimum m	Maximum m	Mean m	Standard deviation	Skewness
All cairns	5	180	37.6	35.3	1.49
Cluster I	5	60	25.0	21.8	1.27
Cluster II	5	28	18.3	9.6	-1.05
Cluster III	5	180	41.2	43.2	1.02
Clusters IV-VI	5	120	50.9	42.0	0.61

Absolute altitude

	Minimum m	Maximum m	Mean m	Standard deviation	Skewness
All cairns	3	100	50.5	30.0	0.40
Cluster I	3	29	15.6	12.2	0.32
Cluster II	12	100	37.8	42.0	1.87
Cluster III	10	100	39.0	23.6	0.62
Clusters IV-VI	23	100	61.1	25.5	-0.03

Relative altitude

Table 12.18. Absolute altitude and relative altitude: statistics by cluster.

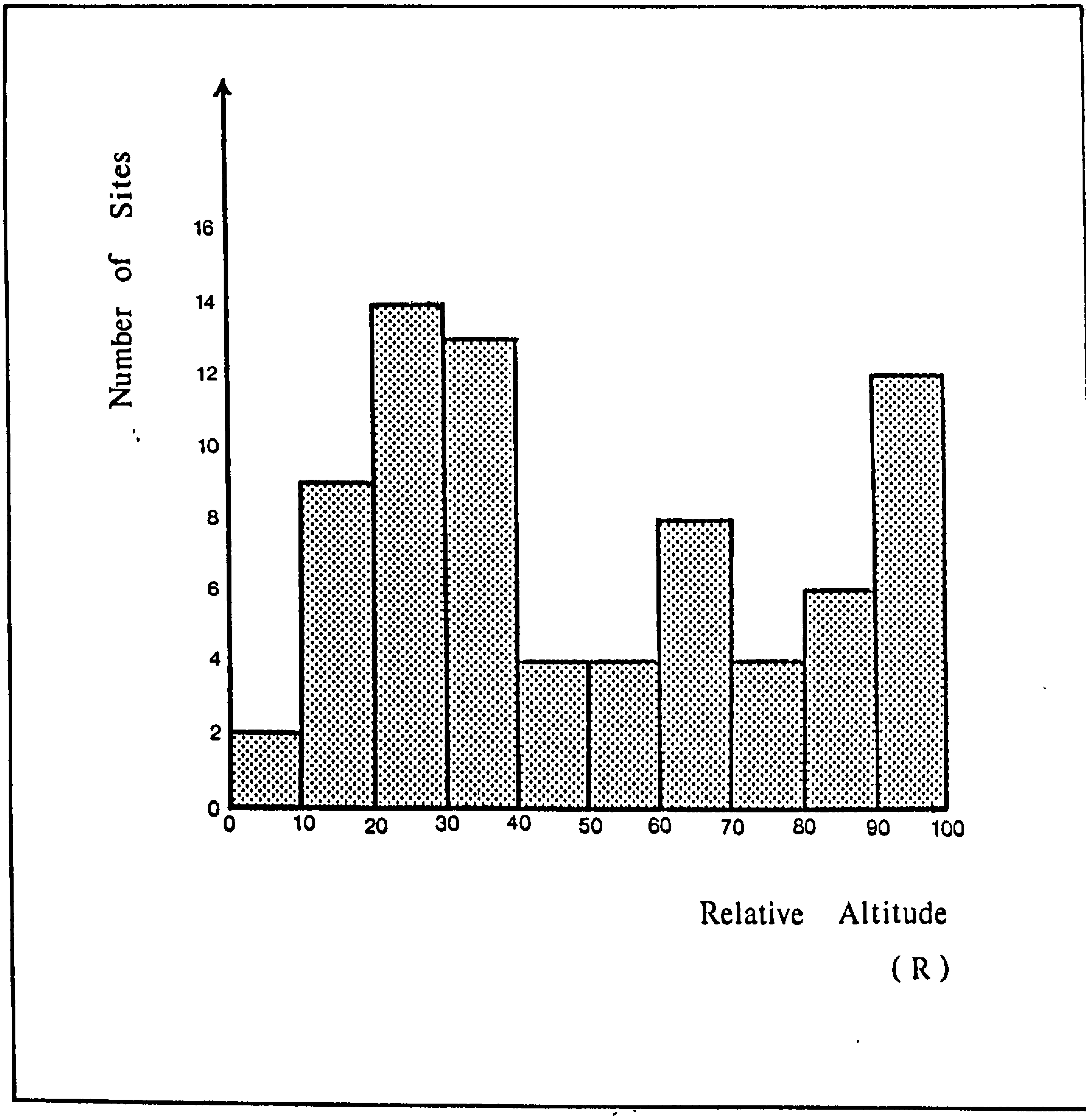


Figure 12.19. Relative altitude: distribution of cnambered cairns.

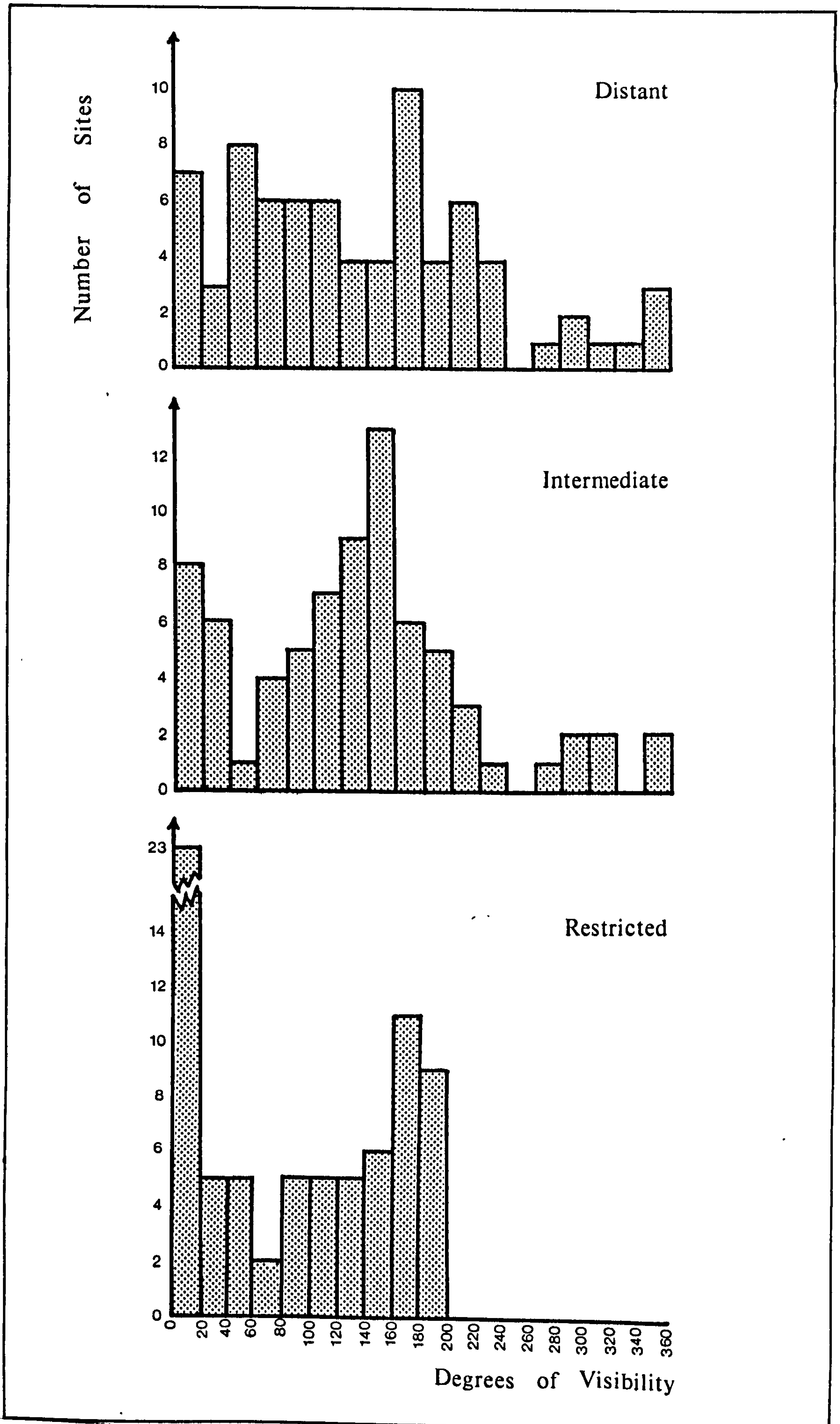


Figure 12.20. Visibility: sum total of degrees of visibility by class.

	Distant				Intermediate				Restricted			
	Min	Max	Mean	S.D.	Min	Max	Mean	S.D.	Min	Max	Mean	S.D.
All cairns	0	360	137	91	0	360	132	87	0	199	89	74
Cluster I	12	180	70	65	29	328	217	125	0	199	73	95
Cluster II	13	192	131	69	31	180	105	70	0	177	125	73
Cluster III	0	331	110	84	0	360	137	94	0	195	107	70
Clusters IV-VI	0	360	134	121	0	360	144	122	0	192	85	85

Table 12.21. Visibility - distant, intermediate and restricted: statistics by cluster.

	Cluster I	Cluster II	Cluster III	Clusters IV-VI	Unclustered	Totals	(%)
Poor	0	0	1	0	0	1	(1.3)
Fair	3	1	6	1	1	12	(15.8)
Good	2	3	18	6	34	63	(82.9)
Totals	5	4	25	7	35	76	(100.0)

Table 12.22. Drainage: distribution of chambered cairns by cluster.

	Cluster I	Cluster II	Cluster III	Clusters IV-VI	Unclustered	Totals	(%)
Difficult	0	0	0	0	0	0	(0.0)
Restricted	1	0	5	1	2	9	(11.2)
Easy	4	4	20	6	33	67	(88.2)
Totals	5	4	25	7	35	76	(100.0)

Table 12.23. Approaches: distribution of chambered cairns by cluster.

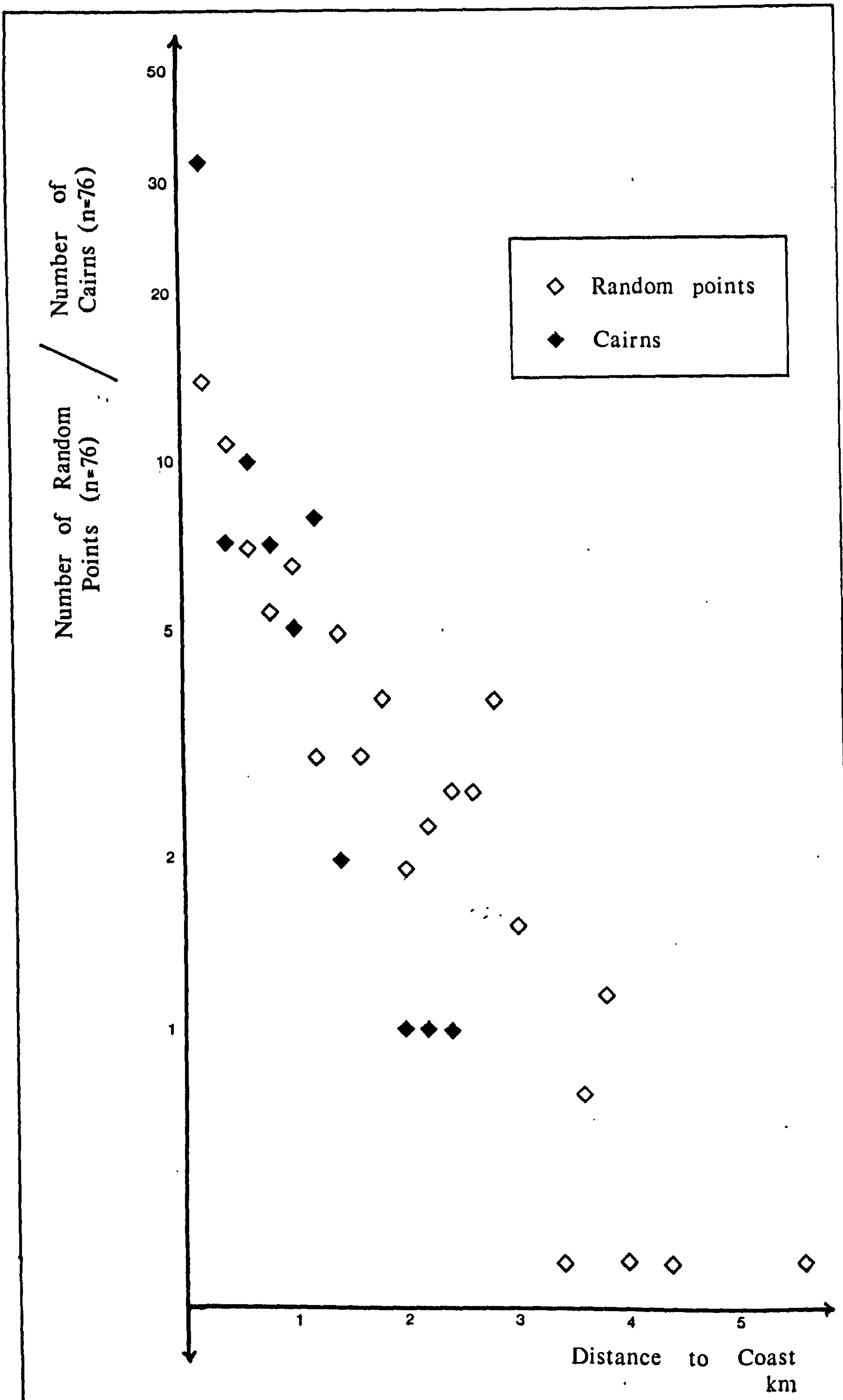


Figure 12.24. Distance to nearest coast: curve of littorality.

	Minimum m	Maximum m	Mean m	Standard deviation
All cairns	0	2220	465	504
Cluster I	40	1200	484	431
Cluster II	40	980	360	213
Cluster III	20	1210	391	78
Clusters IV-IV	30	1900	684	243

Table 12.25. Distance to nearest coast: statistics by cluster.

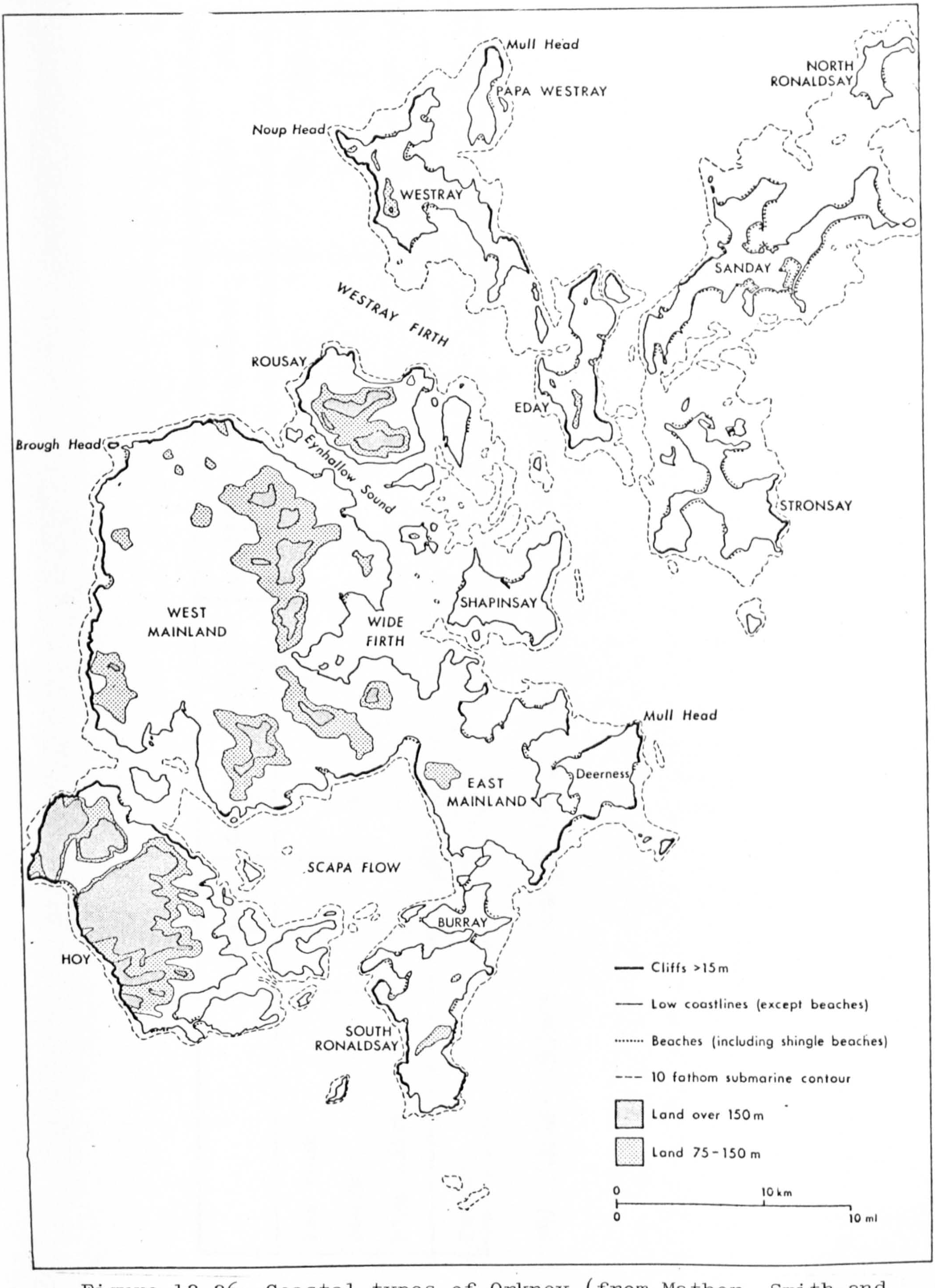


Figure 12.26. Coastal types of Orkney (from Mather, Smith and Ritchie, 1975).

	Cluster I	Cluster II	Cluster III	Clusters IV-VI	Unclustered	Totals	(%)
Low rock	3	4	18	6	22	53	(69.7)
Beach	0	0	0	0	1	1	(1.3)
High cliff	2	0	7	1	12	22	(28.9)
Totals	5	4	25	7	35	76	(99.9)

Table 12.27. Nature of nearest coast: distribution by cluster.

Variable	Mean	Standard deviation
WATER	37.05	31.69
GEOSS	40.51	27.13
GEOPT	5.48	11.95
GEOBC	14.40	18.05
GEOMI	2.31	4.80
SOIPZ	20.73	20.10
SOIPC	13.93	23.76
SOIGL	17.69	14.81
SOIGC	3.10	12.30
SOIPT	5.88	12.44
SOIMI	1.60	3.85
LUCC3	11.11	15.23
LUCC4	20.05	15.23
LUCC5	15.31	15.99
LUCC6	15.84	19.14
LUCC7	0.30	1.07
ALTAB	37.61	35.29
ALTRE	50.47	30.02
COAST	464.60	503.84
VISID	136.93	91.43
VISII	132.67	86.61
VISIR	89.31	74.67

Table 12.28. Principal Components Analysis: statistics for all variables.

Factor	Eigenvalue	Percentage of variance	Cumulative variance
1	5.155	23.4	23.4
2	3.073	14.0	37.4
3	2.330	10.6	48.0
4	1.966	8.9	56.9
5	1.772	8.1	65.0
6	1.651	7.5	72.5
7	1.244	5.7	78.2
8	0.964	4.4	82.5
9	0.798	3.6	86.2
10	0.675	3.1	89.2
11	0.517	2.4	91.6
12	0.457	2.1	93.7
13	0.430	2.0	95.6
14	0.279	1.3	96.9
15	0.205	0.9	97.8
16	0.183	0.8	98.7
17	0.176	0.8	99.5
18	0.095	0.4	99.9
19	0.013	0.1	100.0
20	0.004	0.0	100.0
21	0.001	0.0	100.0
22	0.000	0.0	100.0

Table 12.29. Principal Components Analysis: eigenvalues and variance.

Variable	Communality
WATER	0.974
GEOSS	0.868
GEOPT	0.870
GEOBC	0.782
GEOMI	0.776
SOIPZ	0.639
SOIPC	0.813
SOIGL	0.609
SOIGC	0.816
SOIPT	0.904
SOIMI	0.772
LUCC3	0.690
LUCC4	0.798
LUCC5	0.797
LUCC6	0.876
LUCC7	0.491
ALTAB	0.830
ALTRE	0.633
COAST	0.776
VISID	0.875
VISII	0.781
VISIR	0.813

Table 12.30. Principal Components Analysis: communalities for seven-factor solution.

	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	Factor 7
WATER	-0.930	-0.291	0.025	0.011	0.039	-0.086	-0.119
GEOSS	0.794	-0.159	0.205	-0.242	-0.148	-0.022	0.298
GEOPT	0.389	-0.134	-0.733	0.324	0.146	0.186	-0.036
GEOBC	0.133	0.811	0.063	0.237	-0.101	0.026	-0.184
GEOMI	0.123	0.053	0.285	-0.469	0.644	0.189	-0.074
SOIPZ	0.295	0.558	-0.046	0.315	0.236	0.020	0.287
SOIPC	0.441	-0.119	0.095	-0.480	-0.564	0.183	0.112
SOIGL	0.218	0.417	0.316	0.101	0.010	0.325	-0.413
SOIGC	0.388	-0.291	0.164	0.067	0.005	-0.737	0.069
SOIPT	0.347	-0.122	-0.768	0.228	0.311	0.169	0.000
SOIMI	0.213	-0.066	0.163	-0.170	0.801	0.029	0.152
LUCC3	0.165	0.703	-0.010	-0.221	-0.061	-0.221	-0.258
LUCC4	0.254	0.599	0.294	-0.181	0.003	0.361	0.351
LUCC5	0.692	-0.184	0.134	-0.006	0.202	-0.471	0.045
LUCC6	0.611	-0.388	-0.383	-0.021	-0.172	0.411	0.072
LUCC7	0.355	-0.292	0.322	-0.027	-0.093	0.345	-0.218
ALTAB	0.784	-0.166	0.140	0.345	-0.216	-0.010	0.032
ALTRE	-0.079	-0.094	0.333	0.678	-0.109	-0.034	0.181
COAST	0.826	0.198	0.115	0.147	0.089	0.103	0.019
VISID	-0.210	-0.466	0.487	0.499	0.131	0.311	0.106
VISII	-0.279	0.506	-0.399	-0.304	-0.143	-0.178	0.377
VISIR	0.572	-0.065	-0.104	-0.265	0.015	-0.166	-0.610

Table 12.31. Principal Components Analysis: factor loadings for seven-factor solution. (Loadings in excess of |0.50| are underlined).

Factor	Eigenvalue	Percentage of variance	Cumulative variance
1	6.174	28.1	28.1
2	3.142	14.3	42.3
3	2.912	13.2	55.6
4	2.400	10.9	66.5
5	1.815	8.3	74.8
6	1.537	7.0	81.7
7	0.959	4.4	86.1
8	0.826	3.8	89.9
9	0.753	3.4	93.3
10	0.483	2.2	95.5
11	0.290	1.3	96.8
12	0.196	0.9	97.7
13	0.179	0.8	98.5
14	0.135	0.6	99.1
15	0.090	0.4	99.5
16	0.062	0.3	99.8
17	0.035	0.2	100.0
18	0.001	0.0	100.0
19	0.000	0.0	100.0
20	0.000	0.0	100.0
21	0.000	0.0	100.0
22	-0.000	-0.0	100.0

Table 12.32. Principal Components Analysis, cluster III: eigenvalues and variances.

Variable	Communality
WATER	0.976
GEOSS	0.887
GEOPT	0.894
GEOBC	0.897
GEOMI	0.522
SOIPZ	0.750
SOIPC	0.762
SOIGL	0.731
SOIGC	0.767
SOIPT	0.972
SOIMI	0.841
LUCC3	0.849
LUCC4	0.922
LUCC5	0.829
LUCC6	0.945
LUCC7	0.780
ALTAB	0.843
ALTRE	0.649
COAST	0.866
VISID	0.795
VISII	0.764
VISIR	0.732

Table 12.33 Principal Components Analysis, cluster III: communalities for six-factor solution.

	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6
WATER	-0.868	0.049	-0.422	0.129	0.112	0.117
GEOSS	0.862	0.204	0.030	-0.132	-0.202	-0.209
GEOPT	0.264	-0.758	0.215	-0.326	-0.288	0.132
GEOBC	0.030	0.490	0.689	0.064	0.421	0.034
GEOMI	-0.121	-0.083	0.070	0.666	0.160	-0.165
SOIPZ	-0.056	0.212	0.585	-0.324	-0.361	-0.354
SOIPC	0.719	0.019	-0.292	-0.155	0.174	-0.324
SOIGL	0.165	0.653	0.166	0.245	-0.115	0.420
SOIGC	0.467	-0.249	-0.453	-0.224	0.418	-0.239
SOIPT	0.171	-0.809	0.436	0.014	-0.179	0.256
SOIMI	0.067	-0.326	0.413	0.684	0.233	0.193
LUCC3	-0.275	0.248	0.359	-0.511	0.566	-0.033
LUCC4	0.147	0.516	0.232	0.094	-0.576	-0.489
LUCC5	0.607	-0.095	0.507	0.439	-0.052	0.013
LUCC6	0.814	-0.467	-0.040	-0.195	-0.083	0.131
LUCC7	0.761	0.330	-0.217	0.042	0.019	0.209
ALTAB	0.818	0.081	-0.108	-0.309	0.201	0.142
ALTRE	0.345	0.372	0.188	-0.350	0.215	0.433
COAST	0.821	0.108	0.386	0.129	0.113	0.004
VISID	0.342	0.288	-0.557	0.213	-0.307	0.381
VISII	-0.600	-0.158	0.435	-0.428	0.035	0.073
VISIR	0.383	-0.226	-0.058	0.372	0.432	-0.454

Table 12.34. Principal Components Analysis, cluster III: factor loadings for six-factor solution. (Loadings in excess of |0.50| are underlined).

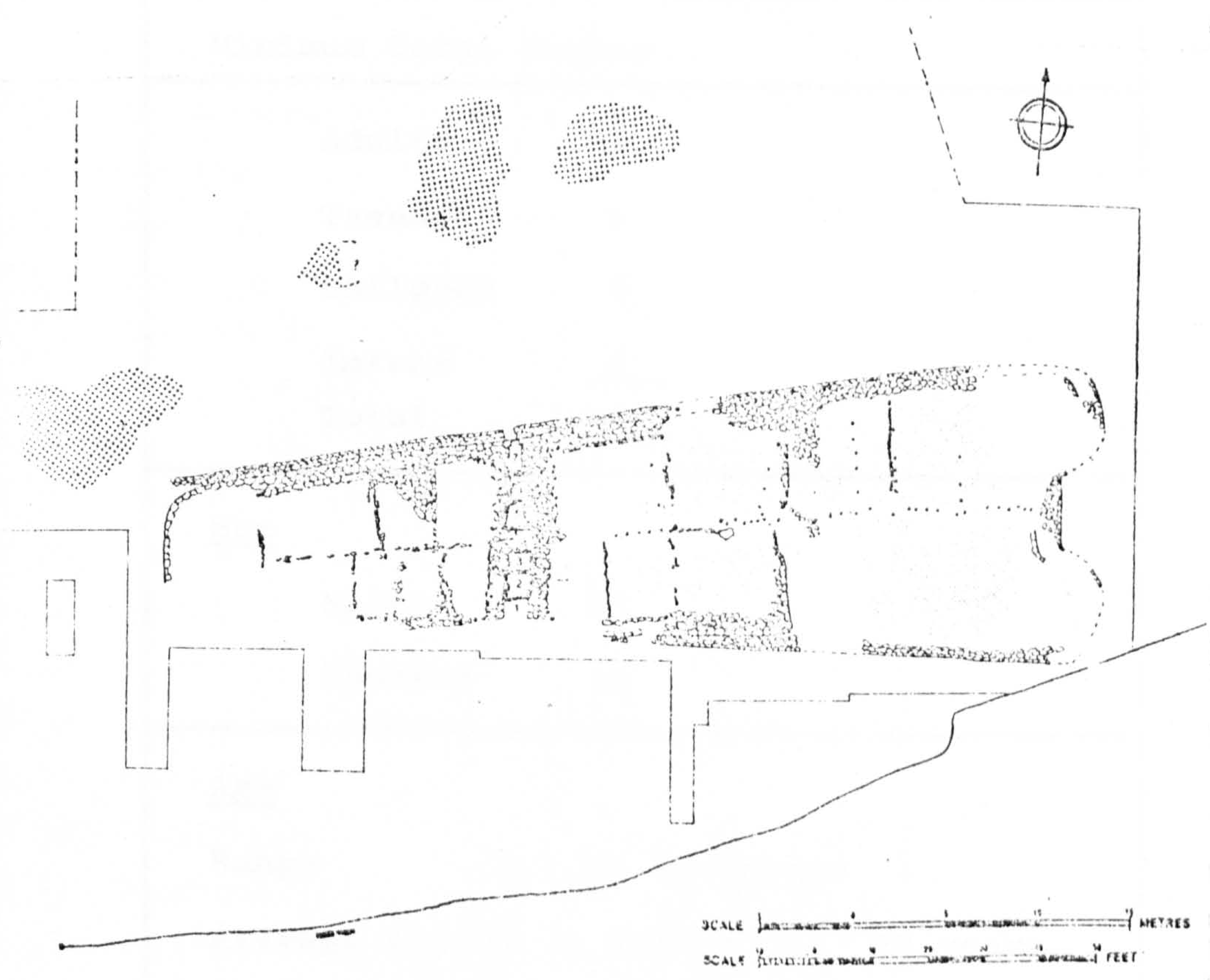


Figure 13.1. Ascott-under-Wychwood long barrow (from Chesterman, 1977)

Minimum Total Number		
Adults	41	
Teenager	1	
Children	6	
Infant	1	
Total	49	
Sex		
Males	13	
Females	15	
Age		
Range	< 1 to 45+ years	
Average age of 46 bodies		23 years
Average age of 13 males		26 years
Average age of 15 females		27 1/2 yrs

Table 13.2. Human burials at Ascott-under-Wychwood (after Chesterman, 1977)

		Male	Female	Uncertain	Total
ORK 3	Blackhammer	2			2
ORK 4	Bookan			*	*
ORK 7	Burray			22	22
ORK 8	Calf of Eday Long			1	1
ORK 12	Cuween Hill	2		6	8
ORK 14	Earl's Knoll			*	*
ORK 21	Holm of P.W. North			6	6
ORK 27	Knowe of Craie			1	1
ORK 28	Knowe of Lairo			3	3
ORK 30	Knowe of Ramsay	2		1	3
ORK 31	Knowe of Rowiegar			*	*
ORK 32	Knowe of Yarso			29	29
ORK 34	Korkquoy			60	60
ORK 36	Maes Howe			1	1
ORK 37	Midhowe			25	25
ORK 44	Quoyness			15	15
ORK 49	Taversoe Tuick		1	4	5
ORK 51	Unstan			*	*
ORK 55	Withebeir			*	*

Table 13.3. The early excavations: minimum number of individuals and sex distribution of burials.

		Adults	Adolescents	Children	Uncertain	Total
ORK 3	Blackhammer	2				2
ORK 12	Cuween Hill	8				8
ORK 30	Knowe of Ramsay	2			1	3
ORK 32	Knowe of Yarso	28	1			29
ORK 37	Midhowe	17	6	2		25
ORK 44	Quoyness	10	3	2		15
ORK 49	Taversoe Tuick	1		1	3	5

Table 13.4. The early excavations: age distribution of burials.

	Burnt/ unburnt	Broken/ unbroken	Articulated/ disarticulated
ORK 3 Blackhammer	unburnt	broken	
ORK 7 Burray	unburnt		
ORK 8 Calf of Eday Long		broken	
ORK 12 Cuween Hill	burnt		
ORK 21 Holm of Papa Westray North	unburnt	unbroken	articulated
ORK 30 Knowe of Ramsay	unburnt		
ORK 32 Knowe of Yarso		broken	disarticulated
ORK 34 Korkquoy	unburnt		articulated
ORK 37 Midhowe			both
ORK 44 Quoyness		unbroken	
ORK 49 Taversoe Tuick	both		both
ORK 51 Unstan	both		articulated

Table 13.5. The early excavations: condition of human bone.

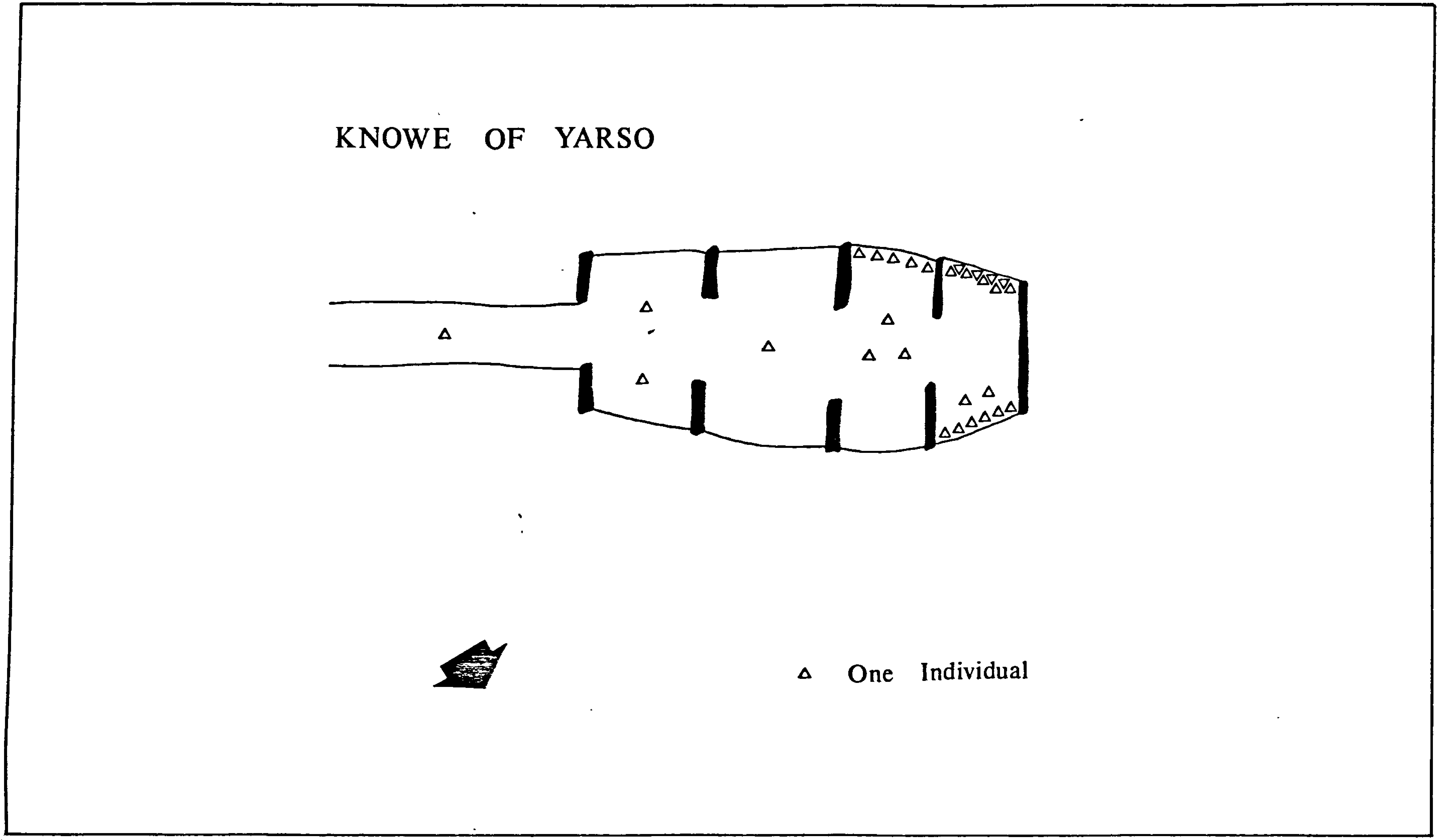


Figure 13.6. Distribution of human remains at Knowe of Yarso (a schematic diagram compiled from a verbal description)

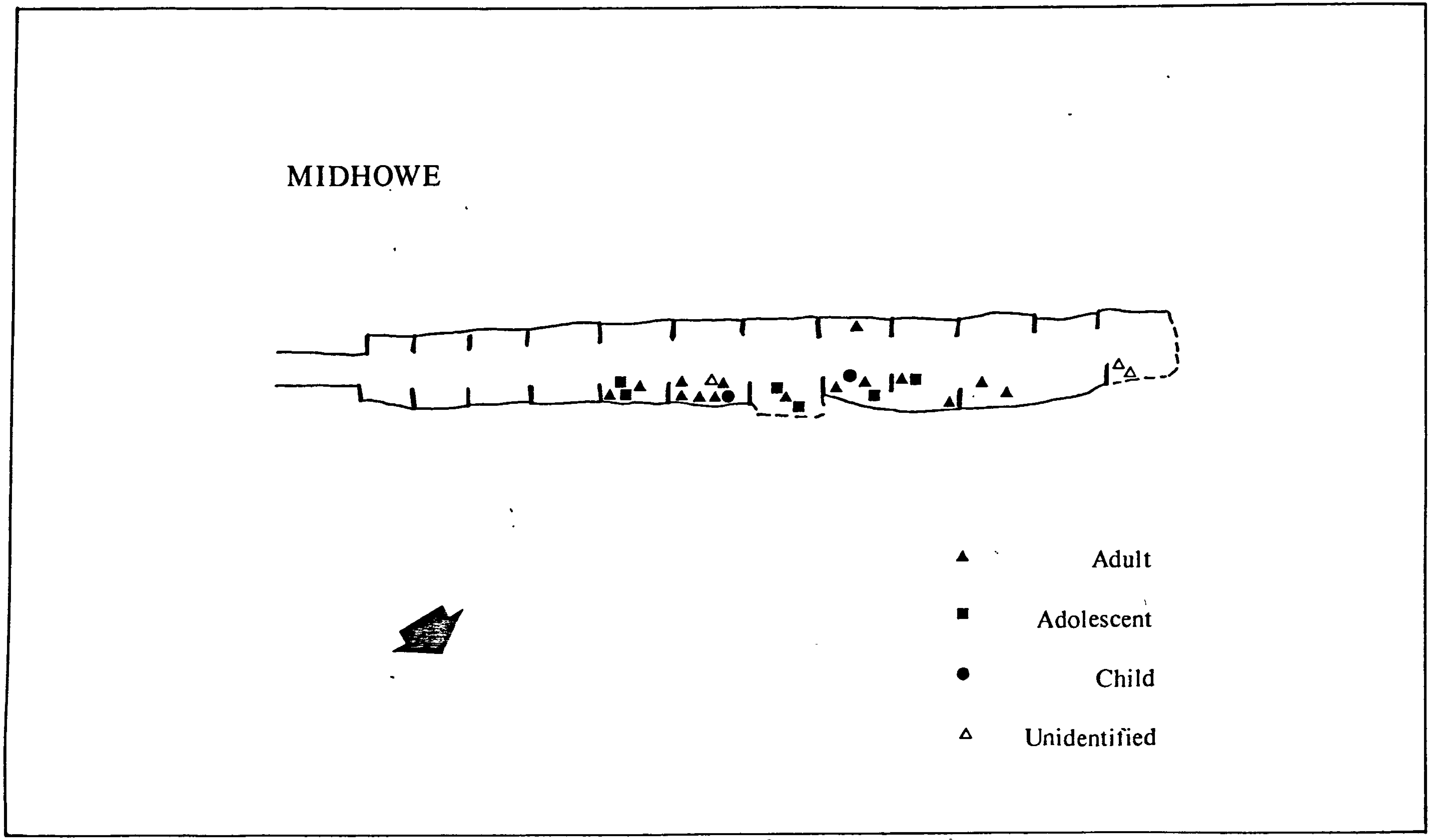


Figure 13.7. Distribution of human remains at Midhowe (a schematic diagram compiled from a verbal description)

Deceased at (years)	Number	Per cent
0 - 2	10	6.4
2 - 12	26	16.5
13 - 19	36	22.9
20 - 29	74	47.1
30 - 40	7	4.5
40 - 50	3	1.9
50 - x	1	0.6
	157	99.9

Table 13.8. Age structure at Quanterness (after Renfrew, 1979)

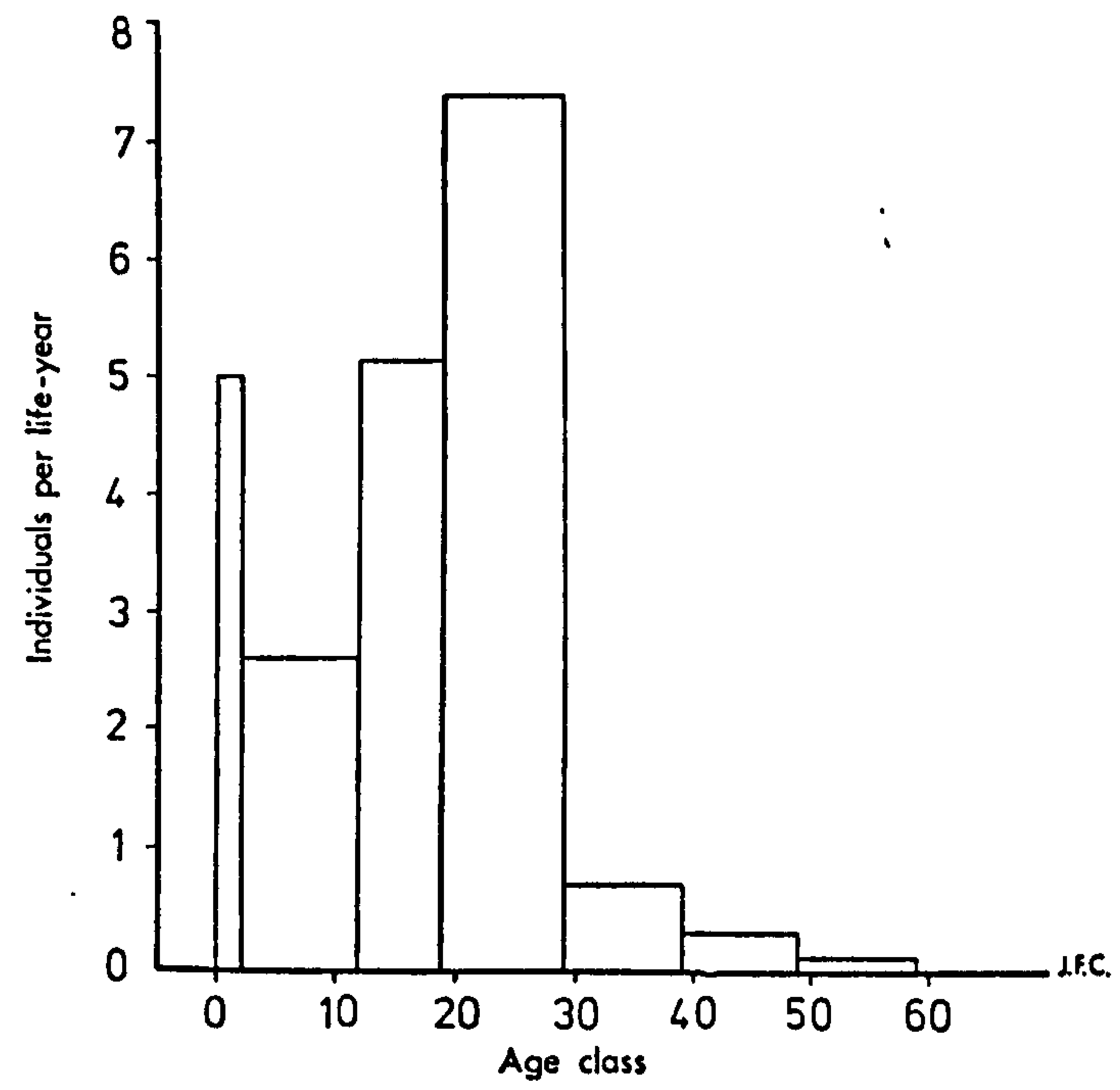


Figure 13.9. Frequency of death in each age class at Quanterness (from Renfrew, 1979)

	Adults Age 20+	Teenagers Age 13-19	Children Age 2-12	Infants Age < 2	Totals
Male	93	8	2	0	103
Female	42	13	0	0	55
Unsexed	50	41	68	24	183
Totals	185	62	70	24	341

Table 13.10. Age and sex structure at Isbister (after Hedges, forthcoming)

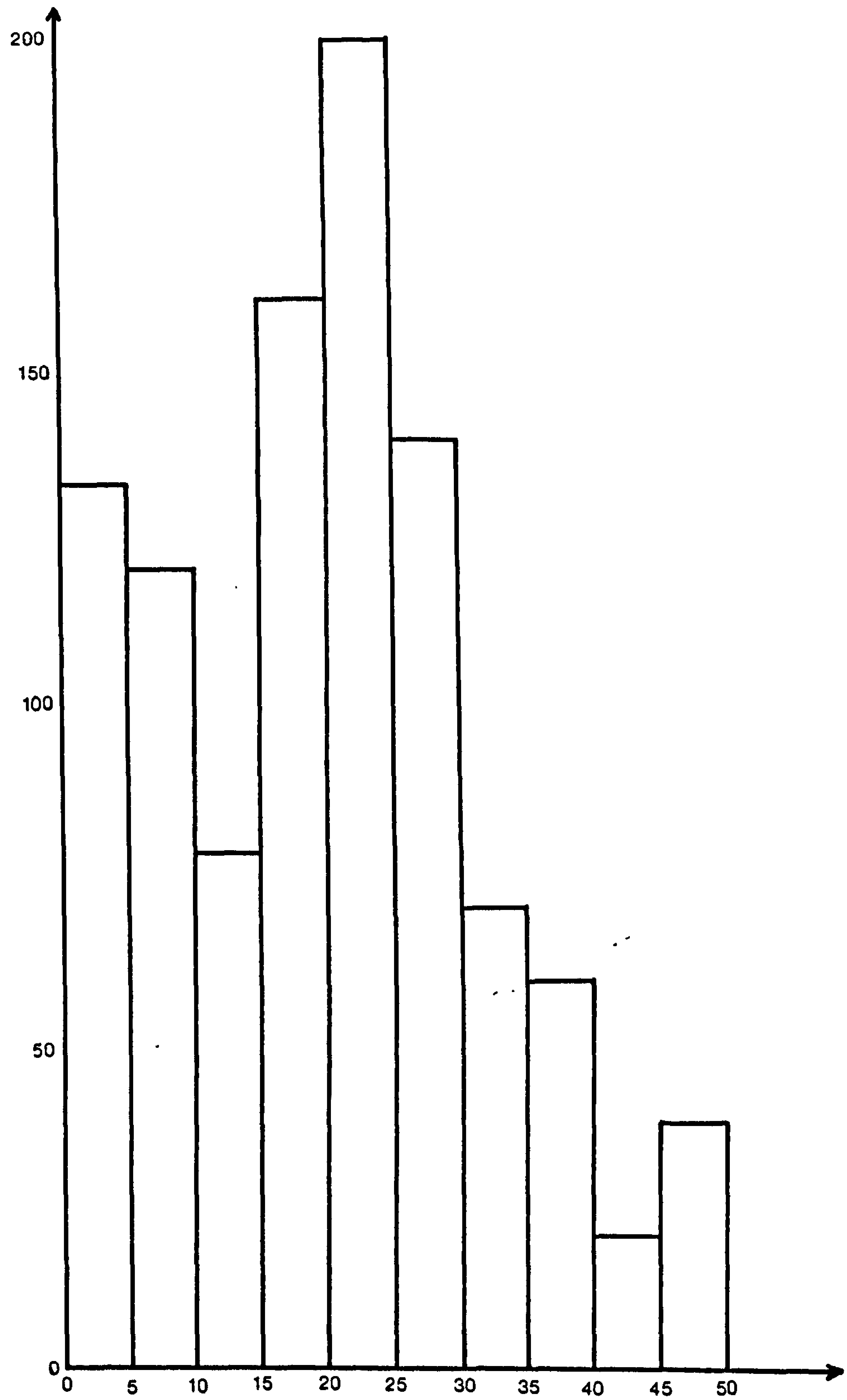


Figure 13.11. Age at death of an Isbister-type population, radix = 1000 (after Hedges, 1982)

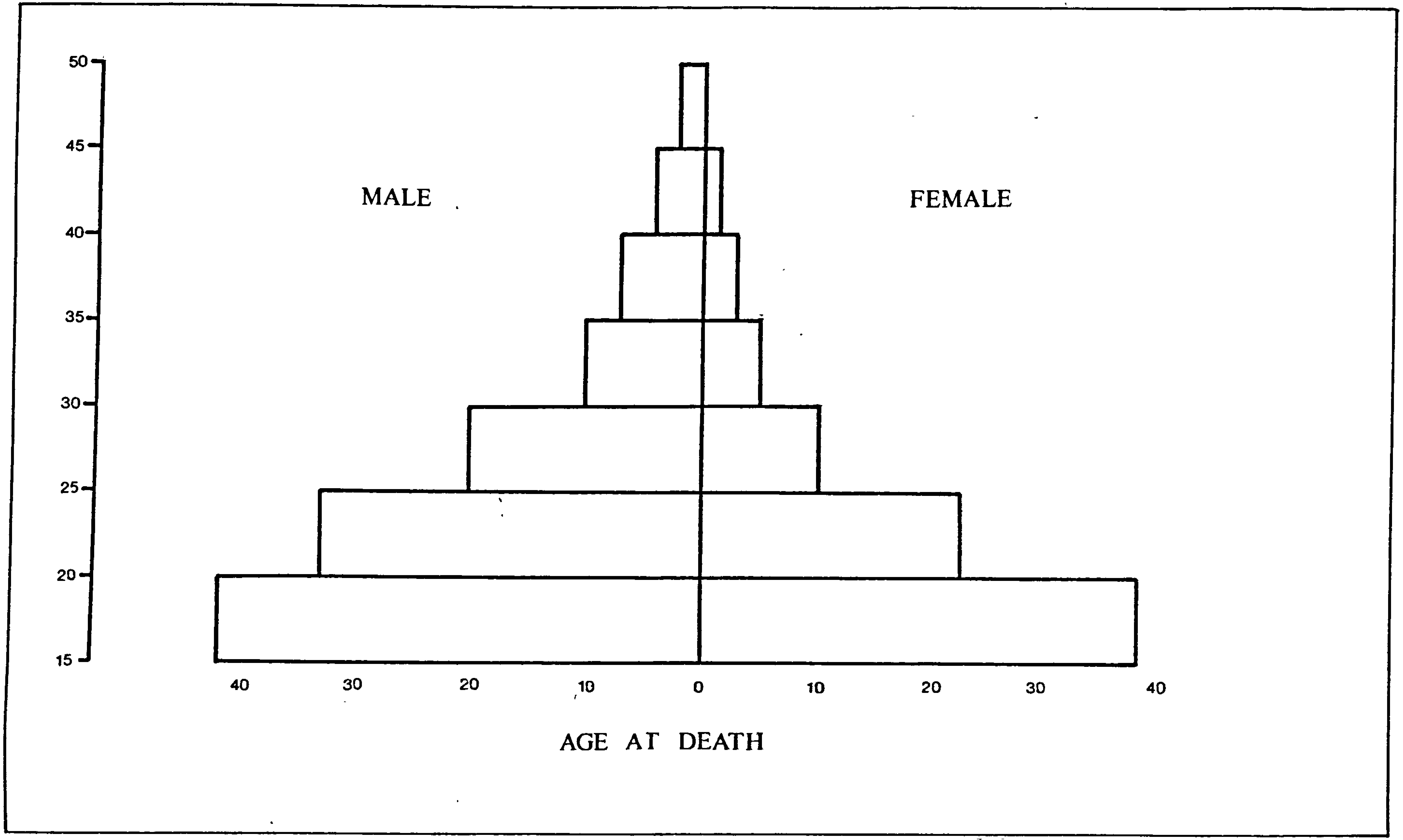


Figure 13.12. Age-structure of an Isbister-type population aged over 15 years, by sex, assuming equal survival to 15, total radix = 200. (after Hedges, 1982)

Monument	Estimate (worker-hours)	Reference
WESSEX		
Durrington Walls	900,000	Wainwright with Longworth, 1971:197
Avebury	1,560,000	Wainwright with Longworth, 1971:197
Maumbury Rings	40,000	Startin in Bradley, 1975:24
Dorset Cursus	9,000,000	Burgess, 1980: 171
Silbury Hill	18,000,000	Burgess, 1980: 171
Stonehenge	30,000,000	Burgess, 1980: 171
ORKNEY		
Stones of Sten-ness (ditch)	50,000	Ralston in J N G Ritchie, 1976: 51
Ring of Brogar (ditch)	80,000	Renfrew, 1979: 213
Quanterness	10,000	Renfrew, 1979: 214

Table 14.1. Labour estimates for some monuments of Wessex and Orkney

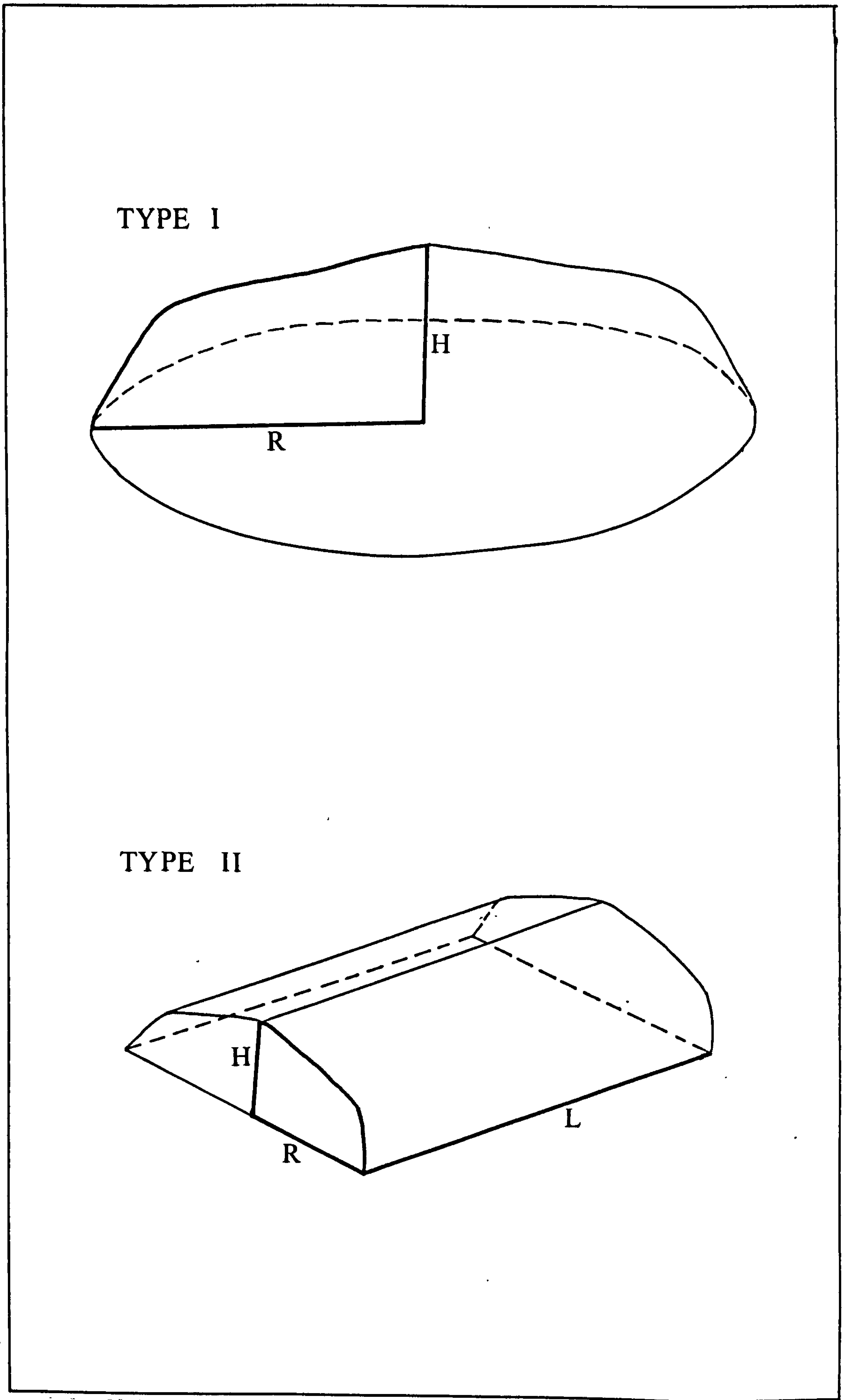


Figure 14.2. Templates of Type I and Type II cairns.

Cairn	Radius r (m)	Height H (m)	Volume V (cu m)	Worker-hours
ORK 2	5.9	3.52	128	1505
ORK 4	6.7	3.65	166	1952
ORK 6	8.4	3.89	265	3116
ORK 9	3.9	3.10	57	670
ORK 10	5.4	3.43	108	1270
ORK 11	8.0	3.84	240	2822
ORK 12	8.0	3.84	240	2822
ORK 20	10.3	4.10	398	4680
ORK 23	5.3	3.42	106	1247
ORK 24	7.7	3.80	222	2611
ORK 26	4.1	3.15	63	741
ORK 27	5.7	3.49	122	1435
ORK 36	17.6	4.65	1160	13641
ORK 38	11.1	4.18	465	5468
ORK 39	7.6	3.78	214	2517
ORK 42	8.6	3.91	275	3234
ORK 43	15.0	4.49	850	9996
ORK 44	9.4	4.01	334	3928
ORK 46	9.5	4.02	341	4010
ORK 47	4.1	3.15	63	741
ORK 49	4.6	3.27	79	929
ORK 50	8.0	3.84	240	2822
ORK 51	6.7	3.66	169	1987
ORK 52	10.3	4.10	398	4680
ORK 53	8.6	3.91	275	3234
ORK 54	6.6	3.64	163	1917
ORK 55	7.7	3.80	222	2611
ORK 56	8.9	3.95	298	3504
ORK T2	7.4	3.76	206	2423
ORK T3	9.3	4.00	328	3857
ORK T4	6.2	3.58	145	1705
ORK T5	8.3	3.88	260	3058
ORK T6	7.7	3.80	222	2611
ORK T8	4.2	3.18	66	776
ORK T9	6.5	3.63	160	1882
ORK T12	6.1	3.56	139	1635
ORK T13	6.4	3.61	154	1811
ORK T15	6.9	3.69	179	2105
ORK T16	10.1	4.08	383	4504
ORK T17	4.8	3.31	86	1011
ORK T21	10.4	4.11	406	4775

Table 14.3. Volumes and worker-hours: Type I cairns.

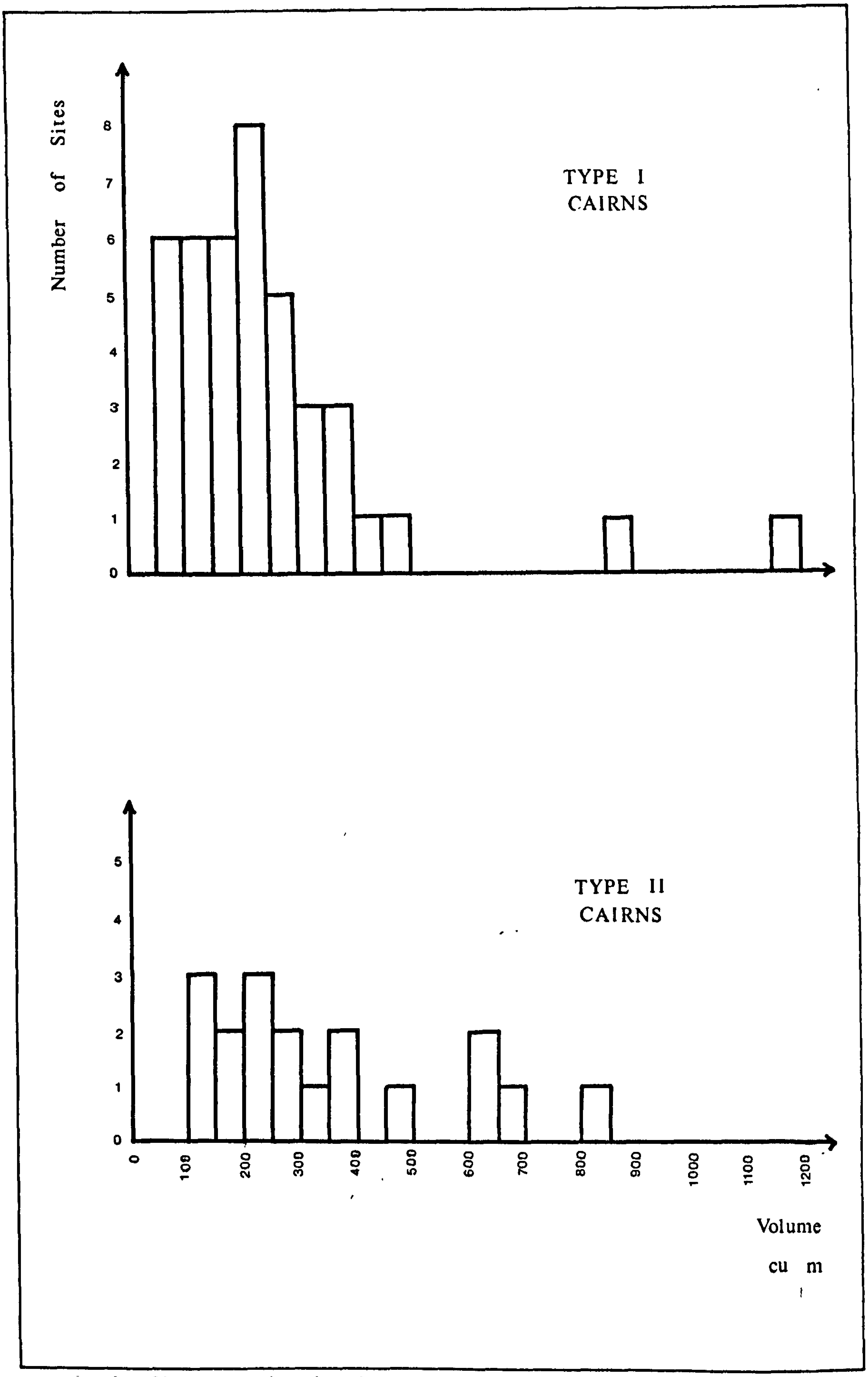


Figure 14.4. Volumes of Type I and Type II cairns (n = 41, 18)

Cairn	Radius R (m)	Height H (m)	Length L (m)	Volume V (cu m)	Worker-hours
ORK 1	6.8	3.67	24.0	371	4363
ORK 3	4.1	3.15	22.1	202	2376
ORK 5	8.9	3.95	31.1	635	7468
ORK 8	4.1	3.15	20.1	184	2164
ORK 16	4.7	3.29	18.5	195	2293
ORK 19	10.0	4.07	27.2	626	7362
ORK 21	4.6	3.27	12.1	125	1470
ORK 22	8.4	3.89	35.0	673	7914
ORK 29	6.1	3.56	21.3	295	3469
ORK 30	3.7	3.05	31.4	259	3046
ORK 31	3.3	2.93	27.4	200	2352
ORK 32	3.9	3.10	15.2	132	1552
ORK 33	5.2	3.40	12.2	144	1693
ORK 37	6.5	3.63	32.5	482	5668
ORK T10	5.7	3.49	24.0	310	3646
ORK T14	5.3	3.42	17.2	207	2434
ORK T18	8.8	3.94	40.0	809	9514
ORK T20	5.9	3.53	27.4	368	4328

Table 14.5. Volumes and worker-hours: Type II cairns.

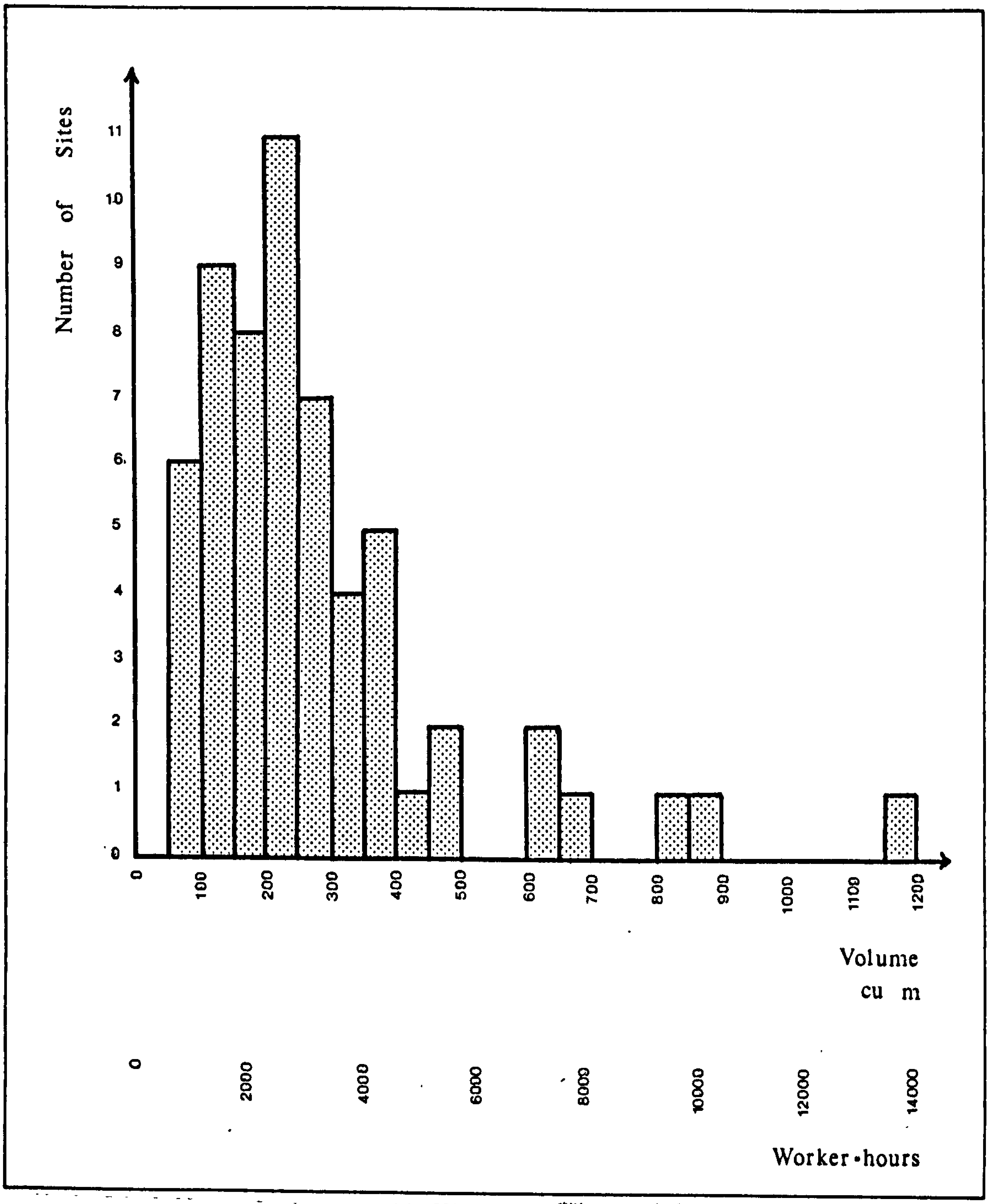


Figure 14.6. Volumes and worker-hours for all cairns (n = 59)

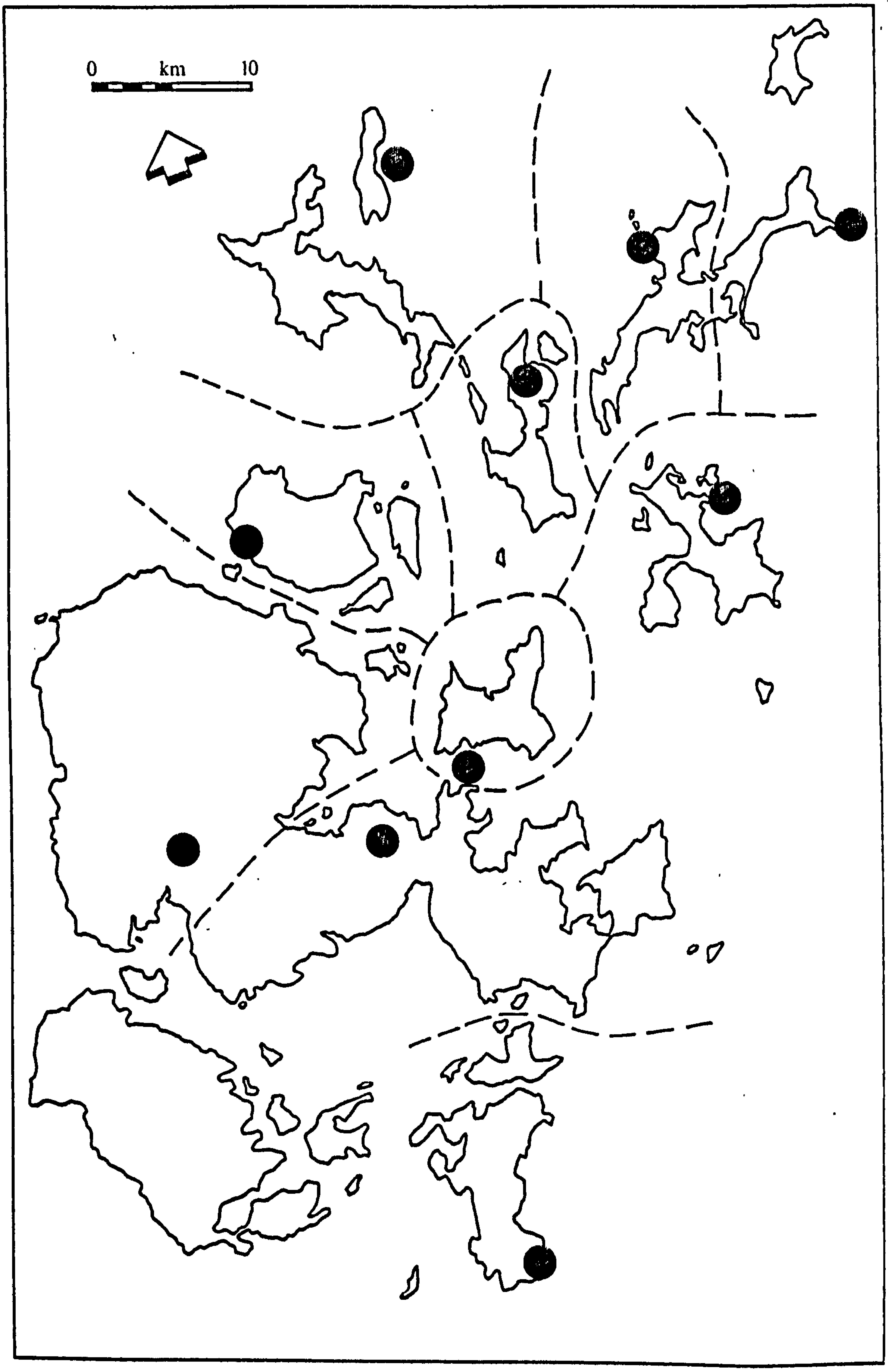


Figure 14.7. Distribution of chambered cairns with volumes in excess of 400 cu m.

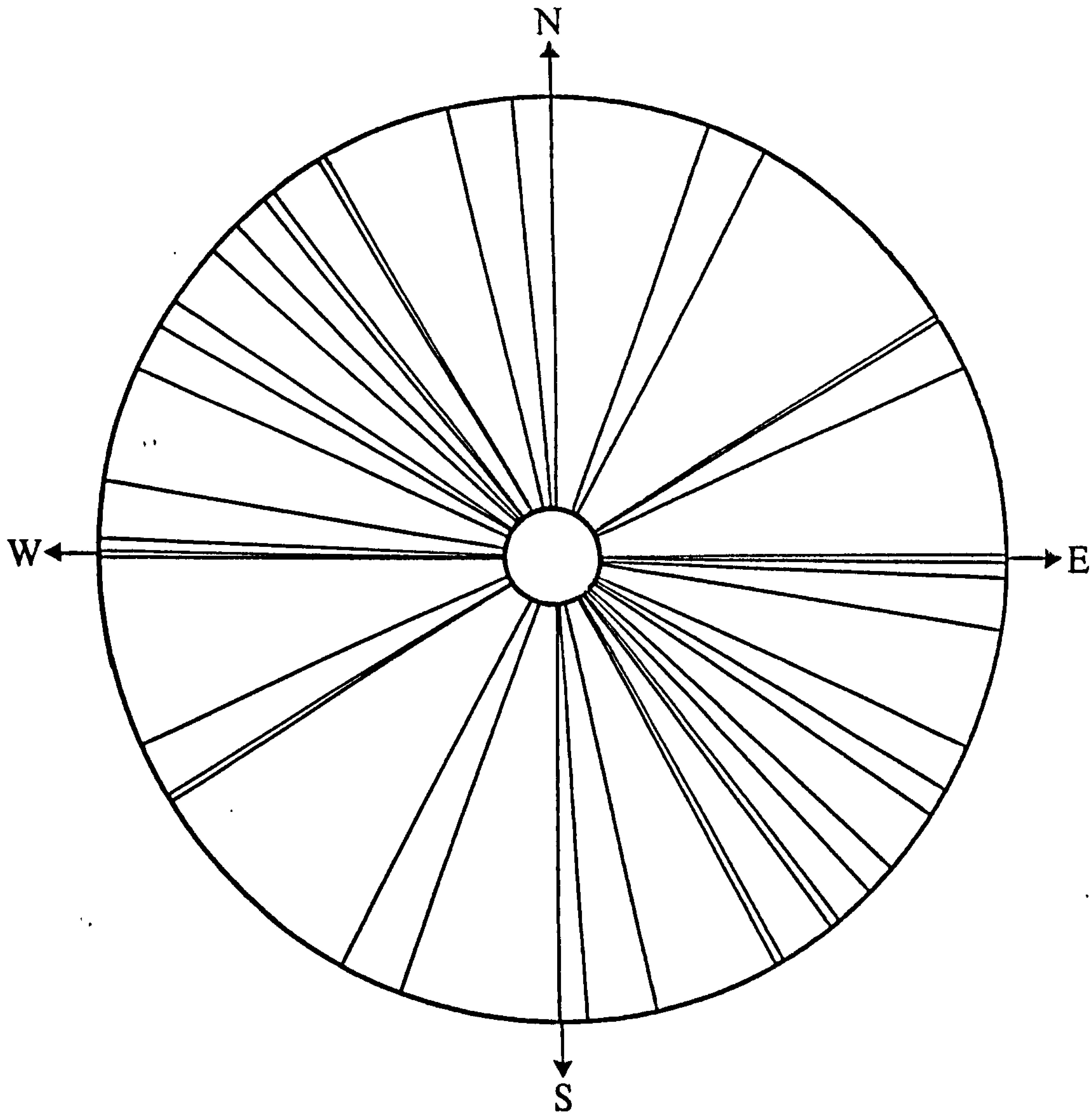


Figure 15.1. Orientation of cairns

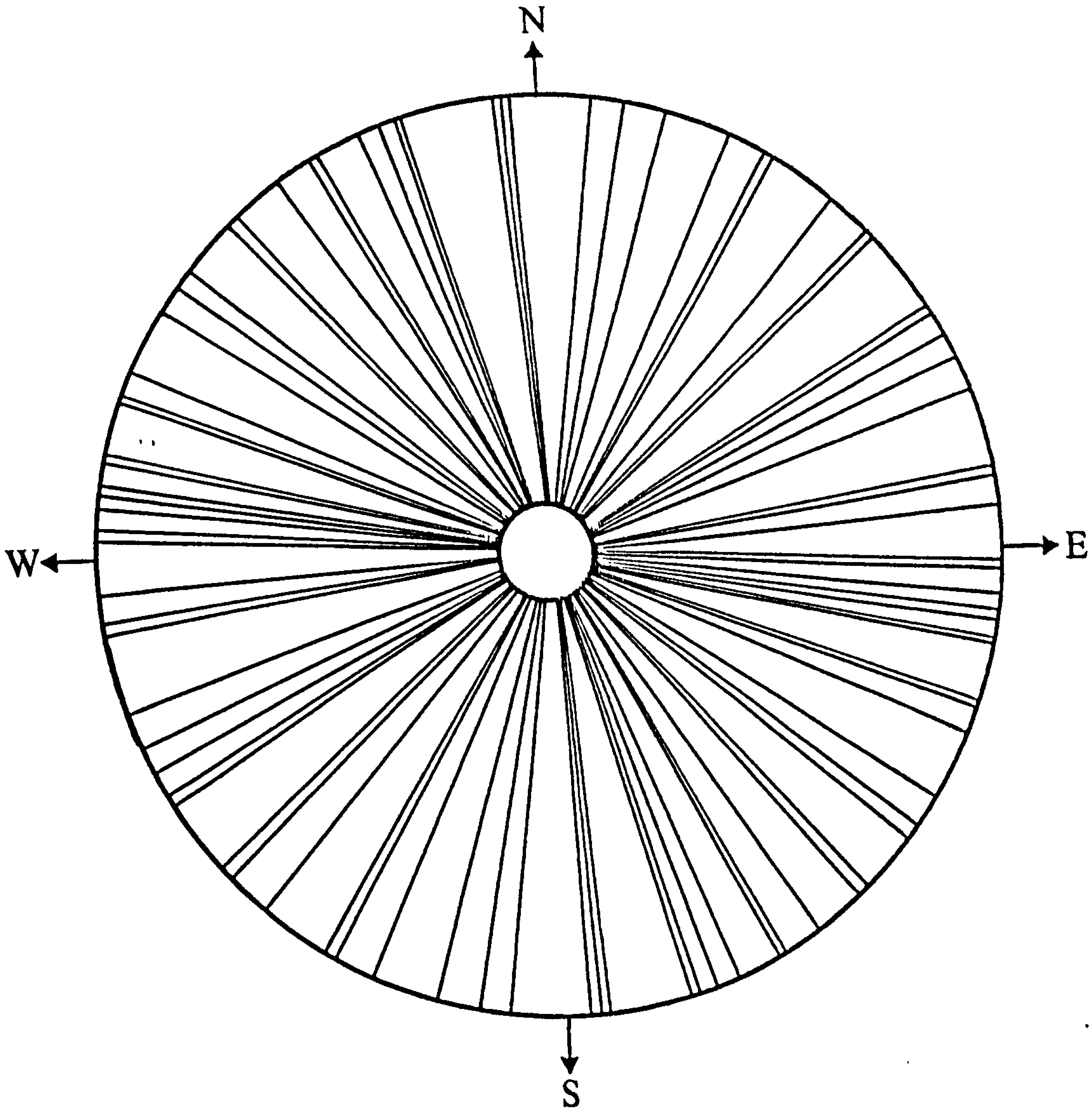


Figure 15.2. Orientation of chambers

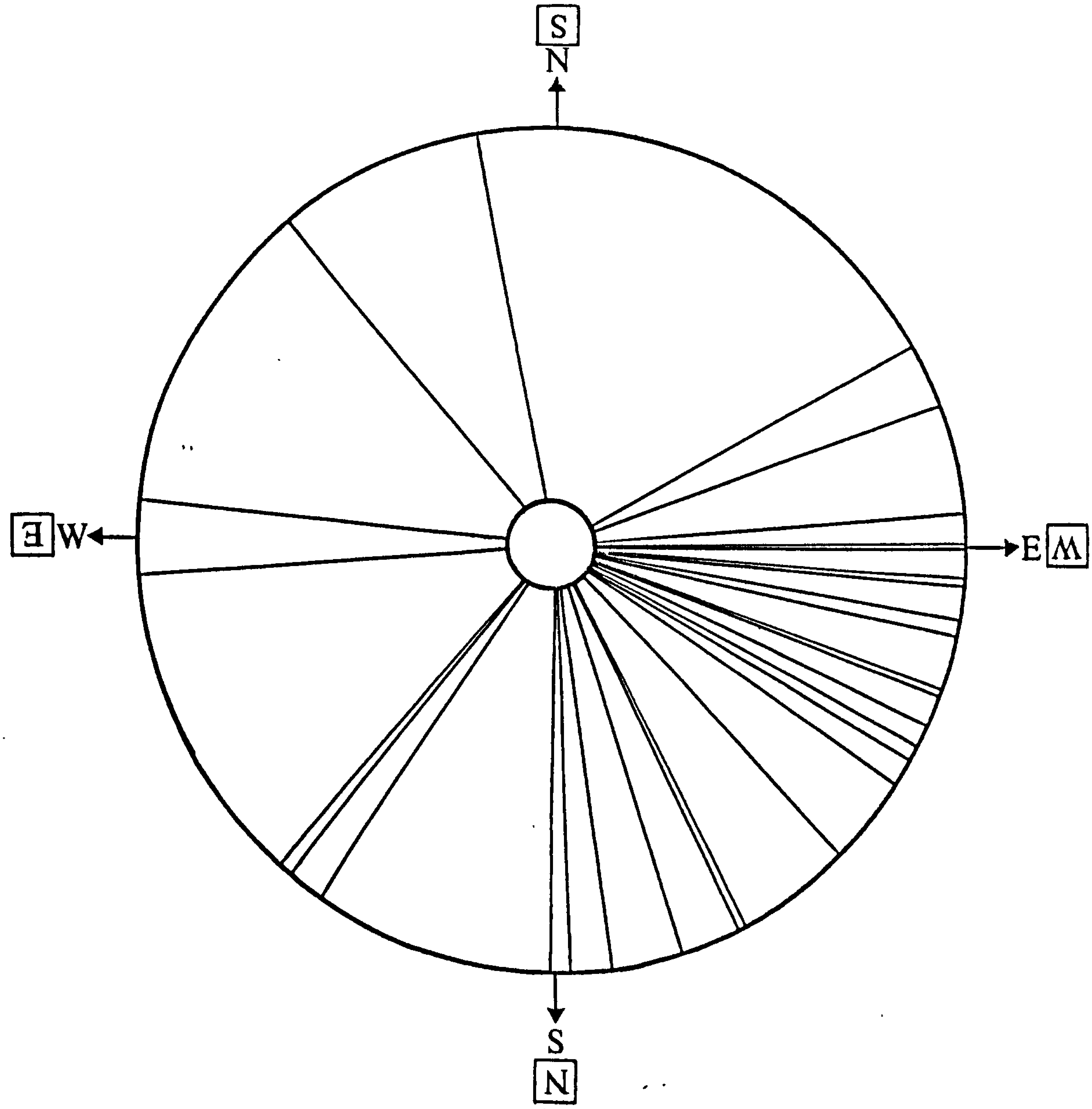


Figure 15.3. Orientation of passages

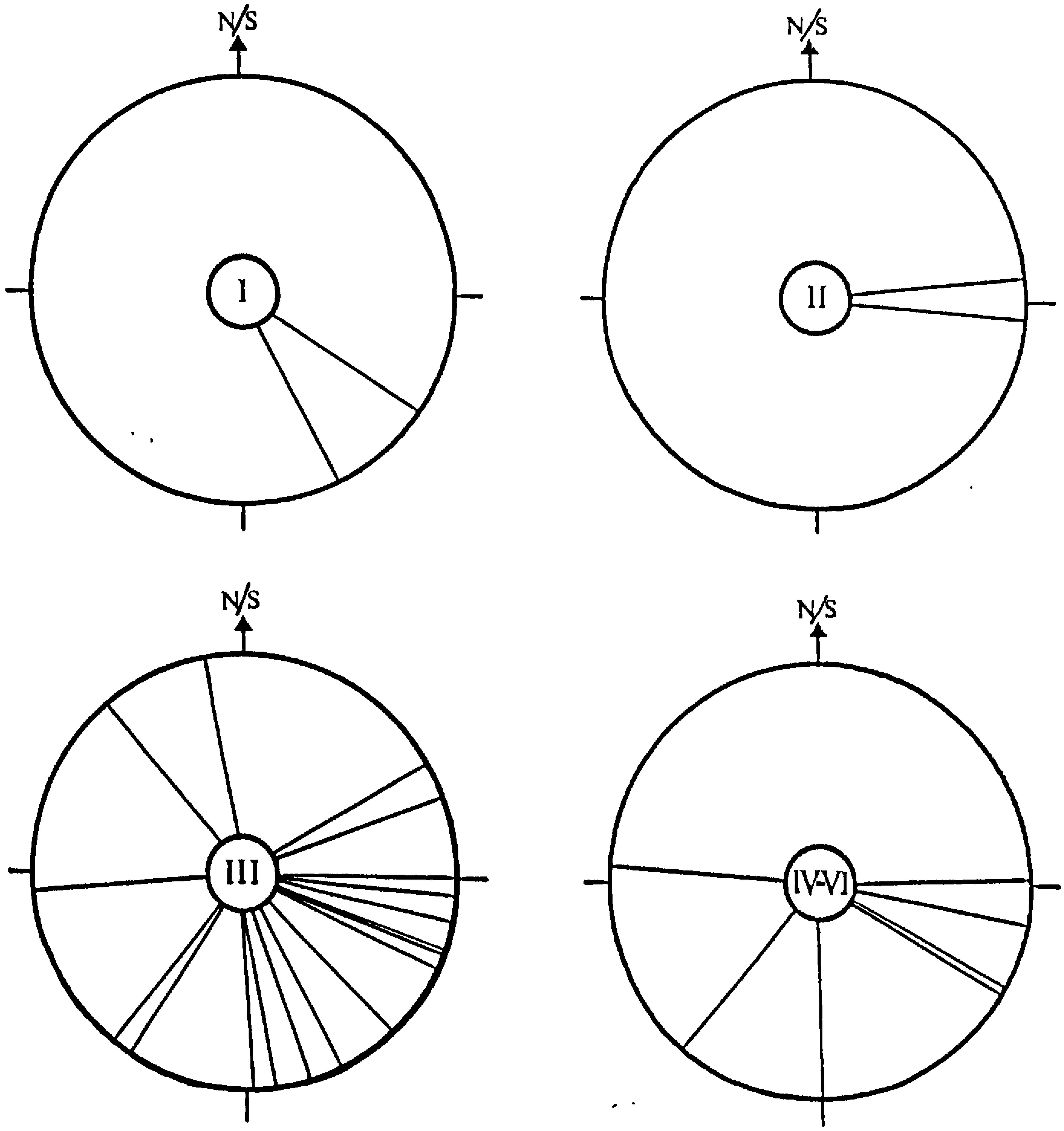


Figure 15.4. Orientation of passages by cluster

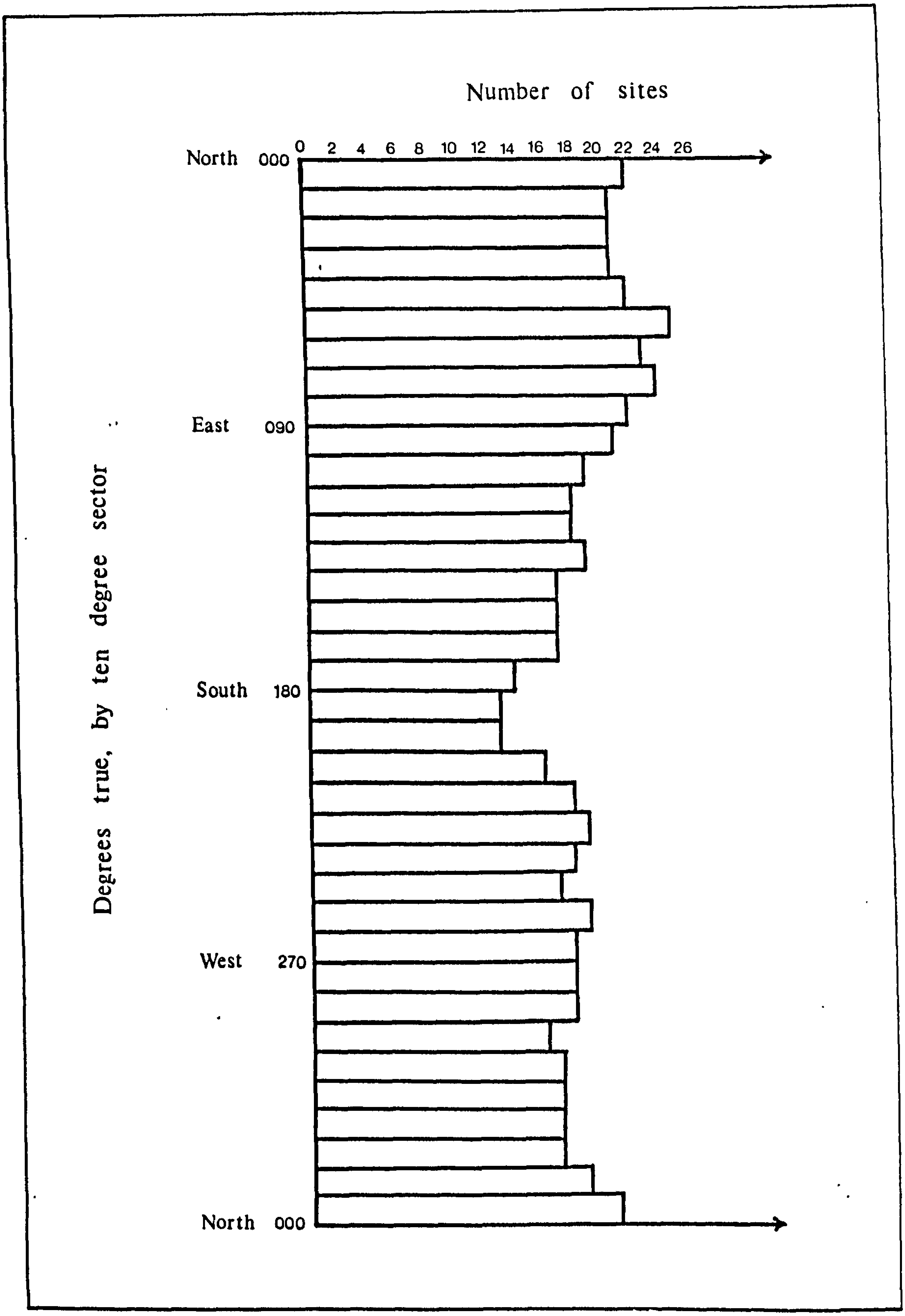


Figure 15.5. Orientation of visibility: number of cairns with restricted visibility, by ten-degree sector

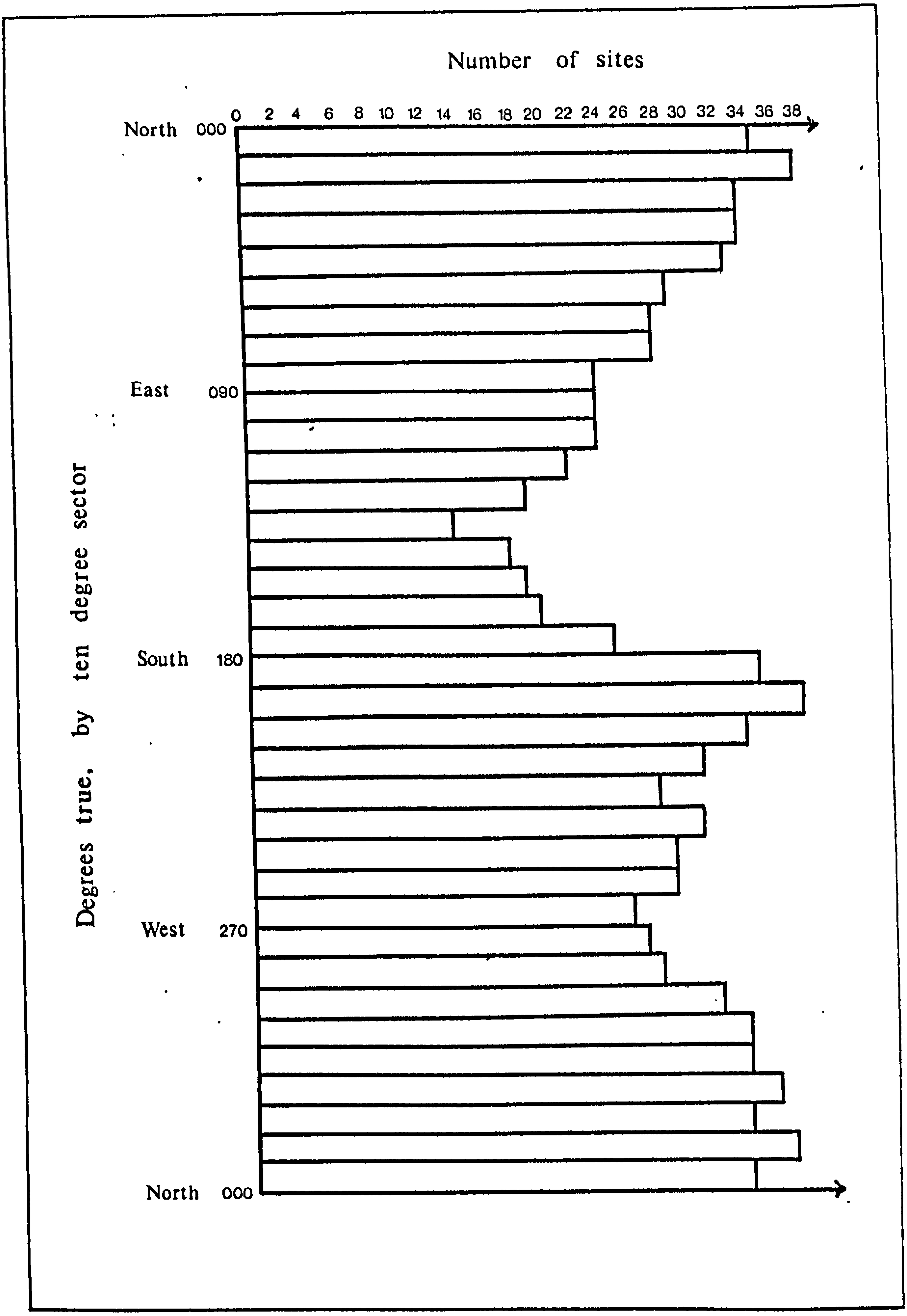


Figure 15.6. Orientation of visibility: number of cairns with intermediate visibility, by ten-degree sector

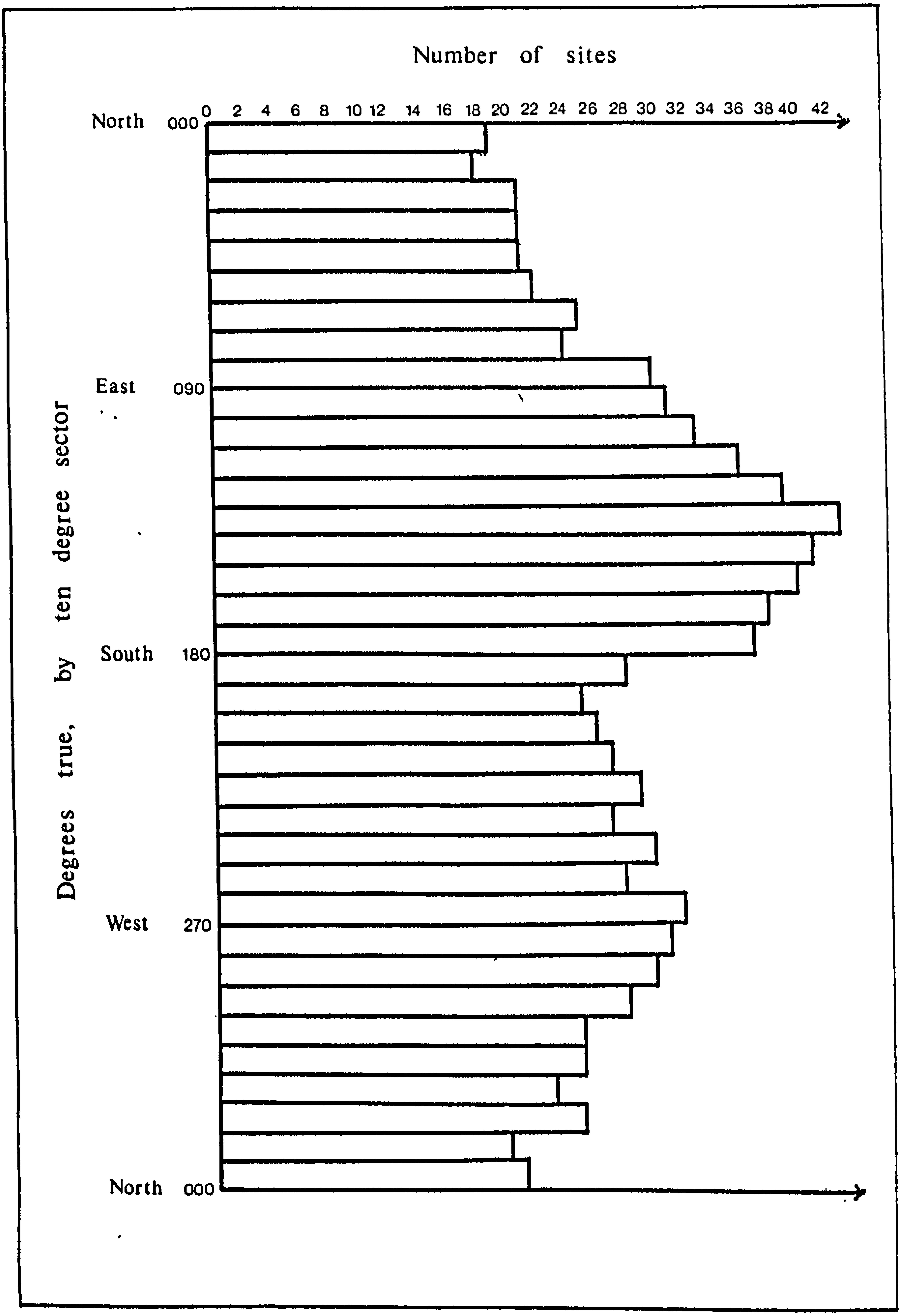


Figure 15.7. Orientation of visibility: number of cairns with distant visibility, by ten-degree sector

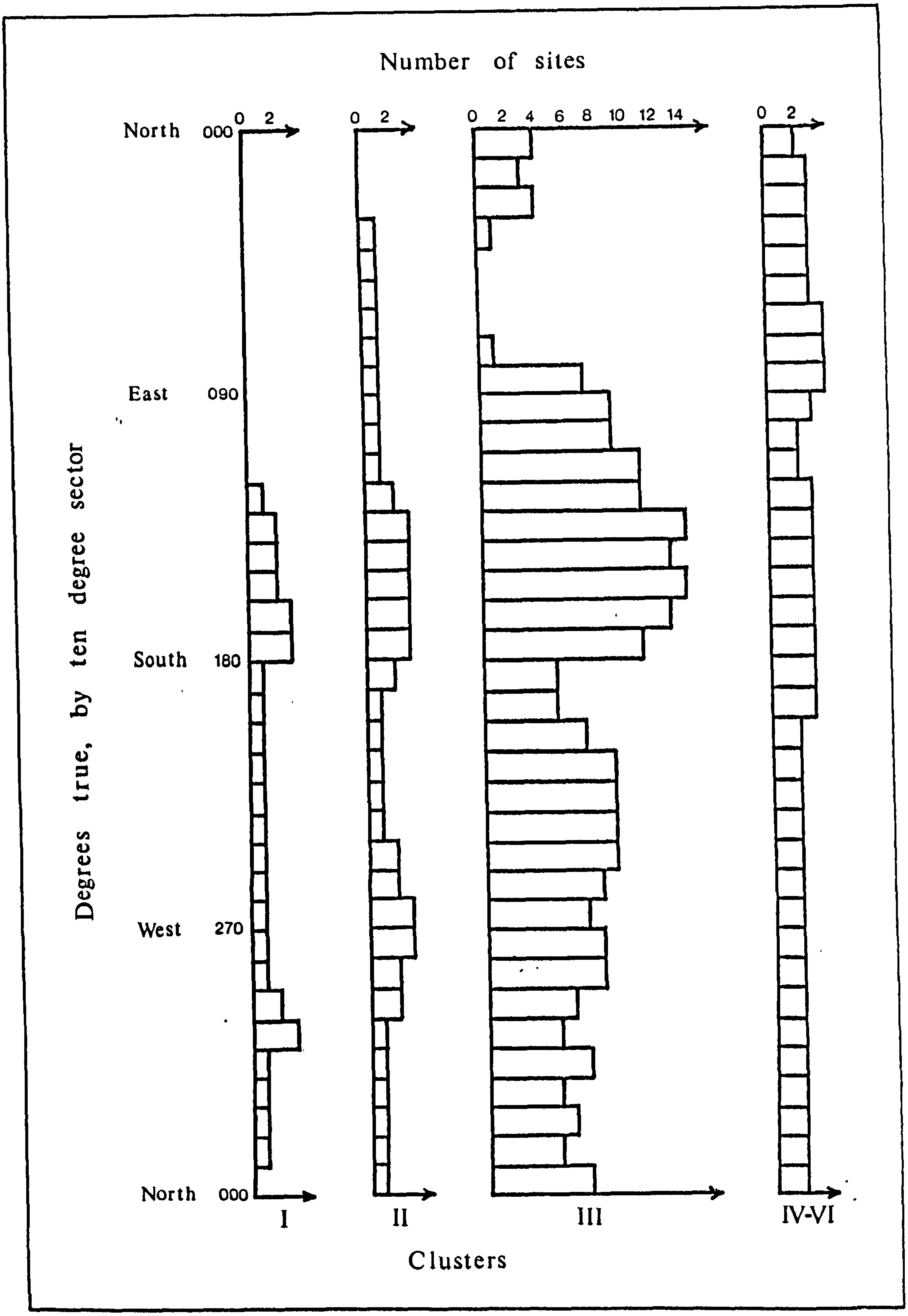


Figure 15.8. Orientation of visibility: number of cairns of each cluster with distant visibility, by ten-degree sector

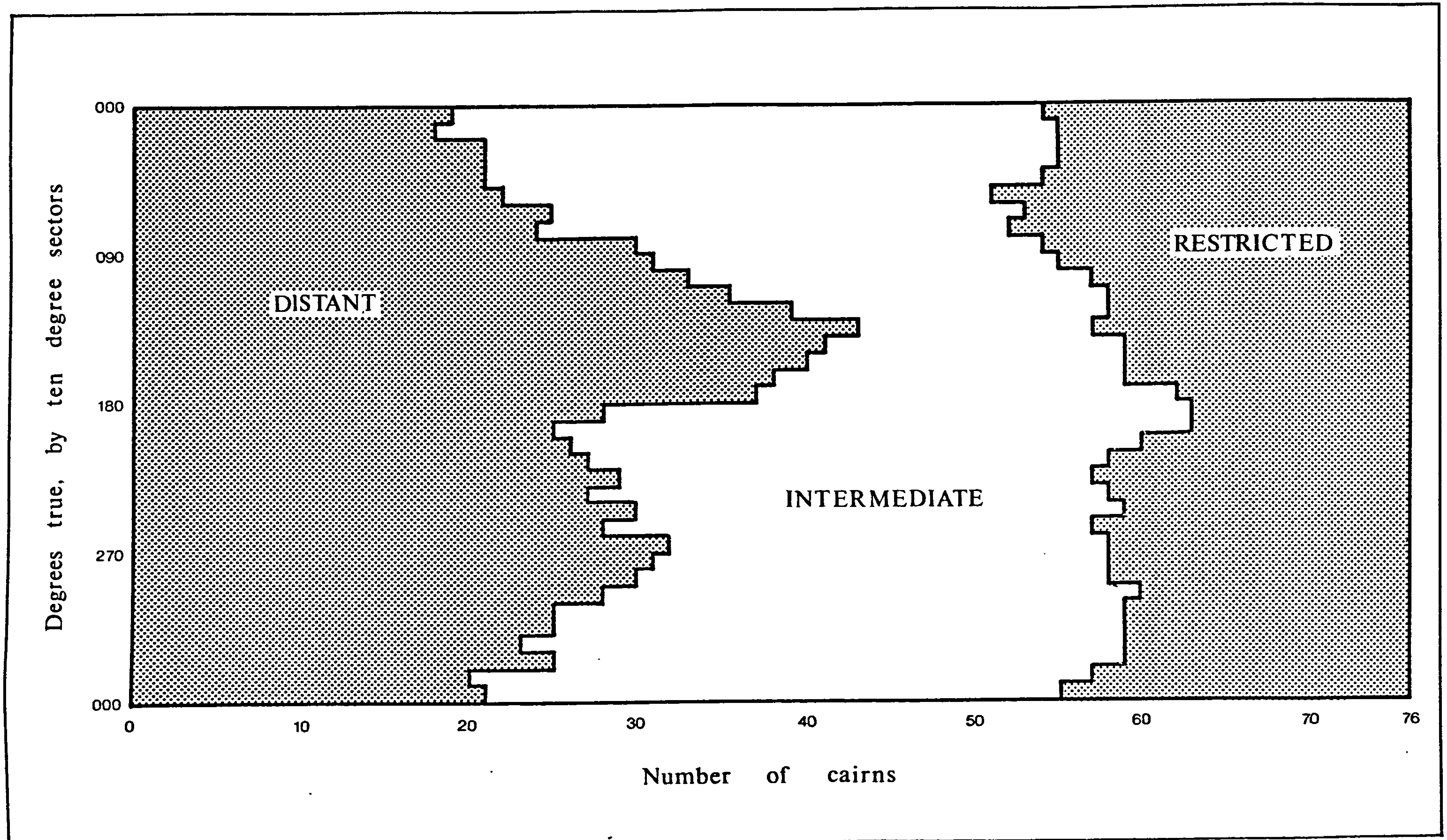


Figure 15.9. Orientation of visibility: number of cairns with distant, intermediate, and restricted visibility, by ten-degree sector

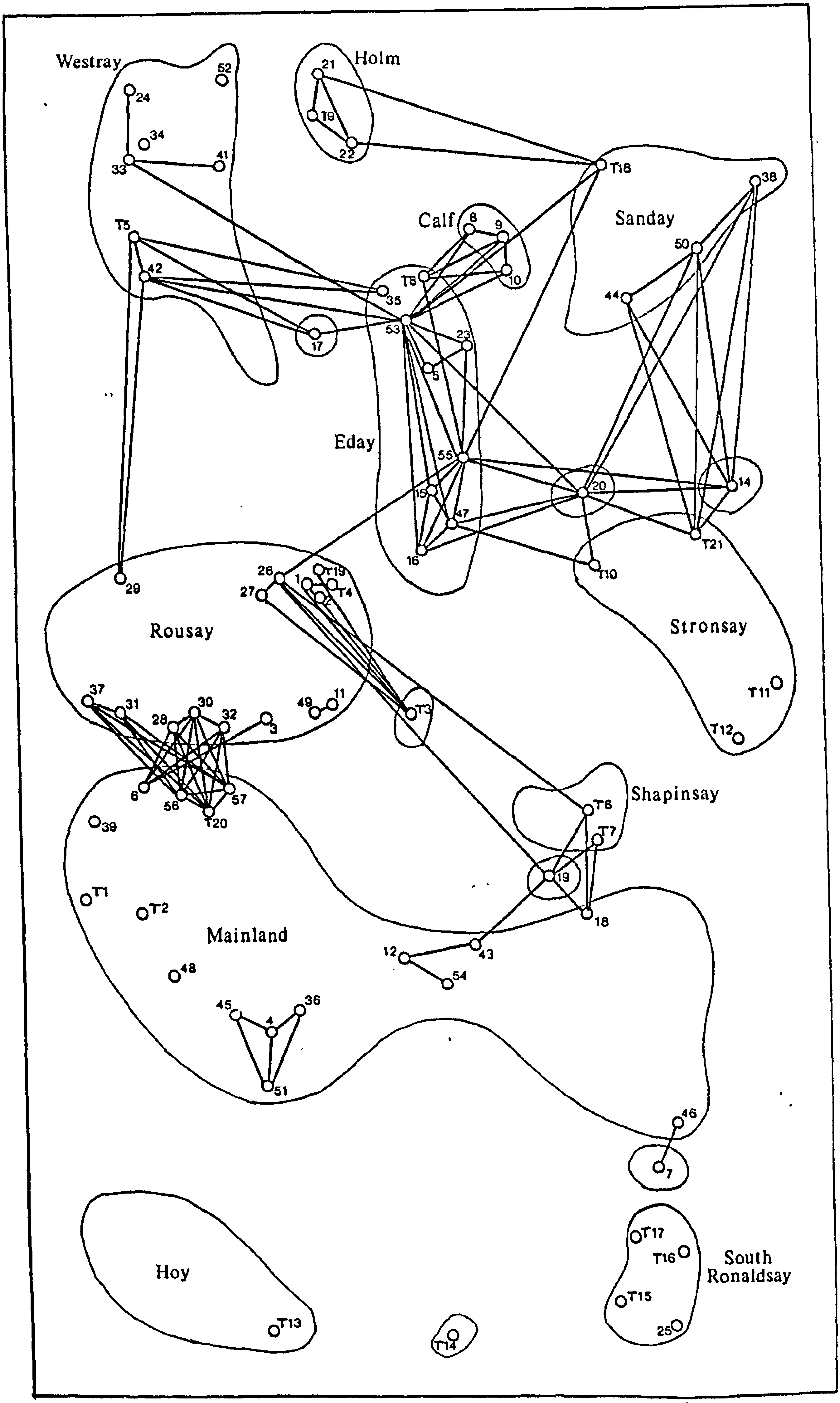


Figure 15.10. Intervisibility: see text for explanation

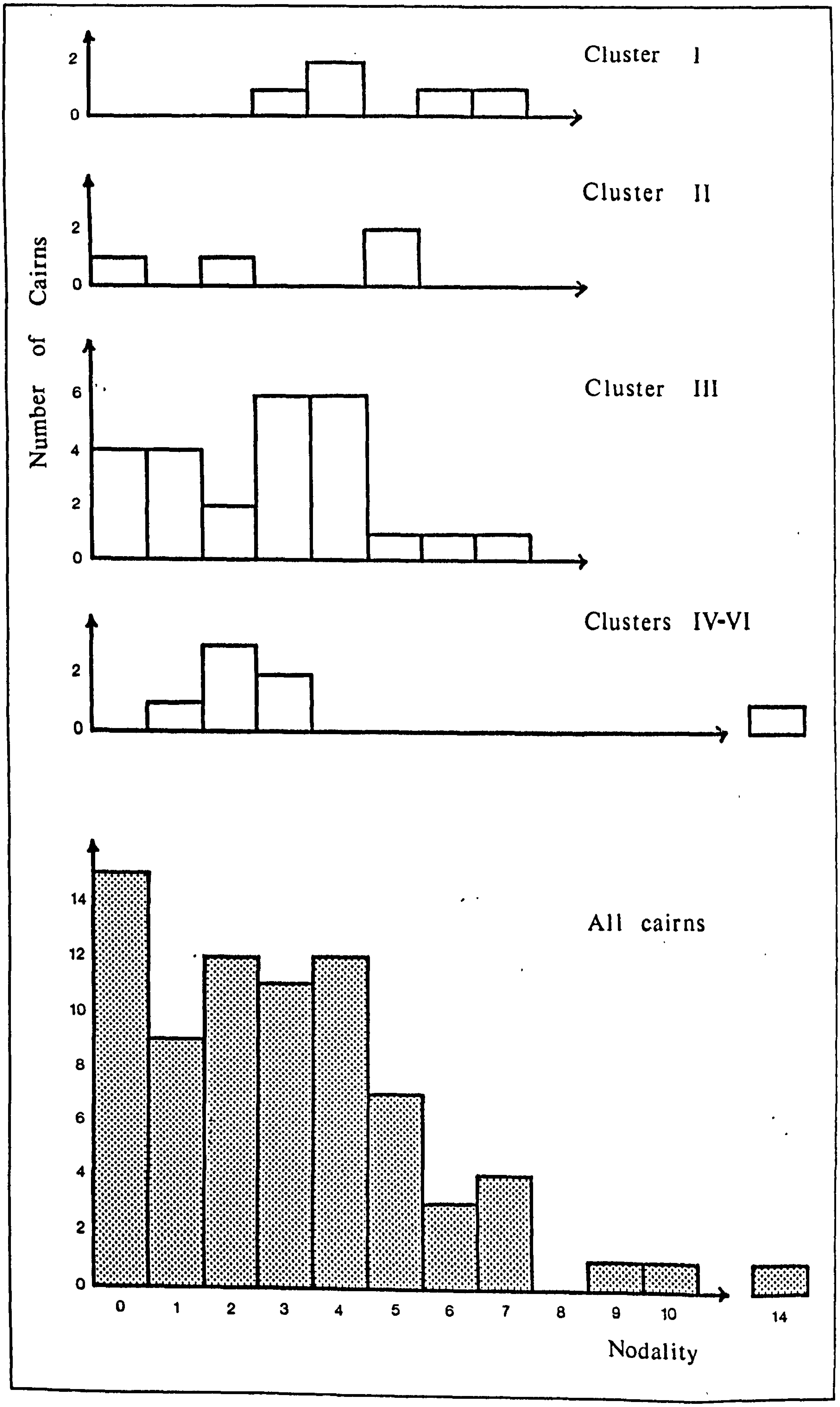


Figure 15.11. Intervisibility: histograms of nodality

Nodality

Cluster	Number	Mean	Standard deviation
I	5	4.80	1.47
II	4	3.00	2.12
III	25	2.72	1.87
IV-VI	7	3.86	4.19
All cairns	76	3.00	2.62

Cutpoint index

Cluster	Number	Mean	Standard deviation
I	5	1.20	0.40
II	4	1.00	0.71
III	25	1.04	0.72
IV-VI	7	1.57	0.73
All cairns	76	1.00	0.67

Table 15.12. Intervisibility: statistics for nodality and cutpoint index

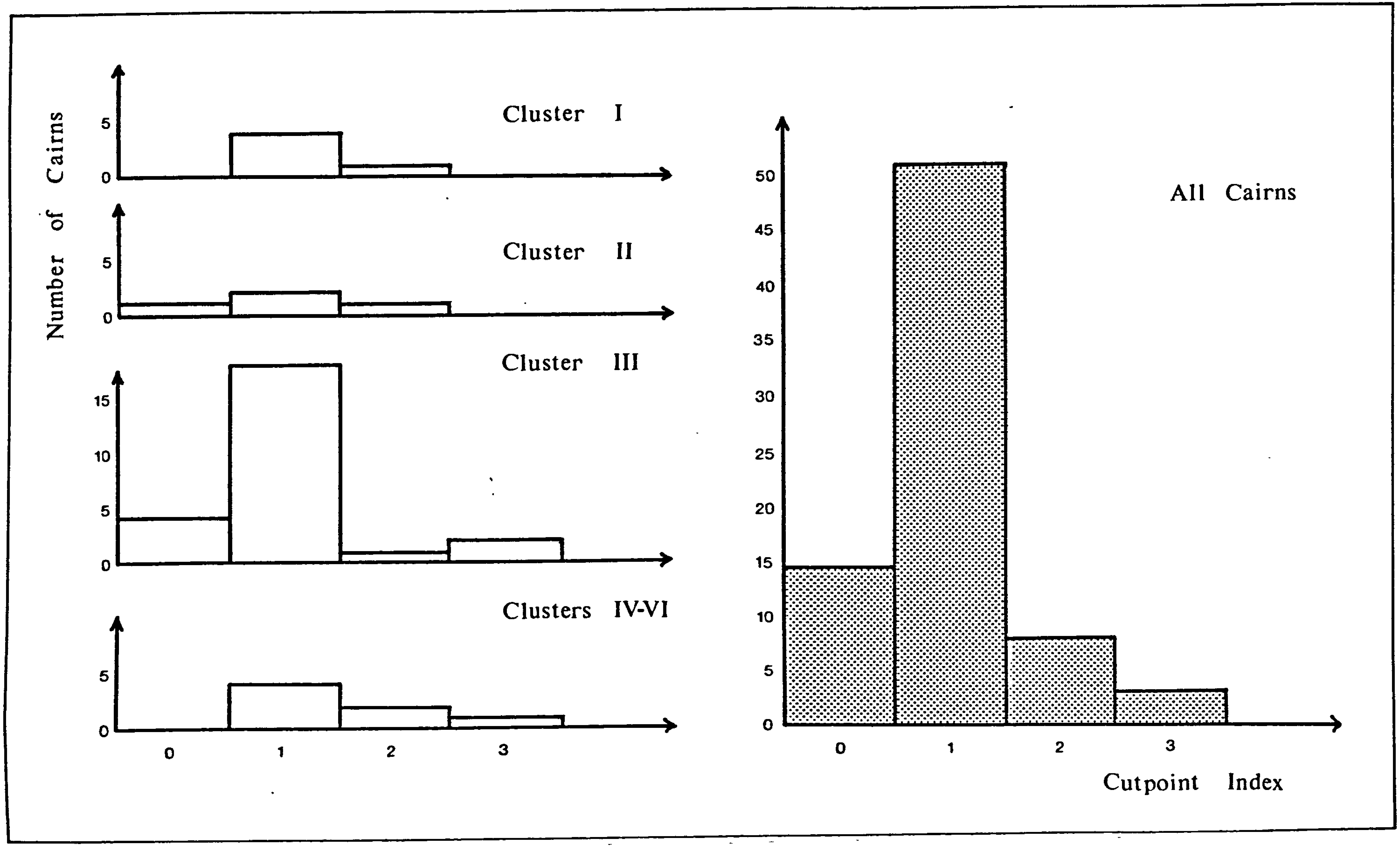
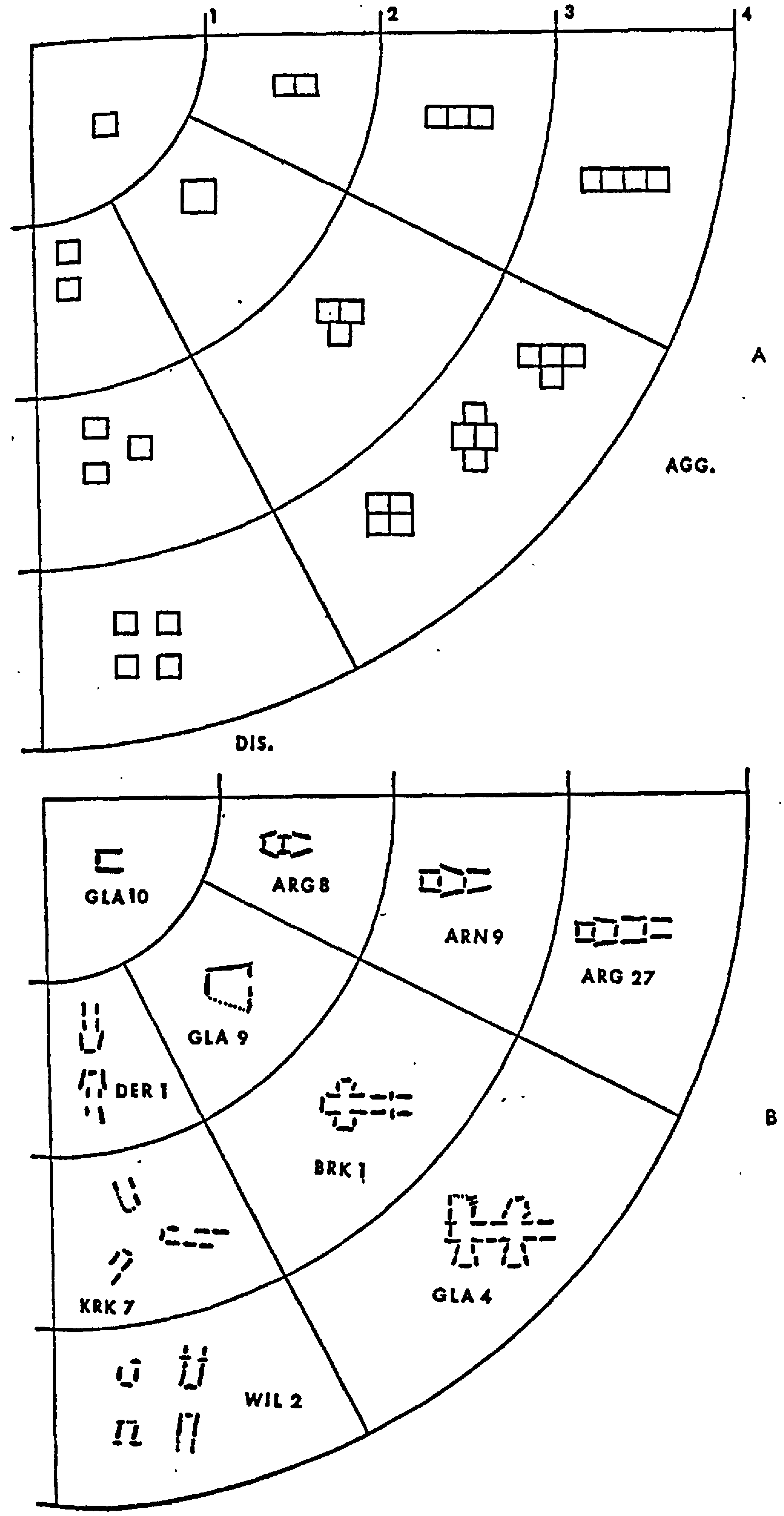


Figure 15.13. Intervisibility: histograms of cutpoint index



A: Systems of modular combination
B: Modular systems in practice

Figure 15.14. Modular combinations of space (from Kinnes, 1975)

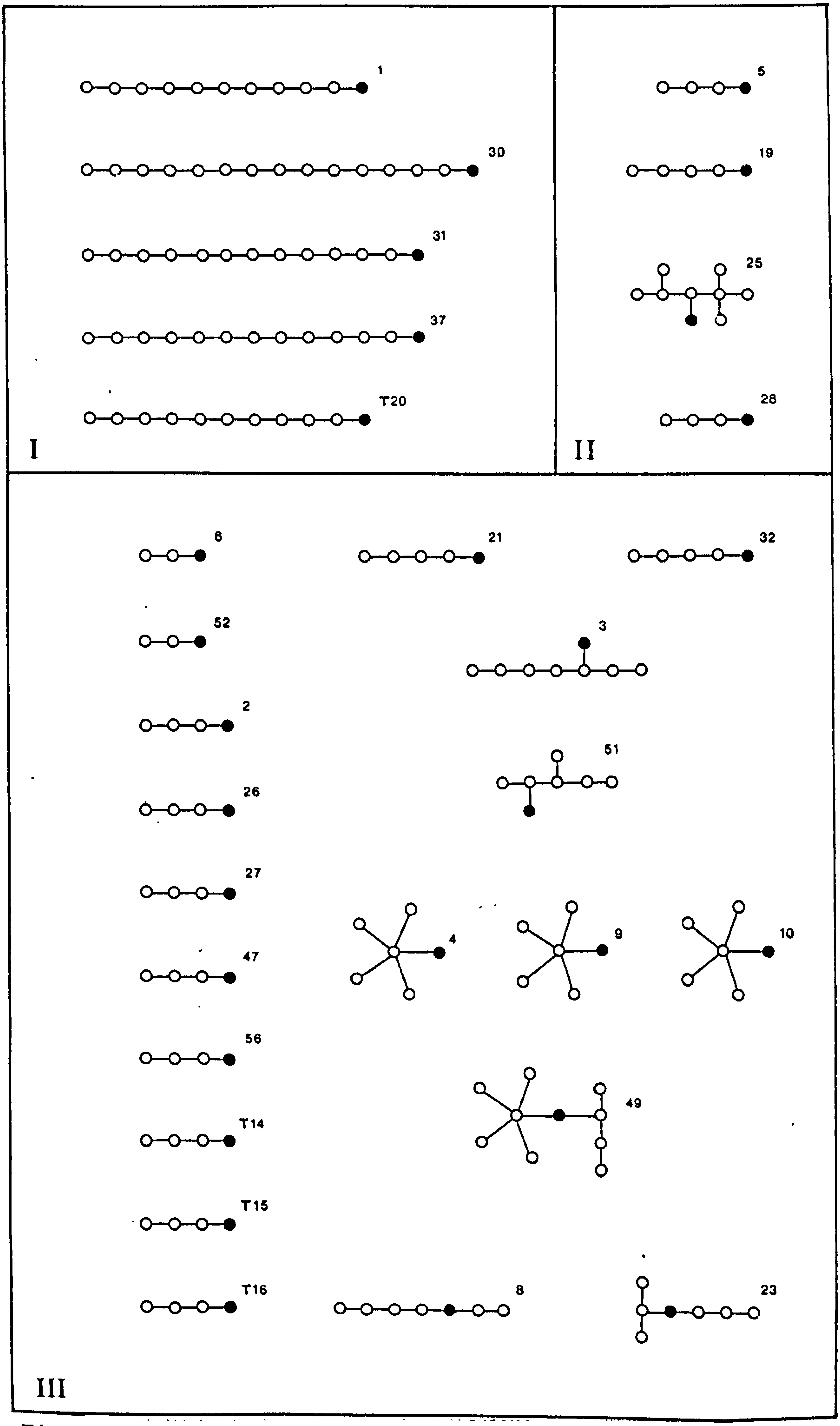


Figure 15.15. Demarcation of space within chambered cairns: clusters I, II, and III

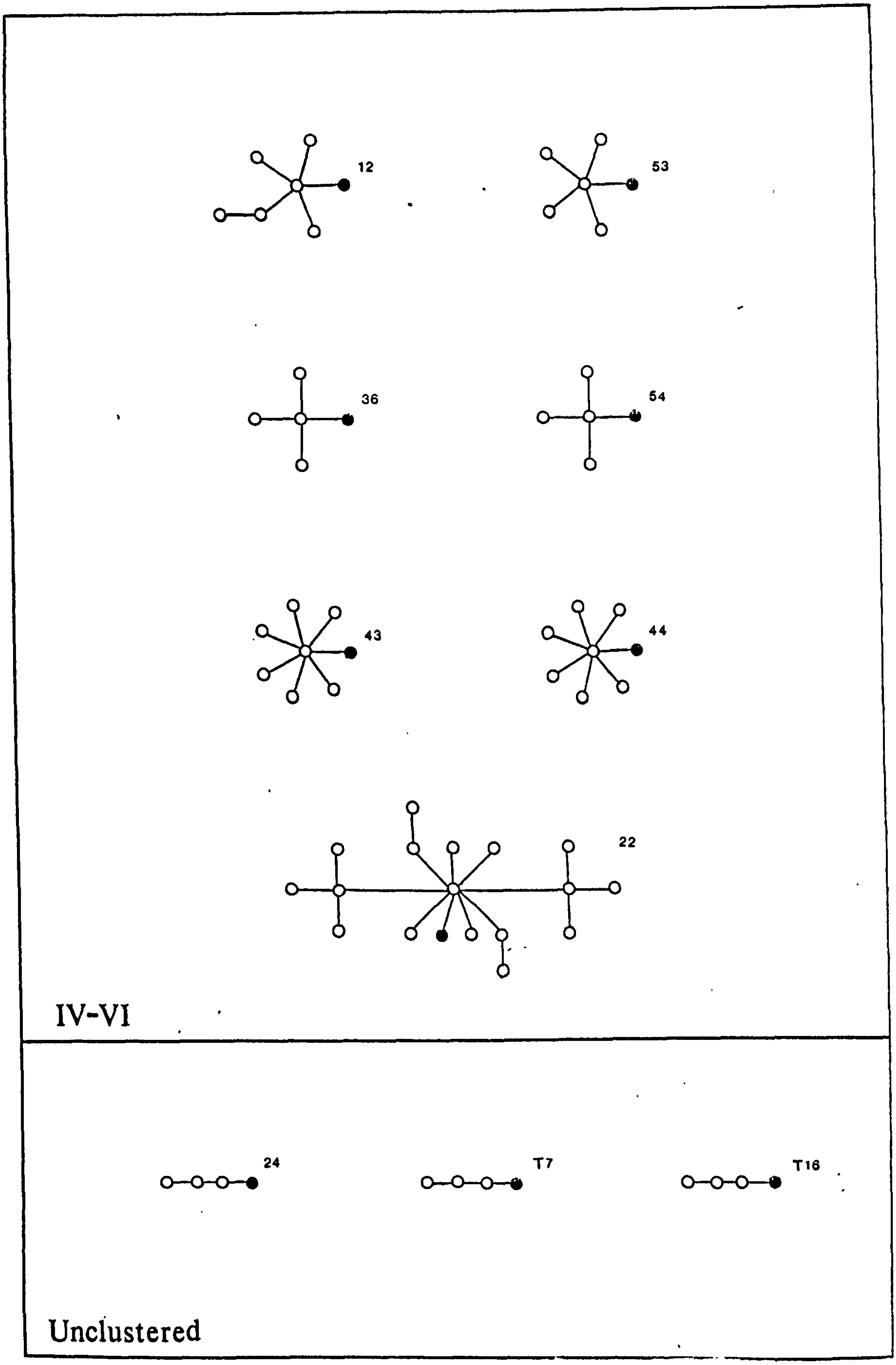


Figure 15.16. Demarcation of space within chambered cairns: clusters IV-VI, unclustered sites

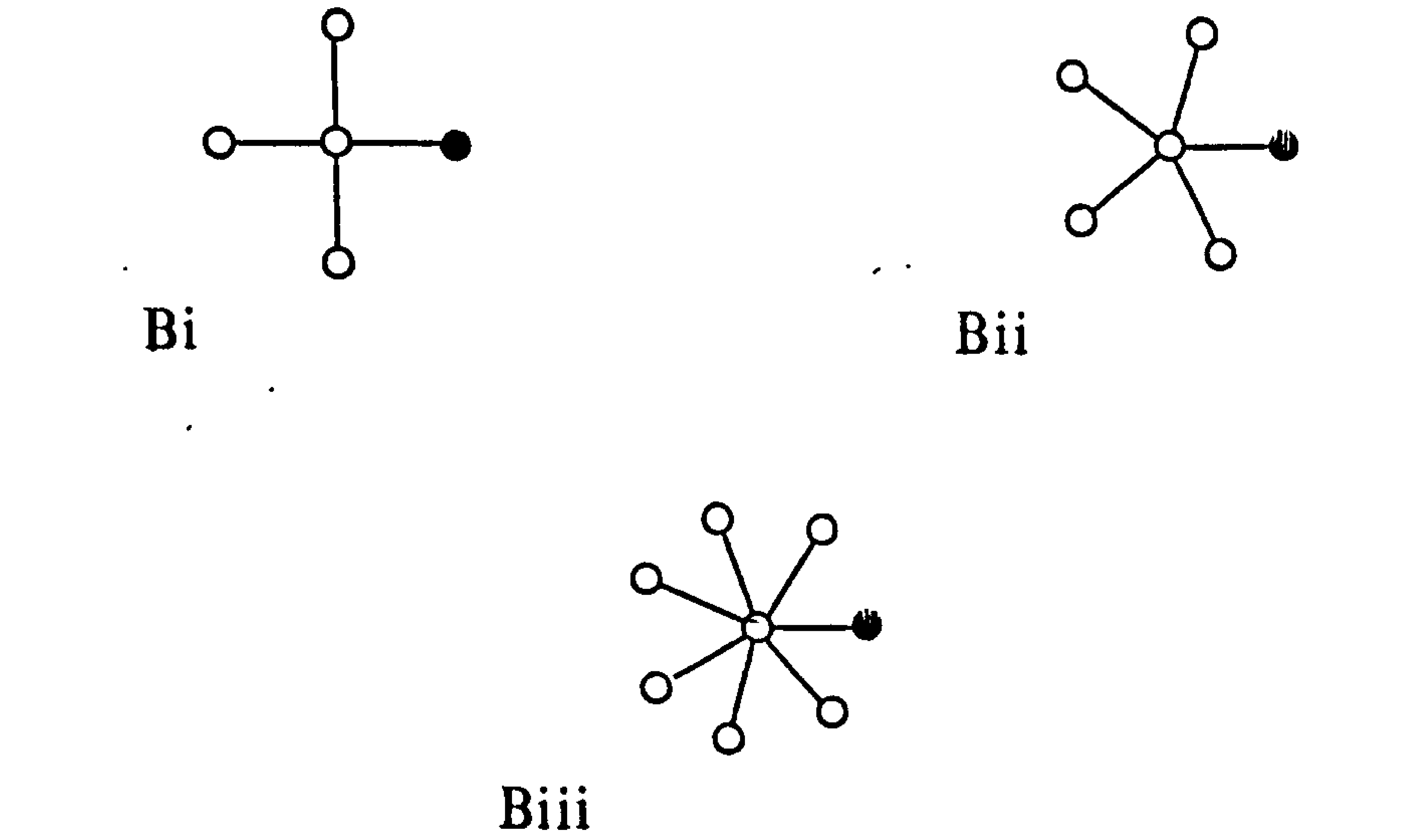


Figure 15.17. Demarcation of space within chambered cairns: general types

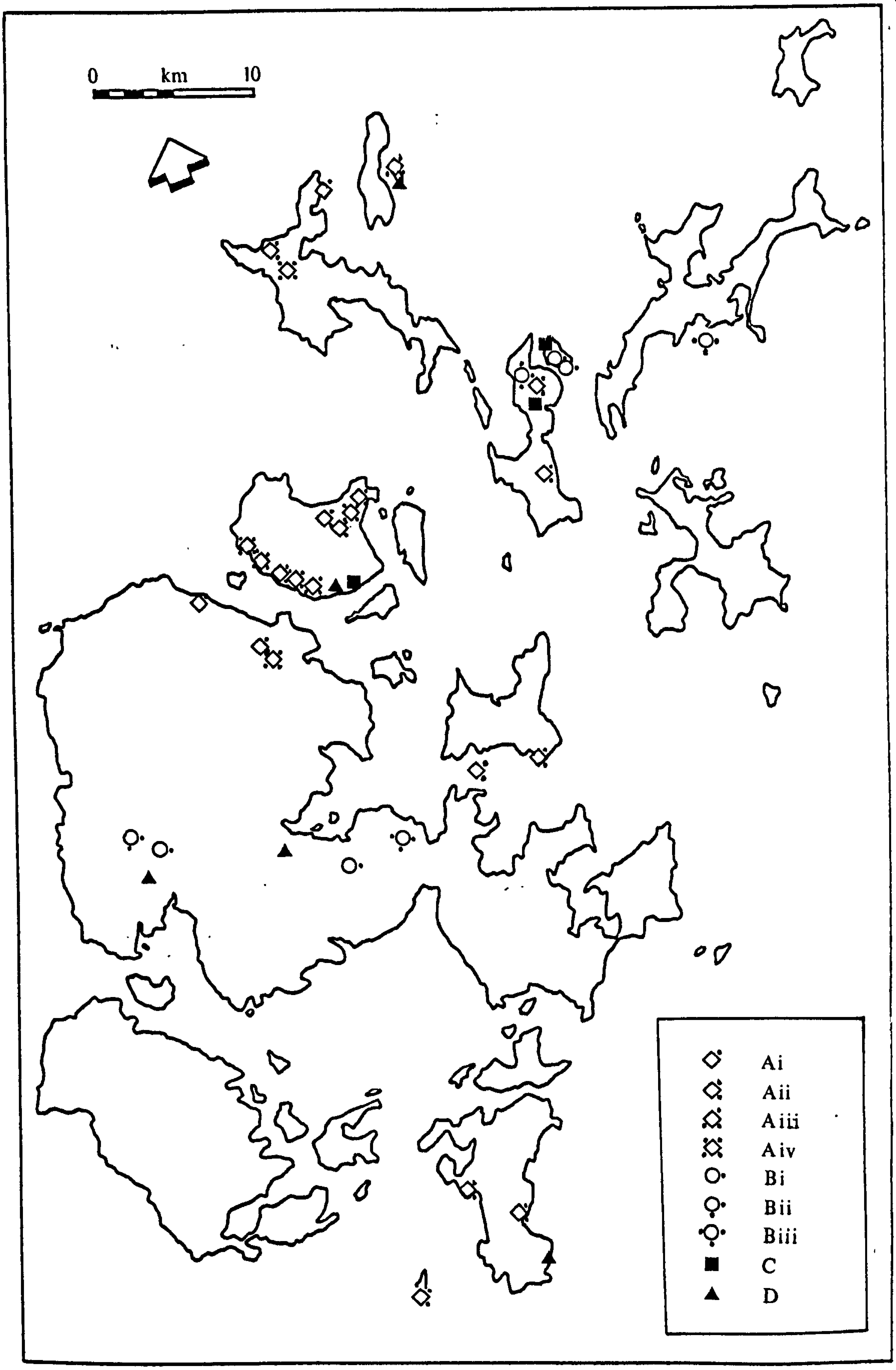


Figure 15.18. Demarcation of space within chambered cairns: distribution of general types

	Minimum number of individuals						
	Bos	Ovis	Cervus	Canis	Sus	Aquila	Others
ORK 3	*	24	*				*
ORK 7				7			*
ORK 12	*			24			*
ORK 21	*	*	13		*		*
ORK 22			*				*
ORK 25	*	*				14	*
ORK 30	*	*	14				*
ORK 31	1	*					*
ORK 32	1	3	35	*			*
ORK 37	*	*	*		*		*
ORK 43	3	25	2	2	2	*	*
ORK 44	*	*	*				*
ORK 51	*	*	*	*	*		*
ORK 54	*	*	*		*		*
ORK 55			*				*

Table 15.19. Concentrations of animal and bird remains from excavated sites

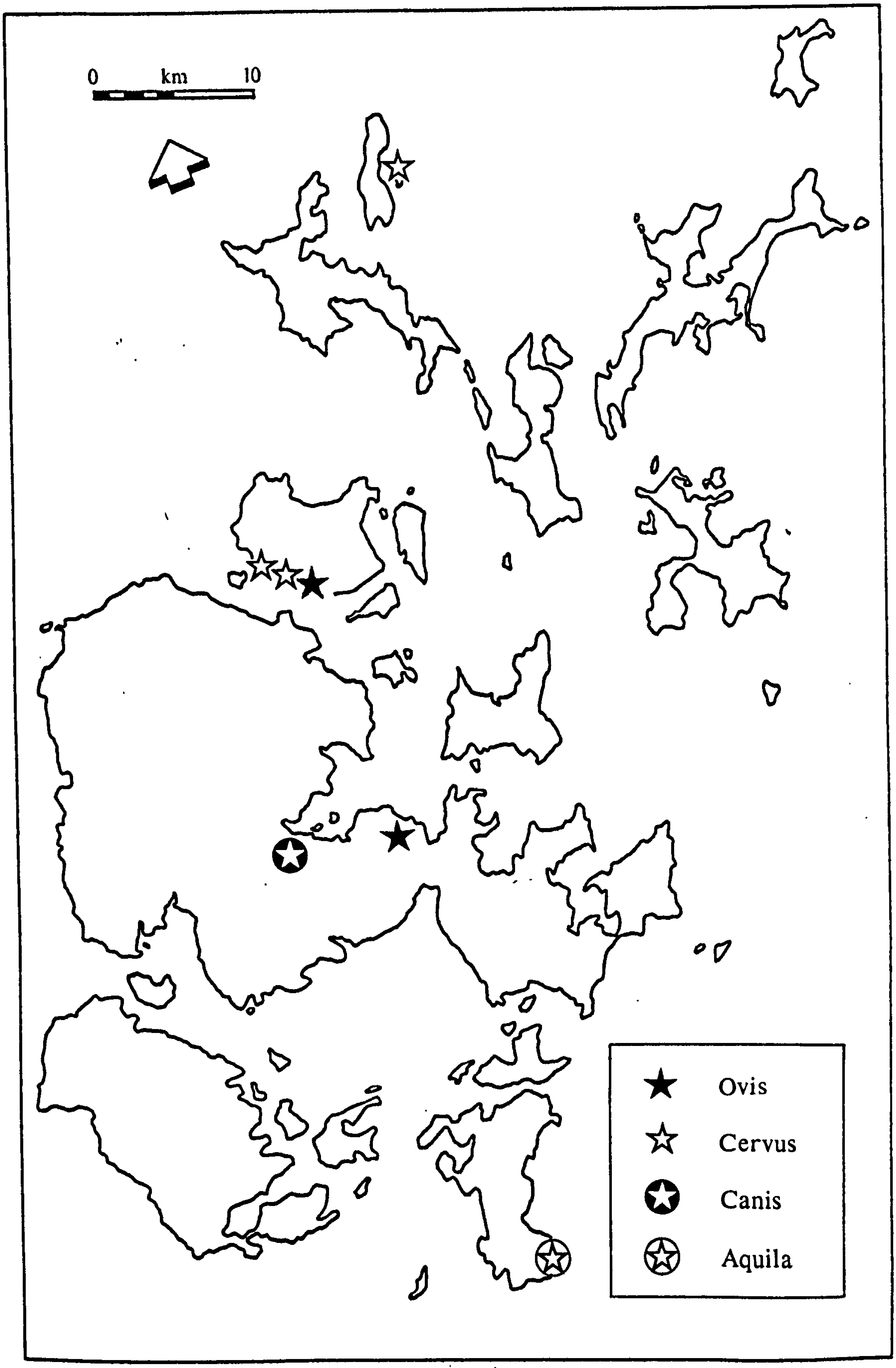
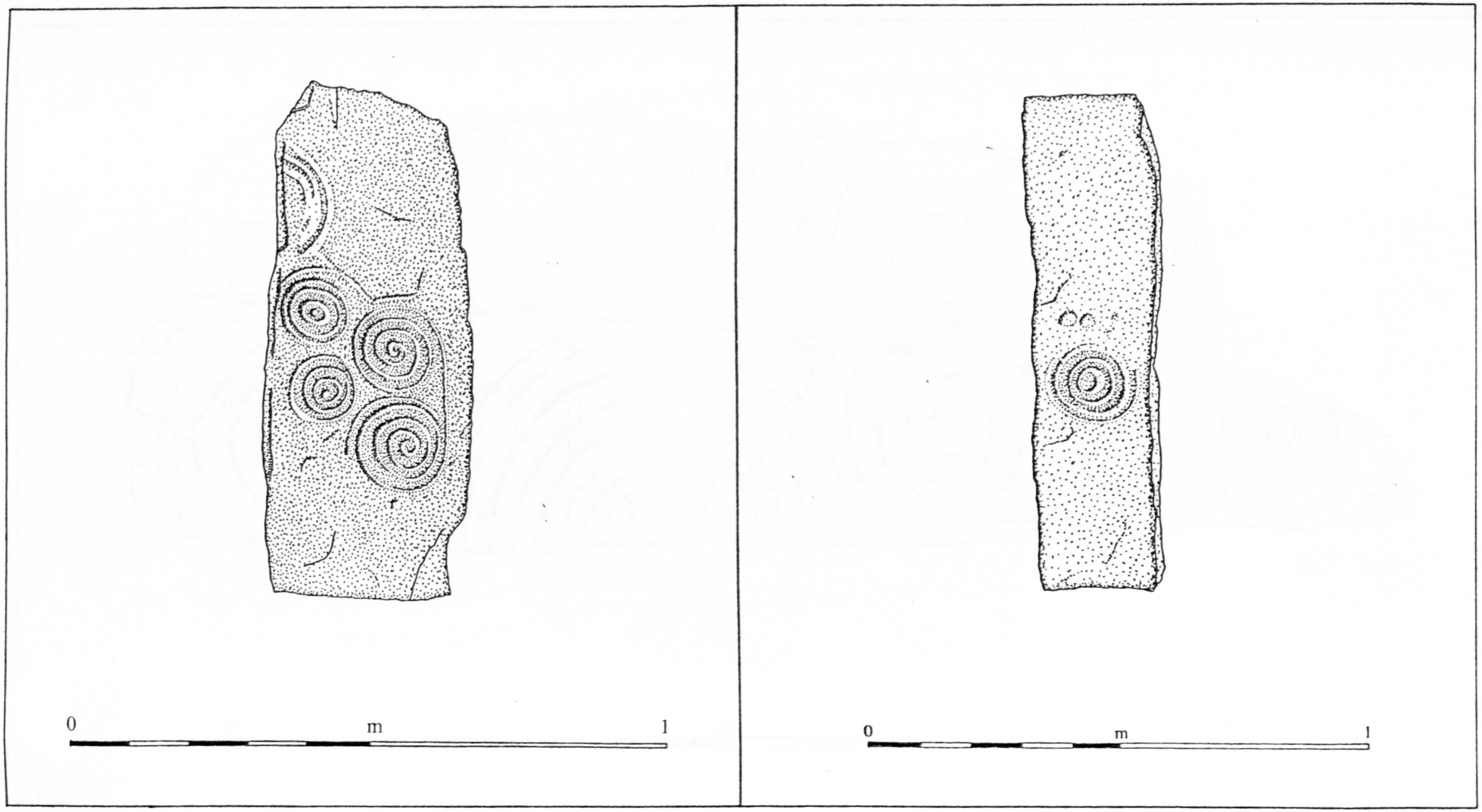


Figure 15.20. Distribution of concentrations of animal and bird remains from excavated sites



The decorated stone from Eday Manse (ORK 15) The decorated stone from a site at Pickaquoy,

Figure 15.21.

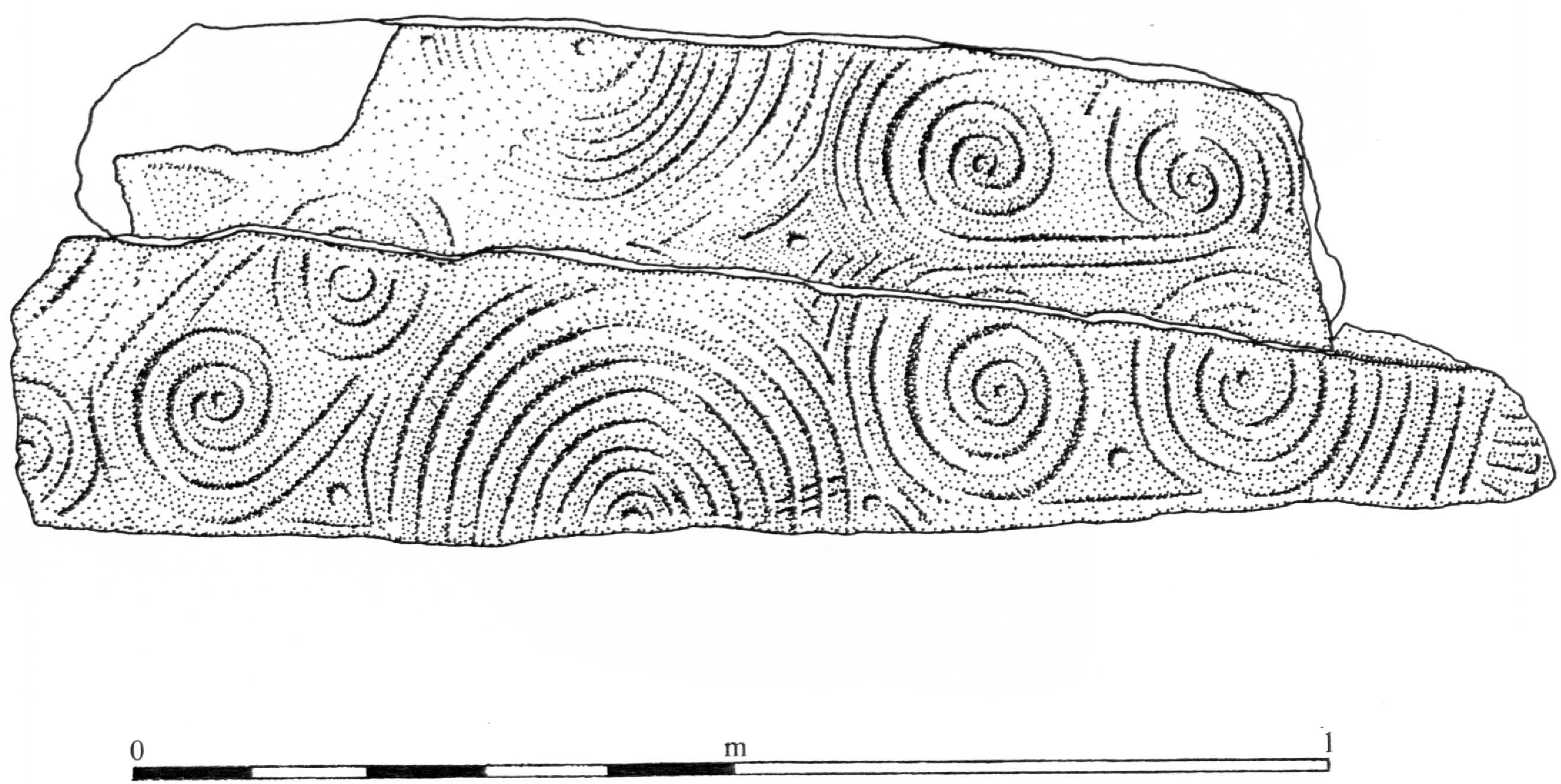


Figure 15.22. The decorated stone C from Pierowall, Westray (the "Westray Stone")

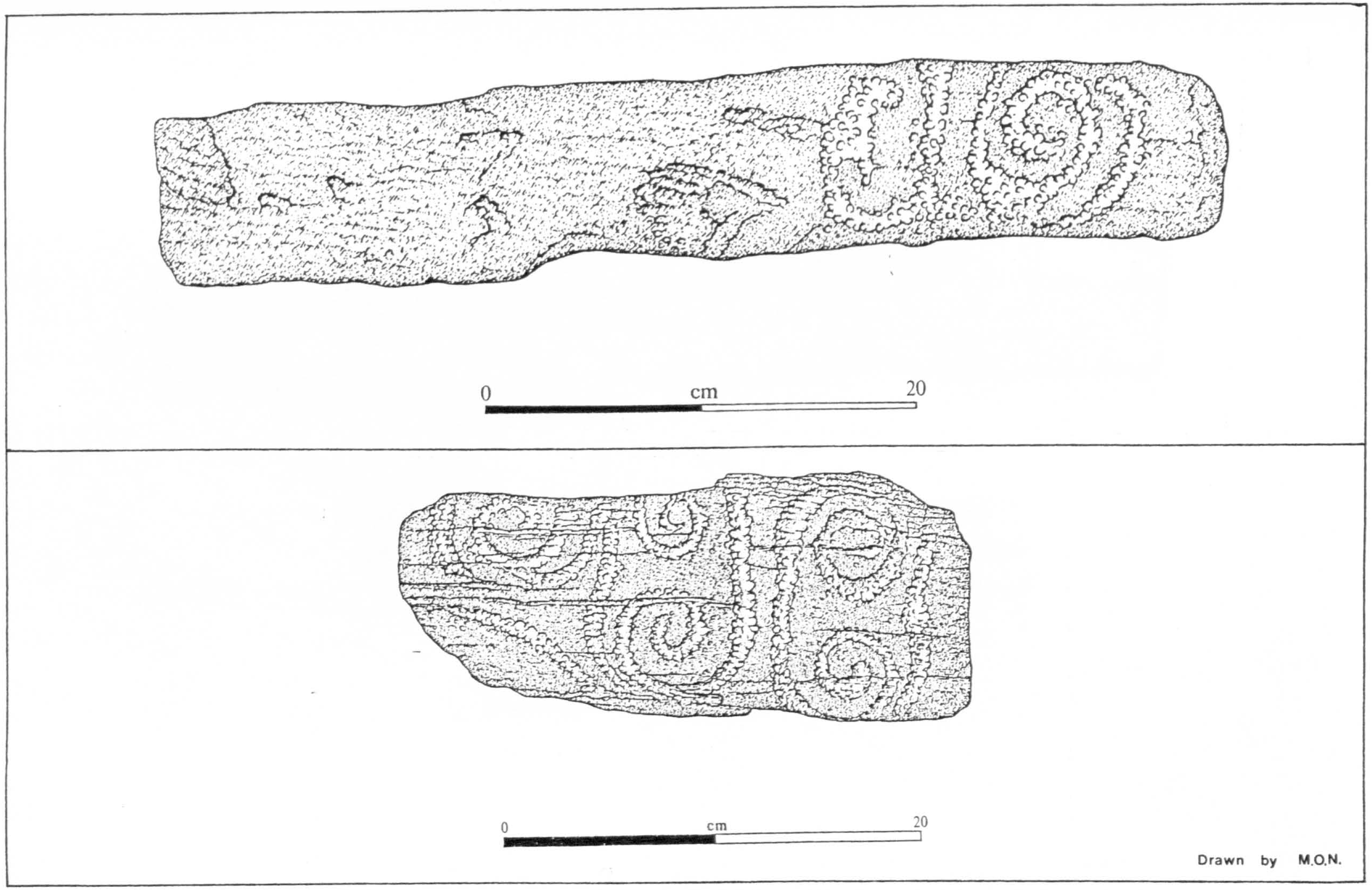


Figure 15.23. The decorated stones A and B from Pierowall, Westray.

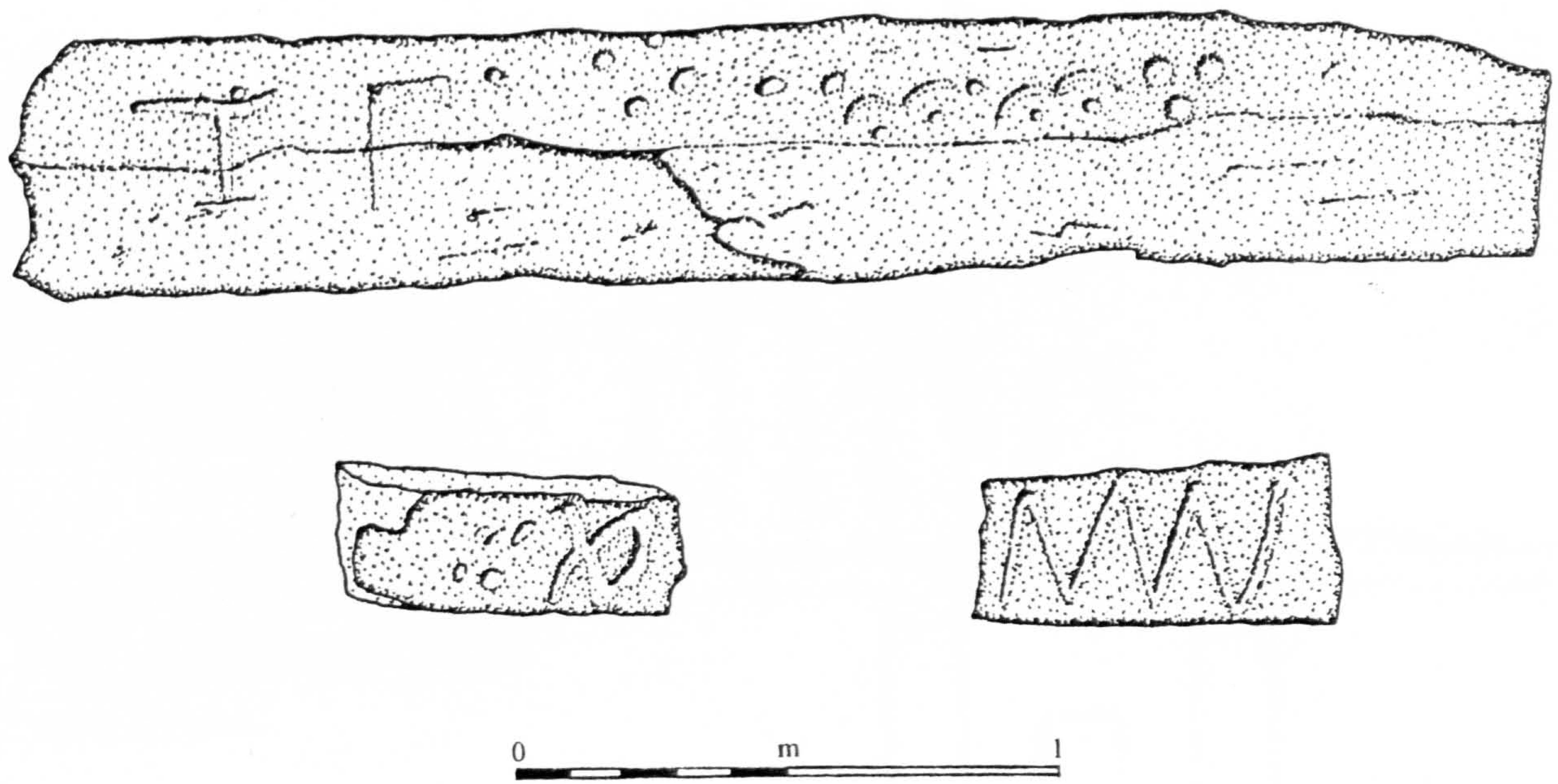


Figure 15.24. The decorated stones at Holm of Papa Westray South (ORK 22)

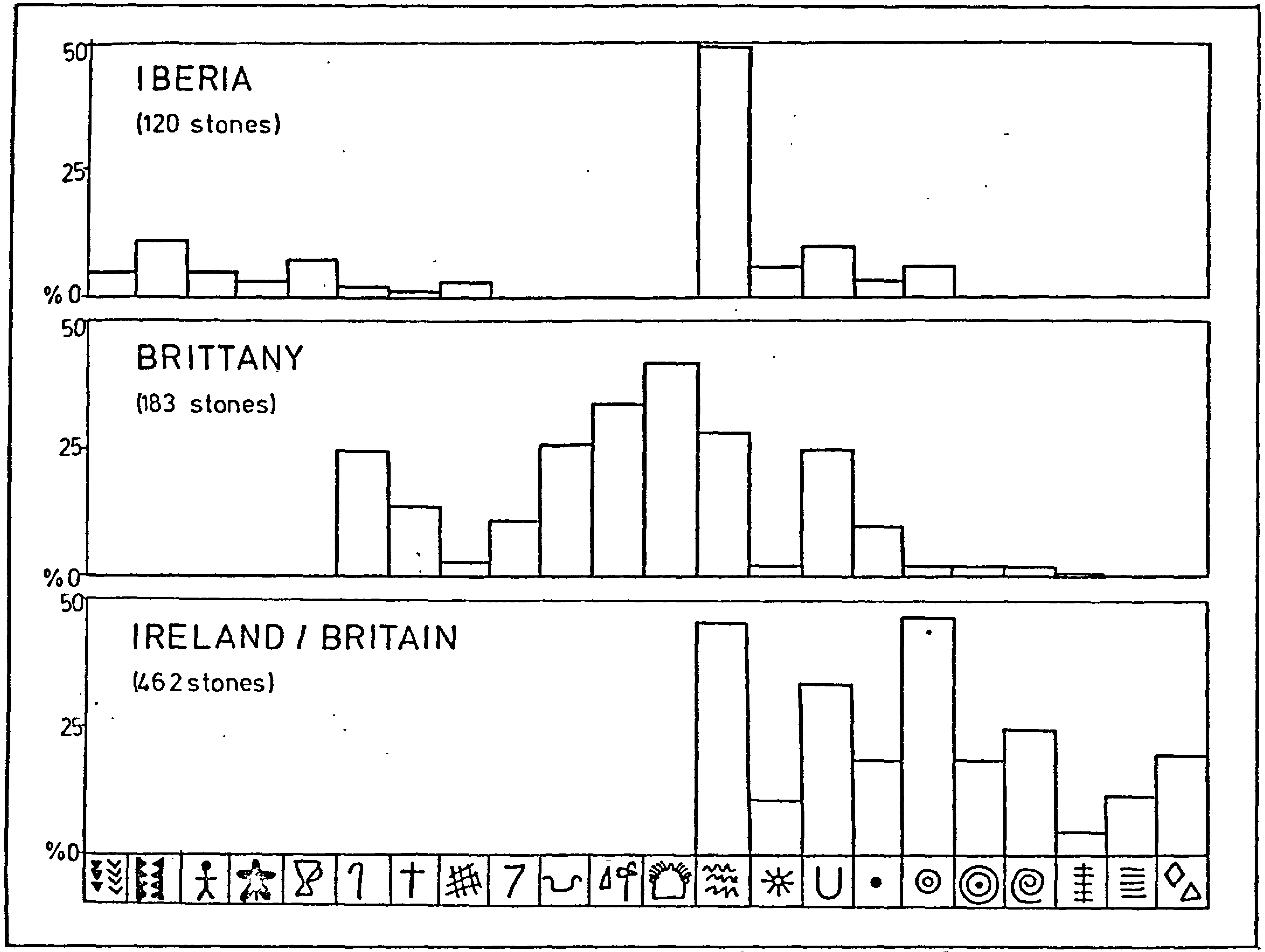


Figure 15.25. Distribution of passage grave motifs (from Twohig, 1981)

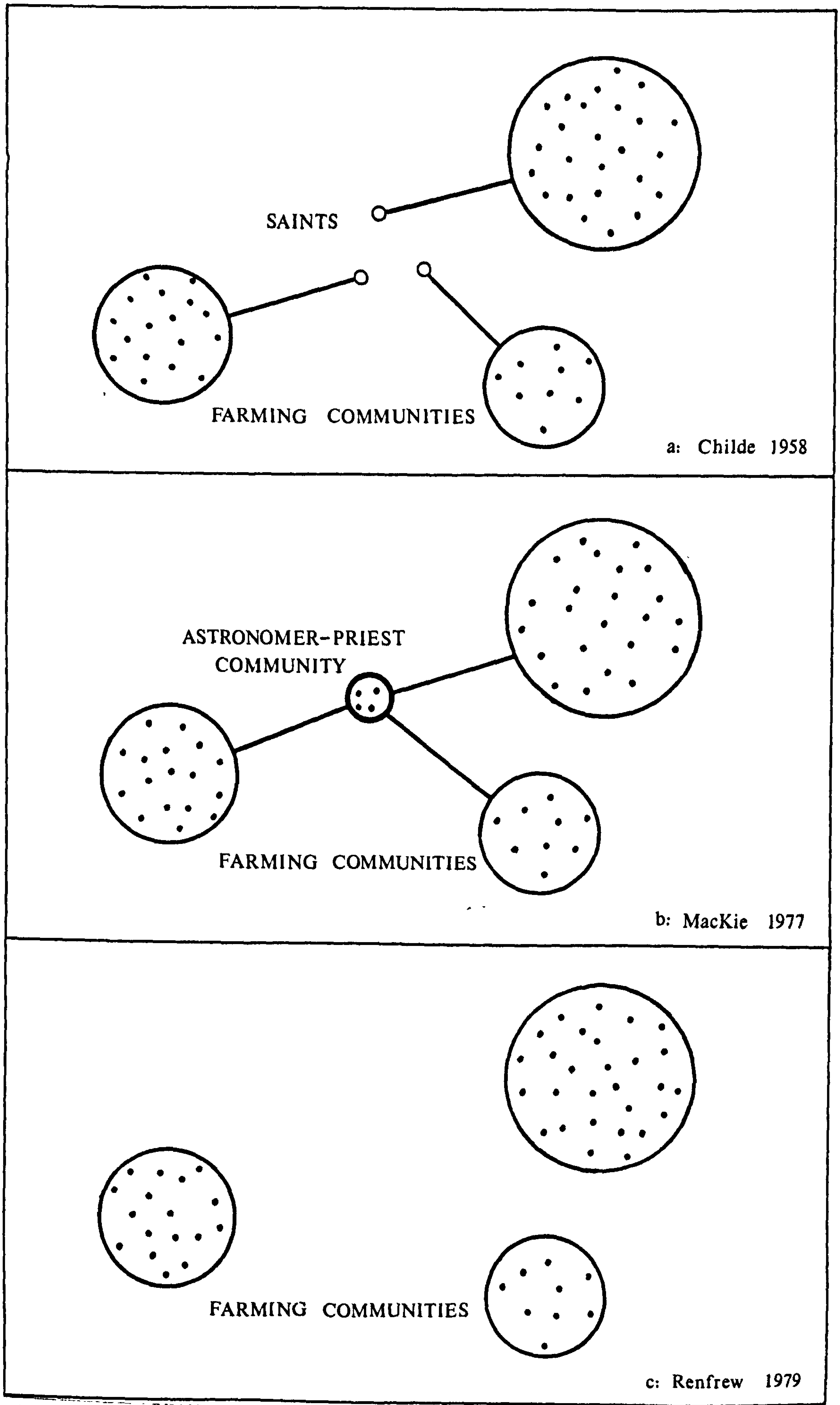


Figure 16.1. The social organisation of Neolithic Orkney: some alternative reconstructions

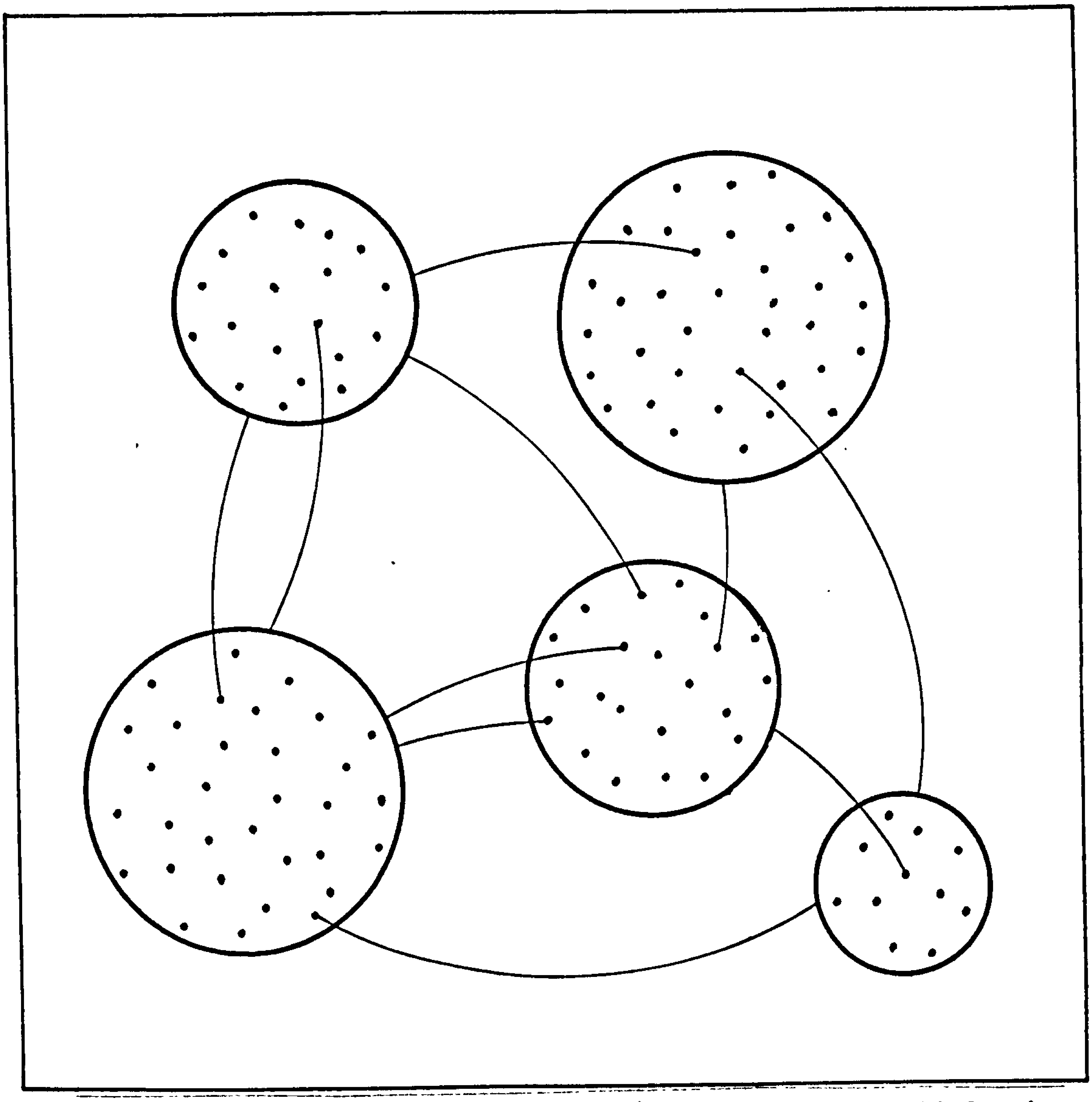


Figure 17.1. Social segmentation with kinship links in Neolithic Orkney

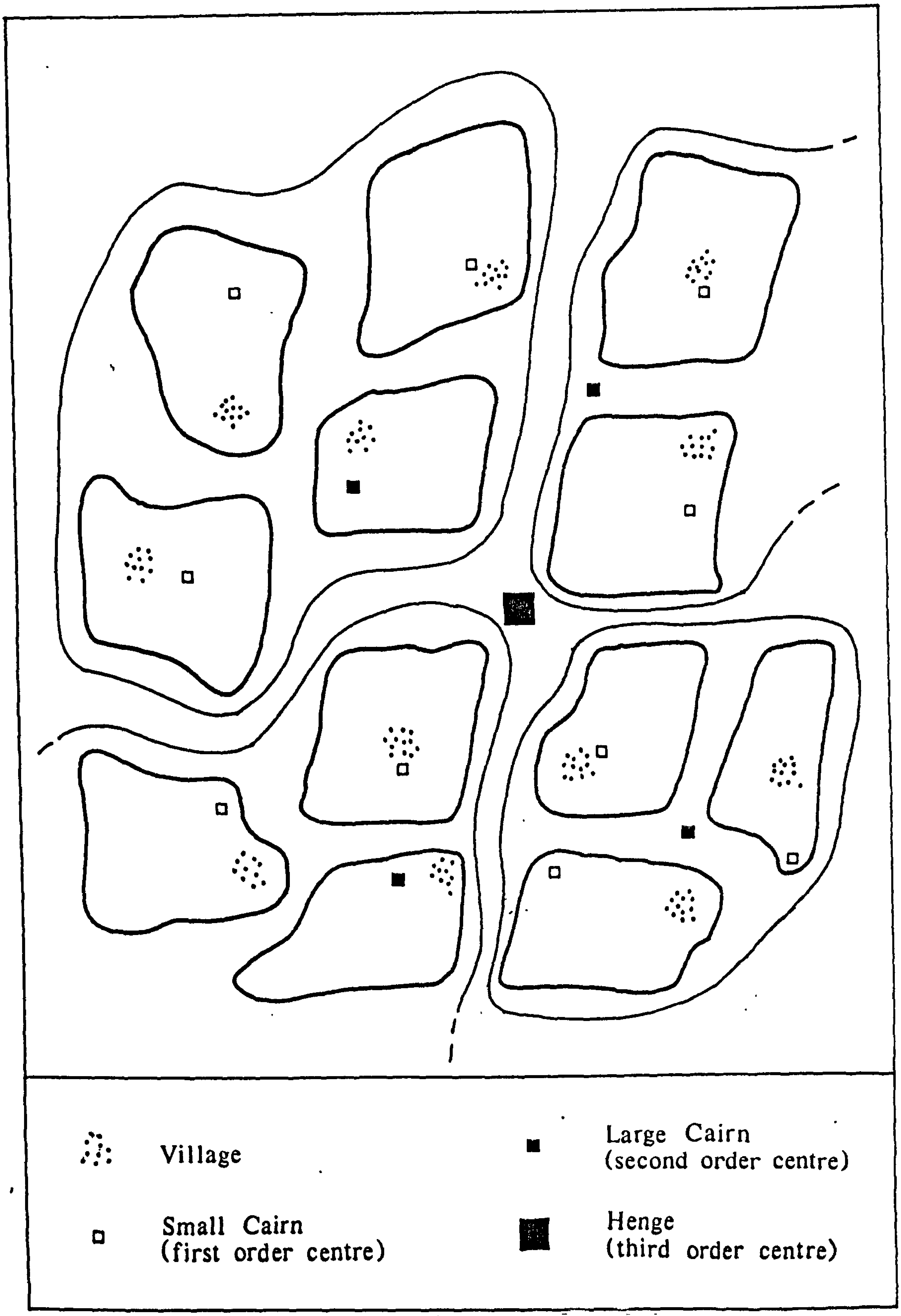


Figure 17.2. Spatial stratification in Neolithic Orkney

PLATES

PLATE A

Active coastal erosion at the site of Point of Cott (ORK 41), Westray.

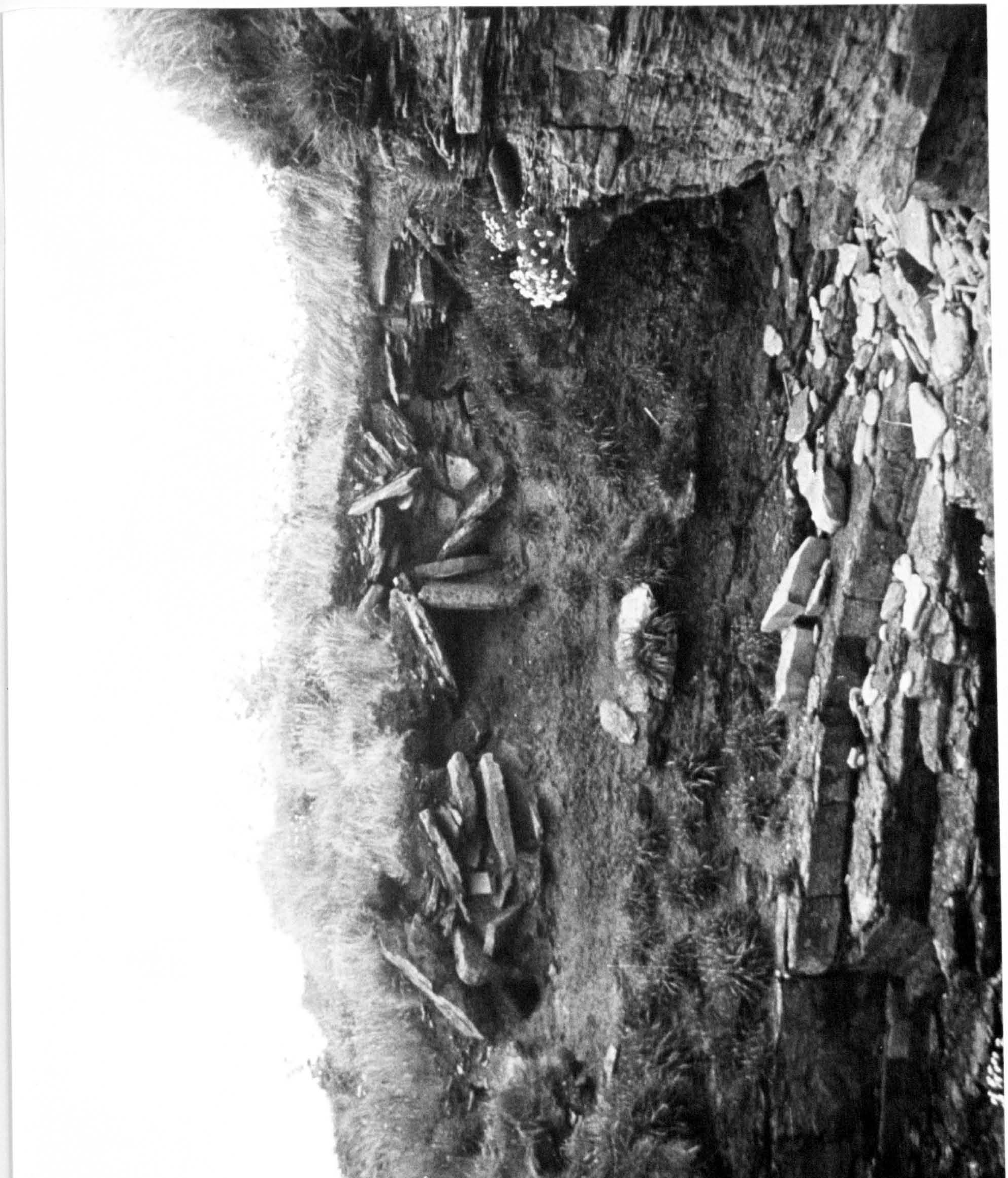


PLATE B

The chambered cairn of Isbister (ORK 25)
South Ronaldsay, showing stepped foundation
course of revetment wall.

PLATE C

The chambered cairn of Isbister (ORK 25), South Ronaldsay, showing interior of chamber divided into compartments and the shelf in the end compartment.

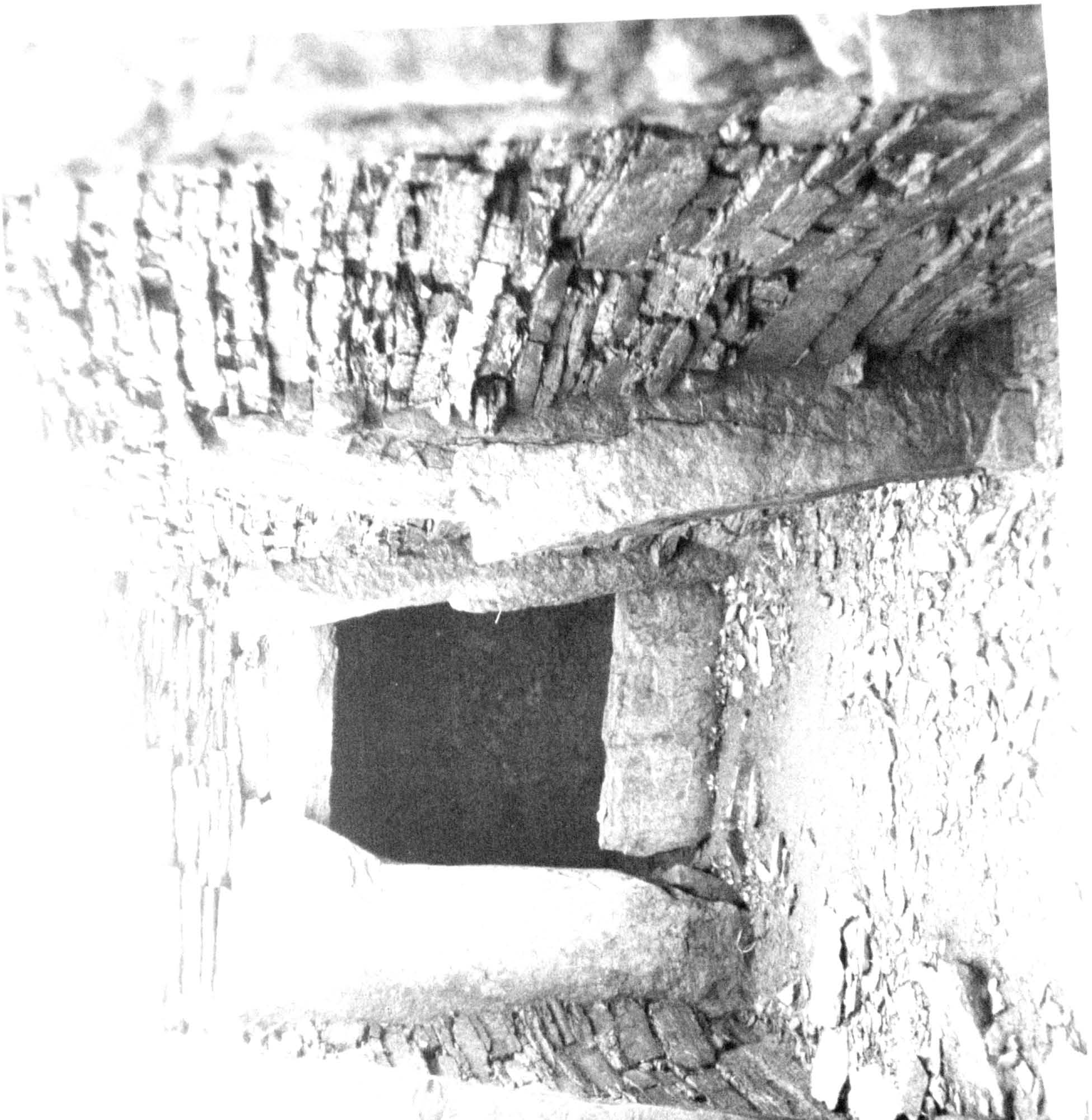


PLATE D

The chambered cairn of Quoyness (ORK 44), Sanday, showing corbelled stone-work of central compartment and entrance to the south-most cell.

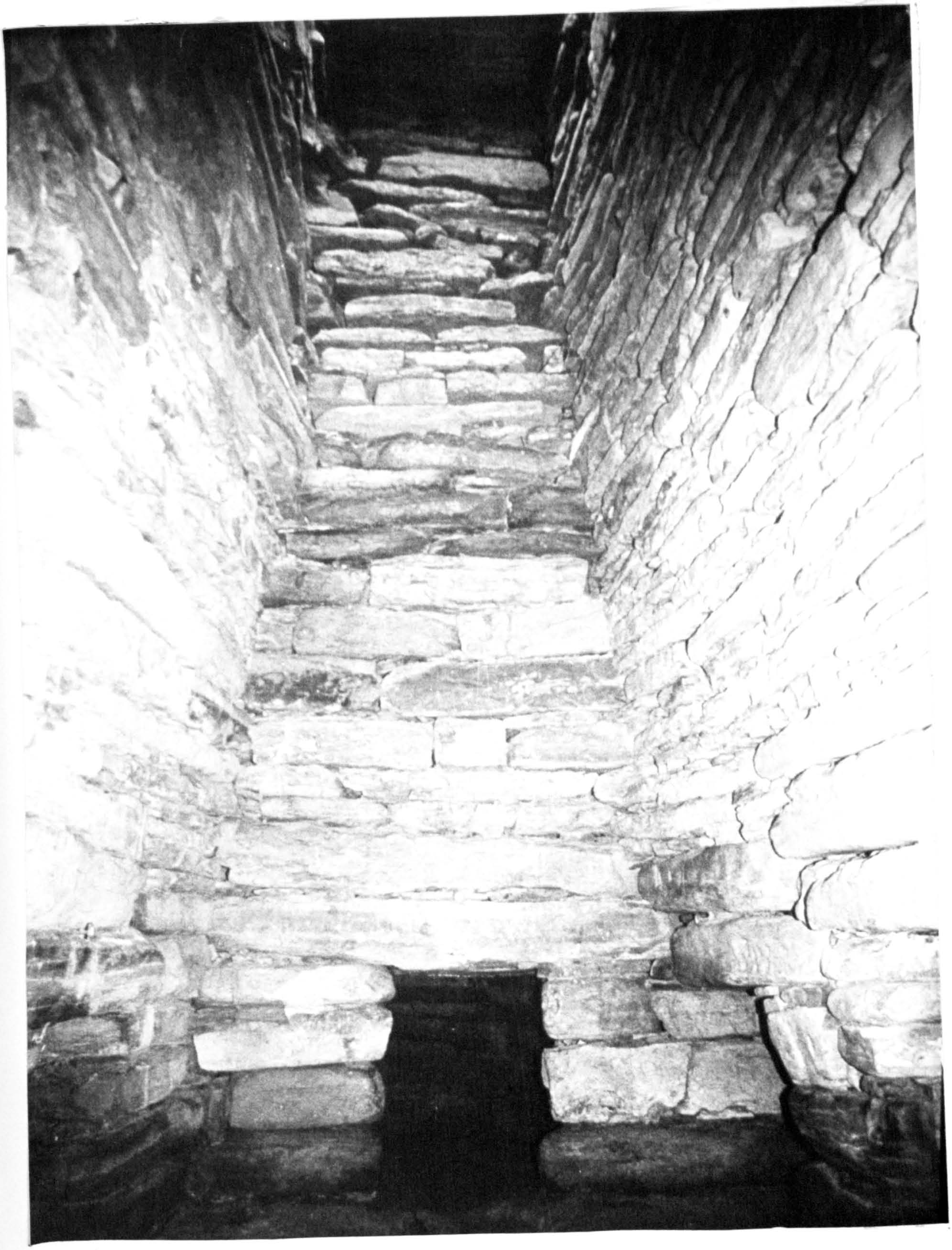


PLATE E

The chambered cairn of Quoyness (ORK 44), Sanday, showing the corbelled roof of the north-east cell.

PLATE F

The interior of the chambered cairn of Bigland Round (ORK 2), Rousay, from the east, with the chamber divided into three compartments by pairs of opposed orthostats.

PLATE G

The settlement site of Knap of Howar, Papa Westray, showing house 2 from the east.

PLATE H

Evidence of ploughing at the base of a Neolithic midden at Links of Noltland, Westray.

PLATE I

Part of the circle of standing stones with exterior ditch, Ring of Brogar, Mainland.

PLATE J

The Stone of Setter, Eday.

PLATE K

The landscape unit of Eday North looking south-east from HY 561379. The chambered cairns of Braeside (ORK 5) and Huntersquoy (ORK 23) are located close together near the centre of the plate.

PLATE L

A rock beach near Honeysgeo, South Ronaldsay, demonstrating the easy availability of good building stone from the Orcadian shore.

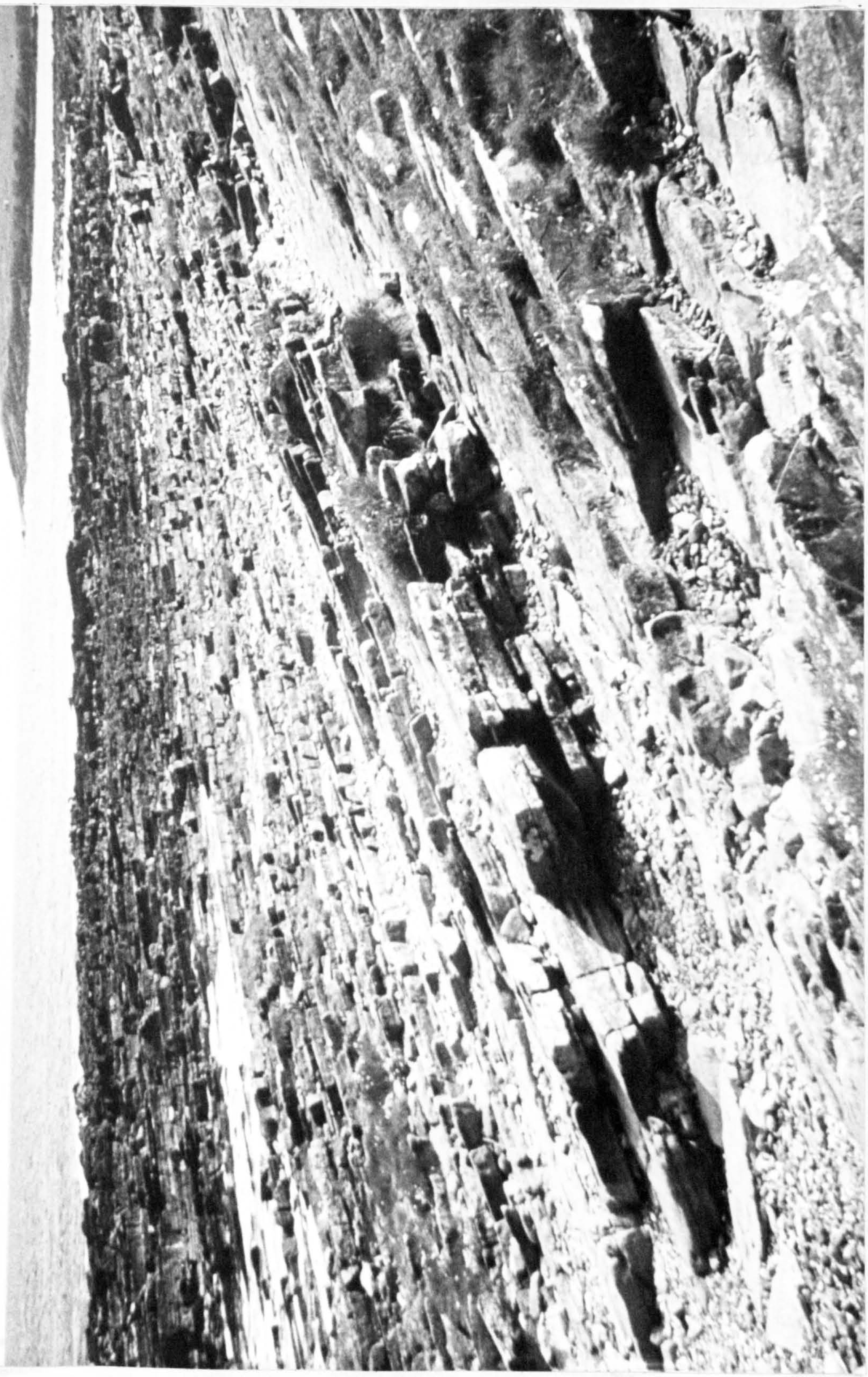


PLATE M

Terraces, or hamars, a characteristic structural feature of the Orkney landscape. The plate is of the north-east shoulder of Kierfea Hill in Rousay, and is taken from the chambered cairn of Bigland Long (ORK 1).

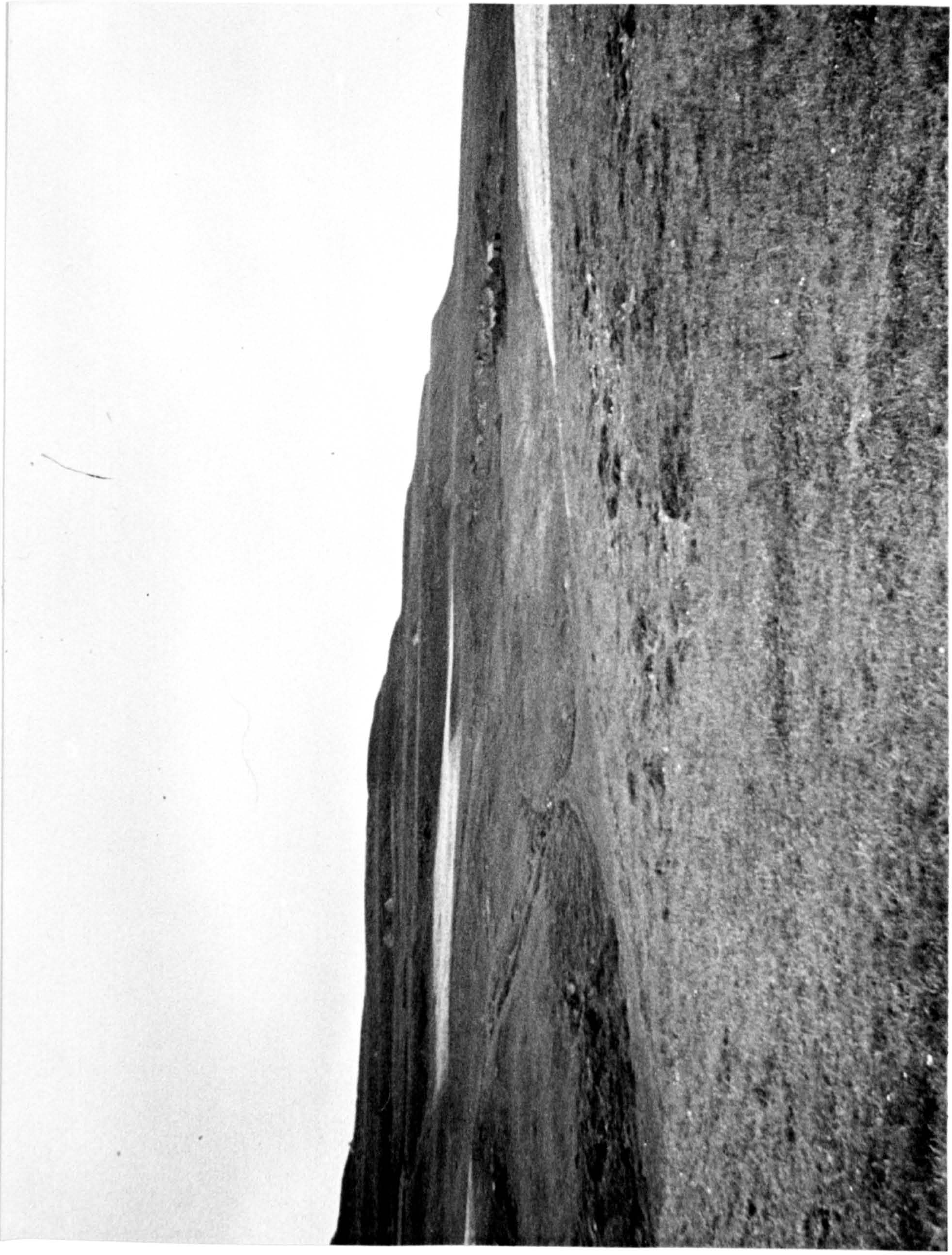


PLATE N

The situation of Bigland Round (ORK 2), Rousay, conforming to the classical Childean model. The cairn in the foreground is on the edge of a terrace and overlooks the settlement site of Rinyo, not visible in the plate but located at the edge of the fields of the modern farm of Bigland.

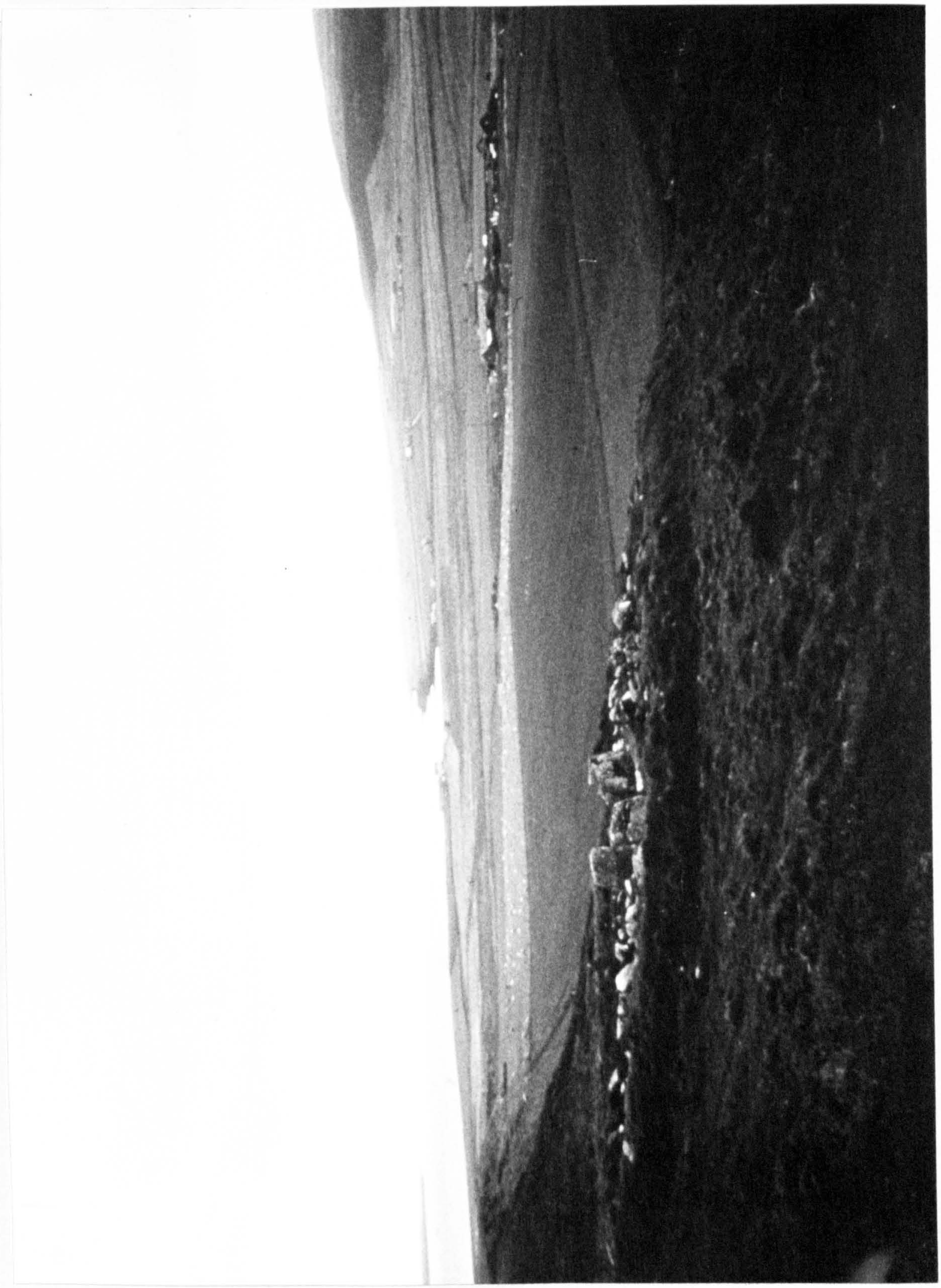


PLATE 0

Thomas' plan of the Ring of Bookan (ORK 45), made in the 1850s. (Reproduced with the kind permission of Ms Alison Fraser, Archivist, Tankerness House).

*Ring of Bóo-can. at Westbuster formed by a deep fosse (excavated) about 6 feet below the level of the adjacent surface.
the banks are very steep on both sides, and perfect for ¾ of the circumference. The interior circle is not level. and has evidently been the
site of some superstructures, but neither their form nor purpose could be ascertained. for here. as with the others. the Vandals have
destroyed the work of the Goths. A segmental bank of earth lies on the south side*

Radius to edge of bank	a	203 links
slope	b	125
bank	c	150
do	d	167
from center to upper bank	e	83

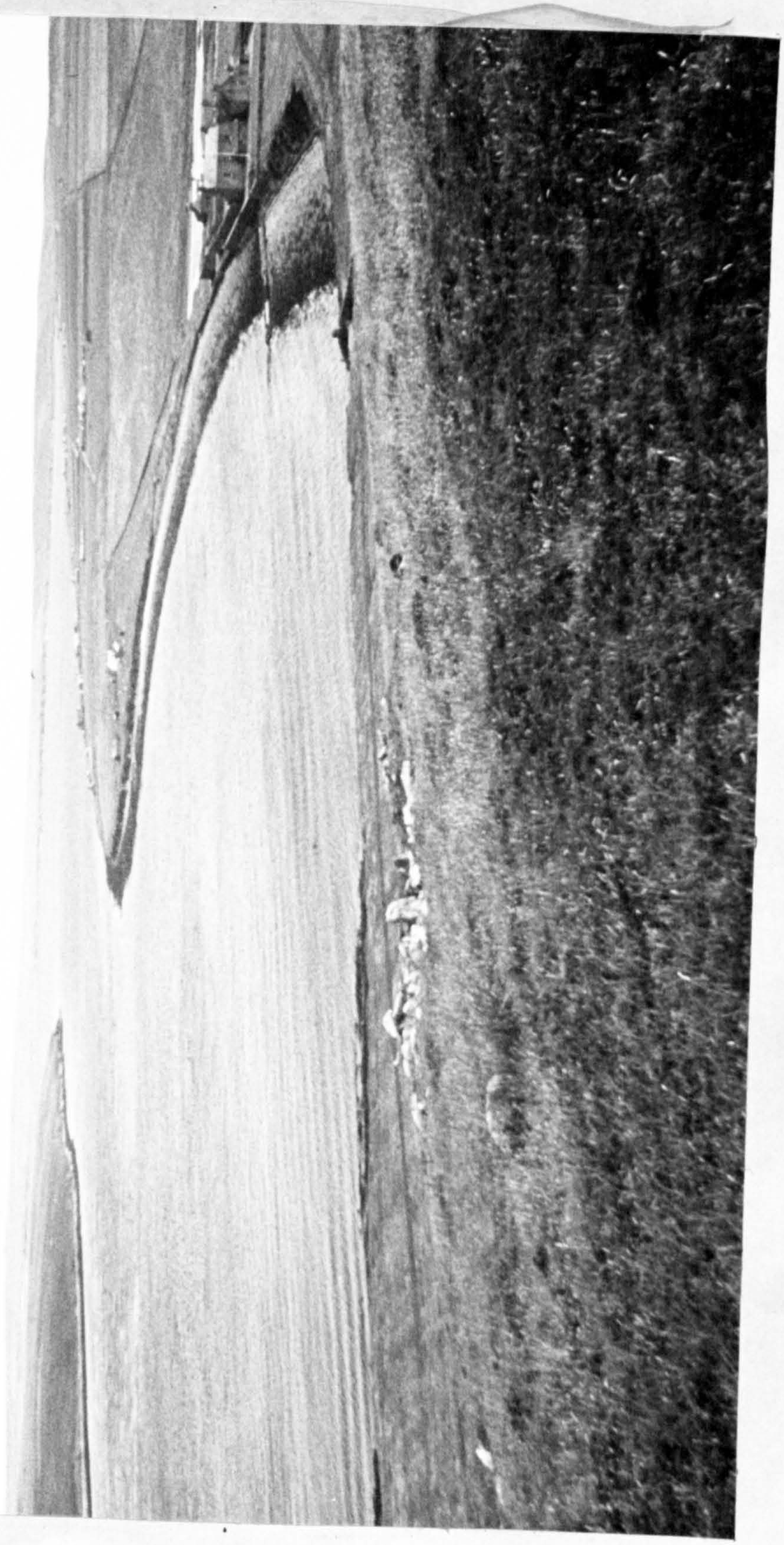
The interior positions of the interior stones are sketched in by eye. there is some indication of an arrangement in squares

PLATE P

The site of Holy Kirk (ORK T2), Sandwick.

PLATE Q

Calf Sound looking from the west with Eday in the foreground, Sanday on the horizon, and Calf of Eday to the left. The site of Carrick House (ORK T8) is in the central foreground and there are three chambered cairns (ORK 8, 9 and 10) barely visible on the Calf of Eday.



THE CHAMBERED CAIRNS OF ORKNEY:

LAND AND SOCIETY

IN THE THIRD AND SECOND MILLENNIA BC

VOLUME THREE

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Thesis submitted in accordance with the requirements for the degree of Doctor of Philosophy in the Faculty of Arts, University of Glasgow.

September, 1982

VOLUME THREE

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A GAZETEER OF THE CHAMBERED CAIRNS OF ORKNEY

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A GAZETEER OF THE CHAMBERED CAIRNS OF ORKNEY

EXPLANATION

This appendix contains the descriptive data on each chambered cairn and its environment used throughout the thesis. There are 76 chambered cairns: each is allocated three pages of information. The first contains identifications, location information, details of archaeological action, metrical details of the characteristics of the monument, and details of its situation. The second contains a written description amplifying and emphasising certain information, and a list of published references. The third page is a plan at 1:200 of the monument.

Each entry in the three data sheets is explained below:

1. Name

Following current archaeological practice, the name of a monument or site is its prime identifier. The names given here are either taken from Henshall's The Chambered Tombs of Scotland or have been agreed in collaboration with Henshall.

2-5. CATALOGUE NUMBERS.

2. Megalith number

Since 1969, there has been a standard system in Britain for referring to chambered cairns, chambered tombs, megaliths, megalithic tombs, and Neolithic mortuary structures. Each site has a three-letter area code followed by a running number. The system is explained

1	2

Map Reference 6	Ordnance Survey 3

Island 7	Parish 8	RCAMS Inventory 4
Category 10	Landranger Sheet 9	Orkney Heritage Society 5
Excavations 11	Plans 12	Visited 13

CAIRN 14	Length	PASSAGE 15	Length	CHAMBER 16	Length
	Width		Width		Width
	Area		Area		Area
	Orientation		Orientation		Compartments
	Shape				Cells
					Orientation
					Shape

GEOLOGY 17 Site Water Sandstone Peat Boulder Clay Miscellaneous	SOIL 18 Site Water Podzols Podzolic Com. Gleys Gleyic Com. Peat Miscellaneous	LAND USE CAPABILITY 19 Site Water Class 3 Class 4 Class 5 Class 6 Class 7 Miscellaneous
Visibility 20	Altitude 21 Site High Low	Topography 25
		Vegetation 26
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	Approaches 23	
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fully in Henshall (1972: 312-13) and Powell _et al_. (1969: xix-xxi). The code for Orkney is ORK. In order not to anticipate a resurvey of Orkney by Henshall and Davidson, it has been decided here to give certain additional sites megalithic numbers of the form ORK T1 where "T" stands for "temporary". These temporary numbers are not intended to have any currency beyond this work and will be replaced by numbers in the continuing ORK sequence in the future.

3. Ordnance Survey

The locational code used by the Ordnance Survey to index an archaeological site. The first six letters and digits refer to a 1:10000 map sheet: the last two digits give each site a unique reference within that sheet.

4. RCAMS Inventory

The number code used by the Royal Commission on the Ancient Monuments of Scotland to refer to a site in their inventory of Orkney, volume 2 of the Twelfth Report, published in 1946.

5. Orkney Heritage Society

The arbitrary number code used by the Orkney Heritage Society in their inventory of all archaeological sites in the island-group. Each number is prefixed by OR for Orkney.

6-9. LOCATION INFORMATION

6. Map reference

The National Grid reference of each site, taken, with few exceptions, from the Ordnance Survey index card for the site. References are given to eight figures. Orkney is contained within the 100 km grid squares ND and HY.

7. Island

The island on which each cairn is located.

8. Parish

The old parish in which each cairn is located, included here because much antiquarian writing uses the parish as a prime aid to location.

9. Landranger Sheet

The number of the Ordnance Survey Landranger map sheet at a scale of 1:50000 on which the cairn falls. Note again that the Ordnance Survey locational code includes the code of the 1:10000 map sheet.

10. Category

The category of certainty of classification, either Alpha, Beta or Gamma. These terms are explained in Volume I: 81-2 and 114-5.

11-13. ARCHAEOLOGICAL ACTION

11. Excavations

The date, and the name of the excavator, of any explorations of the chambered cairn by digging.

12. Plans

The date, and the name of the surveyor, of the plan or plans used in the drawing of the 1:200 plan in this appendix.

13. Visited

The date or dates on which the site was visited by this writer.

14-16. CHARACTERISTICS OF MONUMENT

14. Cairn

The five parameters are defined in Volume I: 89 and 359. Cairn length and width are measured in metres, cairn area in square metres and orientation in degrees true.

15. Passage

The four parameters are defined in Volume I: 111 and 359. Passage length and width are measured in metres, passage area in square metres and orientation in degrees true.

16. Chamber

The seven parameters are defined in Volume I: 104, 108, and 359. Chamber length and width are measured in metres, chamber area in square metres and orientation in degrees true.

17-27. CHARACTERISTICS OF SITUATION

17. Geology

The geological type in the immediate vicinity of the chambered cairn is described under "site". The remaining five figures describe the percentage area of land within one kilometre of the site falling into each geological type. The measurements were taken at a scale of 1:63360 from the maps of the Geological Survey.

18. Soil

The soil type in the immediate vicinity of the chambered cairn is described under "site". The remaining seven figures describe the percentage area of land within one kilometre of the site falling into each soil group. The measurements were taken at a scale of 1:50000 from the soil maps of the Soil Survey.

19. Land Use Capability

The land use capability class in the immediate vicinity of the chambered cairn is described under "site". The remaining seven figures describe the percentage area of land within one kilometre of the site falling into each class. The measurements were taken at a scale of 1:50000 from the land use capability maps of the Soil Survey.

20. Visibility

The sectors of Distant (D), Intermediate (I), and Restricted (R) visibility from each chambered cairn. Readings are taken in degrees true: the full procedure is described in Volume I: 292-3.

21. Altitude

The altitude above sea level of the chambered cairn is given under "site". The highest and the lowest points within one kilometre are given under "high" and "low". All readings are in metres and were taken from the Ordnance Survey 1:10000 maps or converted from the 1:10560 maps.

22. Coast

The nature of the nearest coast is "low rock", "high cliff" or "beach", the terms being explained in Volume I: 302. The distance of that coast is given in metres and was measured from the 1:10000 or 1:10560 map.

23. Approaches

The nature of the approaches to each chambered cairn are described as "easy", "restricted", or "difficult". These terms are defined in Volume I: 298-9.

24. Drainage

The quality of the drainage around each chambered cairn is described as "good", "fair", or "poor". These terms are defined in Volume I: 296.

25. Topography

The terrain immediately around each chambered cairn was placed in one of eight topographic units described in Volume I: 279.

26. Vegetation

The nature of the present-day vegetation around each site is described as "heathland", "unimproved pasture", "improved pasture" or "arable". These terms are discussed in Volume I: 283.

27. Intervisibility

A list of other chambered cairns which can be seen from the site.

28. Short description

This description is intended to amplify, emphasise or disagree with points which have been made in previously published descriptions. It begins with a locational sentence designed to aid the field-worker in finding the site. The cairn and the chamber are then described. Finds made at the site and the presence of nearby monuments of prehistoric date are discussed.

29. Short references

In each case, an asterisk marks the single reference with most primary information. One additional reference for the majority of sites is the Ordnance Survey index card, the code of which is given at item 3.

Inventories

RCAMS The Royal Commission on the Ancient Monuments of Scotland Twelfth Report with an Inventory of the Ancient Monuments of Orkney and Shetland. Three volumes. Edinburgh: HMSO, 1946.

CTS Henshall, A.S. The Chambered Tombs of Scotland. Two volumes. Edinburgh: Edinburgh University Press, 1963 and 1972.

Journals

Arch Archaeologia

Arch J. Archaeological Journal

APA Acta Praehistoria et Archaeologica

MASL Memoirs of the Anthropological Society of London

POAS Proceedings of the Orkney Antiquarian Society

PSAS Proceedings of the Society of Antiquaries of Scotland

Newspapers

TO The Orcadian

OH Orkney Herald

Manuscripts

Antiq Ms Manuscripts housed in the National Museum of Antiquities of Scotland, Edinburgh, belonging to the Societies of Antiquaries of Scotland.

NMR Manuscripts or copies of manuscripts housed in the National Monuments Record, Edinburgh.

Books

References to books by author(s) and date are fully detailed in the bibliography.

30. Plan

Plans of sites are normally at a scale of 1:200. Where this is not the case then the alternative scale is given on the plan. Solid black is used for earth-fast or cairn-fast stones. Outline black is used for stones which are not securely in situ. Solid lines are used for walling revealed by excavation. Dotted lines are used for walling which is uncertain or interpolated, and to mark the outermost edge of cairn scatter. The north arrow is commonly true north, although in some cases where the plan has been copied from a published report, there is no knowledge of the nature of the north arrow.

BIGLAND LONG	ORK 1

Map Reference	Ordnance Survey
HY 43543214	HY 43 SW 12

Island	Parish	RCAMS Inventory
Rousay	Rousay	566

Category	Landranger Sheet	Orkney Heritage Society
Beta	5,6	-

Excavations	Plans	Visited
-	1935: Calder 1980: Fraser	7/6/80

CAIRN		PASSAGE		CHAMBER	
Length	24.0	Length		Length	18.0
Width	13.5	Width		Width	2.5
Area	274	Area		Area	45
Orientation	132-312	Orientation		Compartments	10
Shape	Oval			Cells	0
				Orientation	129
				Shape	Simple

GEOLOGY		SOIL		LAND USE CAPABILITY	
Site	Sandstone	Site	Podzolic Com.	Site	Class 4
Water	5	Water	5	Water	5
Sandstone	77	Podzols	7	Class 3	1
Peat	0	Podzolic Com.	84	Class 4	29
Boulder Clay	16	Gleys	0	Class 5	32
Miscellaneous	2	Gleyic Com.	0	Class 6	33
		Peat	4	Class 7	0
		Miscellaneous	0	Miscellaneous	0

Visibility

I	003-115
D	115-170
I	170-348
R	348-003

Altitude

Site	20
High	165
Low	0

Coast

Nature	Cliff
Distance	660

Approaches: Easy

Drainage: Fair

Topography: Valley bottom

Vegetation: Improved pasture

Intervisibility

ORK 2

ORK T3

ORK T4

BIGLAND LONG ORK 1

In the bottom of the valley between Faraclett Head and Kierfea Hill in north east Rousay, this site is approached across fields from the farm of Bigland.

Now a grass-covered mound of uncertain outline crossed by a fence, there are a number of upright stones protruding through the turf forming a pattern characteristic of the cluster I cairns of Rousay. Henshall interpreted this pattern as consisting of a chamber of six compartments aligned along the main axis of the cairn with a secondary chamber with a massive back-slab inserted at an angle. The back-slab was not visible earlier this century and an equally likely suggestion is that all the upright stones are part of one long chamber with ten or eleven compartments. Angled passage-graves are rare in Scotland but common elsewhere in Europe.

Immediately to the north-east is an area of disturbed ground suggesting two or more small cairns. Within a kilometre are four more Neolithic cairns and the settlement of Rinyo.

Plate M is taken from Bigland Long looking north-west.

*RCAMS 2:205
CTS 1:183


1 BIGLAND LONG

BIGLAND ROUND			ORK 2
Map Reference HY 43833250		**Ordnance Survey** HY 43 SW 13	
Island Rousay	**Parish** Rousay	**RCAMS Inventory** 565	
Category Alpha	**Landranger Sheet** 5,6	**Orkney Heritage Society** -	
Excavations 1938: Grant	**Plans** 1938: Wilson	**Visited** 7/6/80	

CAIRN		PASSAGE		CHAMBER	
Length	12.2	Length	1.2	Length	4.9
Width	11.3	Width	0.5	Width	2.1
Area	109	Area	0.6	Area	8
Orientation	-	Orientation	153	Compartments	3
Shape	Round			Cells	0
				Orientation	162
				Shape	Simple

GEOLOGY		SOIL		LAND USE CAPABILITY	
Site	Sandstone	Site	Podzolic Com.	Site	Class 6
Water	9	Water	9	Water	9
Sandstone	84	Podzols	4	Class 3	1
Peat	0	Podzolic Com.	87	Class 4	27
Boulder Clay	7	Gleys	7	Class 5	27
Miscellaneous	0	Gleyic Com.	0	Class 6	36
		Peat	0	Class 7	0
		Miscellaneous	0	Miscellaneous	0

Visibility	Altitude	Topography
D 153-184 I 184-318 R 318-153	Site 40 High 106 Low 0	Terrace edge
		Vegetation Heathland
	Coast Nature Cliff Distance 550	**Intervisibility** ORK 1 ORK T3
	Approaches Restricted	
	Drainage Good	

BIGLAND ROUND ORK 2

On the south-west slopes of Faraclett Head in north-east Rousay, this monument is situated on the edge of the first major terrace north of the farm-house of Bigland.

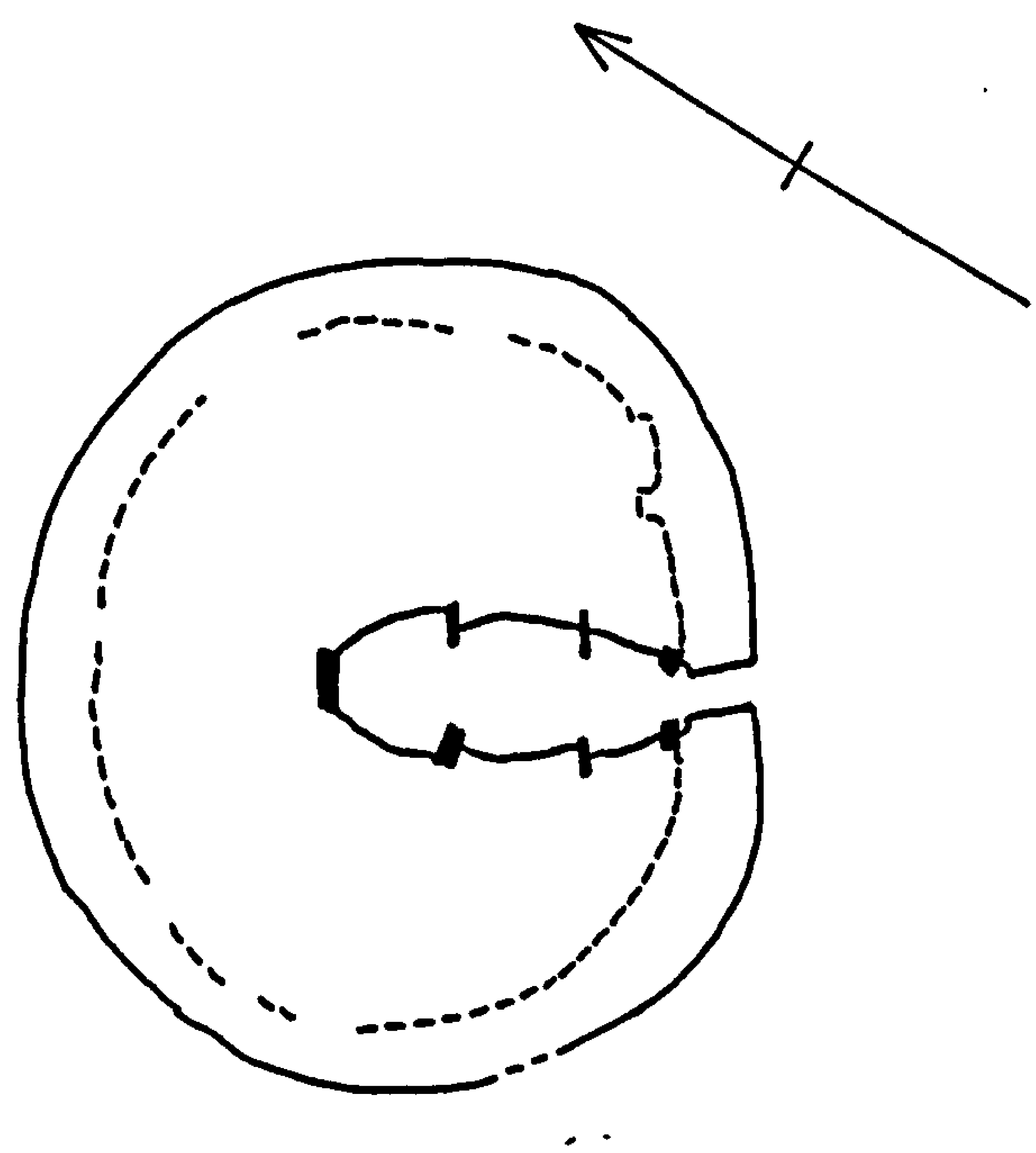
The cairn material has been removed by Grant down to the basal layer. Today all the structural stones of the outer revetment, most of the stones of an inner wall and the base stones of the chamber including seven massive orthostats, can be seen. The tallest orthostat is 1.70 m high. The removal of the cairn makes this site one of the most readily appreciated of the cluster III monuments with tri-partite chambers in Orkney.

Fragments of two simple pots, one of them probably round-based, and several pieces of flint, were found during excavation.

Bigland Round is part of the dense concentration of Neolithic sites, including Rinyo settlement, in this part of Rousay.

Plate F is a view of the chamber from just outside the entrance in the south-east and plate N is taken from the north looking towards the Suso valley.

*RCAMS 2:204
CTS 1:183-4



2 BIGLAND ROUND

BLACKHAMMER	ORK 3

Map Reference	Ordnance Survey
HY 41422761	HY 42 NW 3

Island	Parish	RCAMS Inventory
Rousay	Rousay	573

Category	Landranger Sheet	Orkney Heritage Society
Alpha	5,6	-

Excavations	Plans	Visited
1936: Callander and Grant	1936: Wilson	6/6/80

CAIRN

Length	22.1
Width	8.2
Area	177
Orientation	99-279
Shape	Rectangle

PASSAGE

Length	3.0
Width	0.8
Area	2.4
Orientation	178

CHAMBER

Length	13.0
Width	1.7
Area	23
Compartments	7
Cells	0
Orientation	99-279
Shape	Simple

GEOLOGY

Site	Sandstone
Water	16
Sandstone	69
Peat	15
Boulder Clay	0
Miscellaneous	0

SOIL

Site	Podzolic Com.
Water	16
Podzols	13
Podzolic Com.	43
Gleys	1
Gleyic Com.	20
Peat	7
Miscellaneous	0

LAND USE CAPABILITY

Site	Class 6
Water	16
Class 3	13
Class 4	11
Class 5	7
Class 6	50
Class 7	3
Miscellaneous	0

Visibility

D 109-287
R 287-109

Altitude

Site	65
High	235
Low	0

Topography

Terrace edge

Vegetation

Unimproved pasture

Coast

Nature	Low rock
Distance	440

Approaches

Restricted

Drainage

Good

Intervisibility

ORK 6

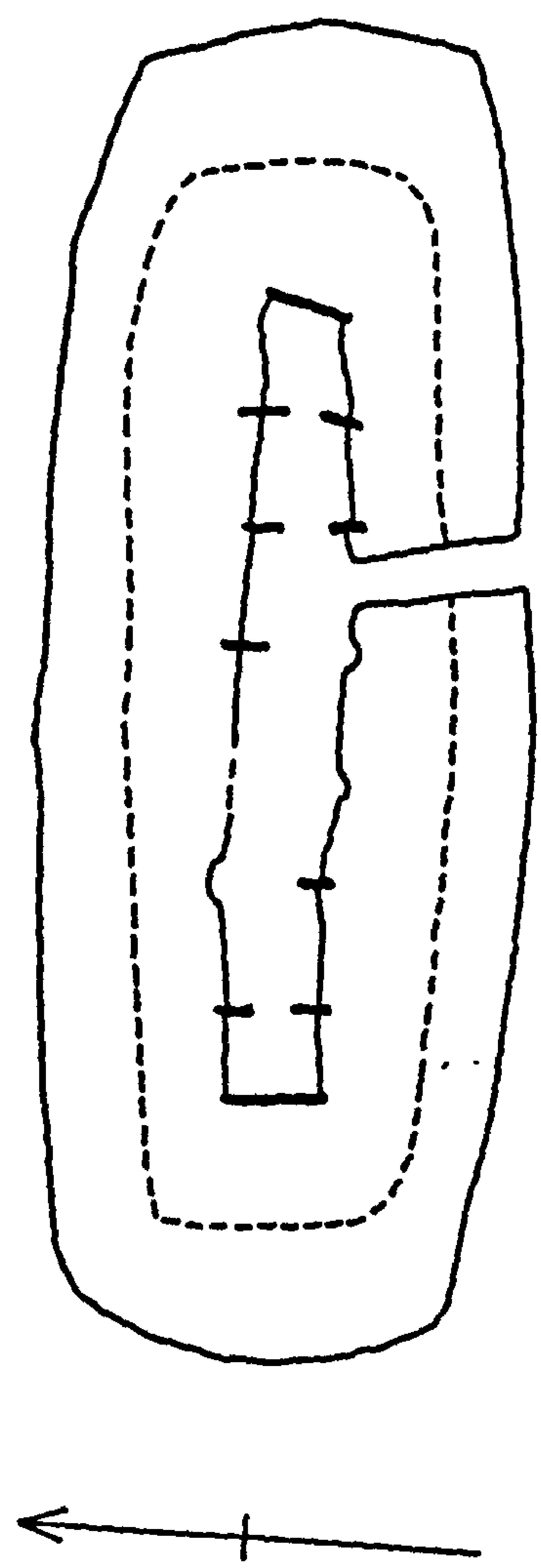
BLACKHAMMER ORK 3

Immediately to the north of the southern coastal road in Rousay, Blackhammer is a guardianship site and is sign-posted from the pier and road.

The monument consists of a long rectangular cairn with inner wall concealing a long rectangular chamber of seven compartments entered by a passage from the south into the third compartment from the east. Ten of the 14 original orthostats remain and much of the chamber walling. The chamber has been disturbed at some time with the construction of secondary masonry. The monument falls into cluster III but obviously has much in common with the many-compartmented cairns of cluster I.

The excavation uncovered the remains of a carinated bowl, a stone axe, flint, and many animal bones including those of at least 24 adult and immature sheep.

*PSAS 71(1937): 297-308
PSAS 76(1942): 132
RCAMS 2: 211-13
CTS 1: 184-5



3 BLACKHAMMER

BOOKAN	ORK 4

Map Reference		Ordnance Survey
HY 28641412		HY 21 SE 10
Island	**Parish**	**RCAMS Inventory**
Mainland	Sandwick	708
Category	**Landranger Sheet**	**Orkney Heritage Society**
Alpha	6	-
Excavations	**Plans**	**Visited**
1861: Farrer	c.1861: Dryden	10/6/80 18/5/81

CAIRN		PASSAGE		CHAMBER	
Length	13.4	Length	1.9	Length	3.3
Width	13.4	Width	0.5	Width	3.0
Area	141	Area	1.0	Area	8
Orientation	-	Orientation	172	Compartments	5
Shape	Round			Cells	0
				Orientation	-
				Shape	Simple

GEOLOGY		SOIL		LAND USE CAPABILITY	
Site	Sandstone	Site	Podzols	Site	Class 3
Water	52	Water	52	Water	52
Sandstone	17	Podzols	42	Class 3	43
Peat	0	Podzolic Com.	0	Class 4	5
Boulder Clay	31	Gleys	6	Class 5	0
Miscellaneous	0	Gleyic Com.	0	Class 6	0
		Peat	0	Class 7	0
		Miscellaneous	0	Miscellaneous	0

Visibility	Altitude	Topography
I 013-328 R 328-013	Site 26 High 26 Low 2	Promontory end
	Coast Nature Low rock Distance 350	**Vegetation** Improved pasture
	Approaches Easy	**Intervisibility** ORK 36 ORK 45 ORK 51
	Drainage Good	

BOOKAN ORK 4

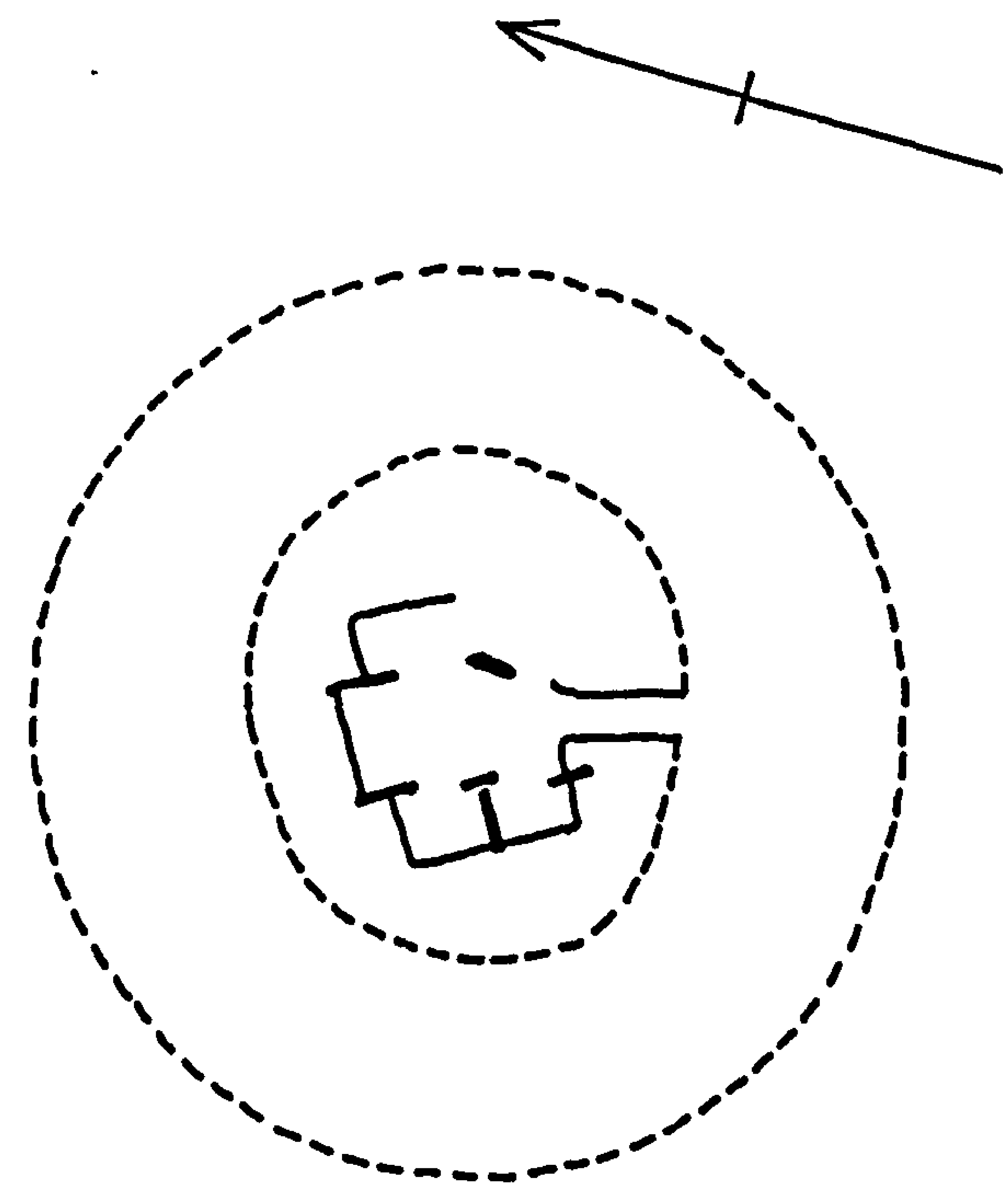
Situated on the crest of the ridge between the lochs of Stenness and Harray, the site can be approached by following a track to a quarry on the farm of Bookan.

The monument is now an irregular mound covered in vegetation but with visible evidence of stone packing. The centre is hollowed and several uprights can be seen. Petrie's description of Farrer's excavation recounted an internal circular wall and a very small passage leading to a complex of "kists" or compartments demarcated with orthostats. A central compartment was surrounded by one to the east, one to the north and two to the west, the general arrangement being peculiar to Orkney and taking its name from this site. Chambered cairns of Henshall's Bookan type fall into cluster III.

Two or more pots with decorated carinations and a flint implement were found in the chamber as were the remains of human skeletons. All are now lost.

Bookan overlooks the complex of prehistoric sites in the heart of the central Mainland including two henges and Maes Howe.

OH	16 July 1861
*Arch J.	20(1863): 35-6
OH	16 August 1871
RCAMS	2: 263-4
CTS	1: 186



4 BOOKAN

BRAESIDE	ORK 5

Map Reference	Ordnance Survey
HY 56333757	HY 53 NE 10

Island	Parish	RCAMS Inventory
Eday	Eday	218

Category	Landranger Sheet	Orkney Heritage Society
Beta	5	-

Excavations	Plans	Visited
-	1928: Calder 1957: Henshall	25/6/80 30/5/81

CAIRN		PASSAGE		CHAMBER	
Length	31.1	Length		Length	6.1
Width	17.7	Width		Width	2.1
Area	498	Area		Area	13.0
Orientation	167-347	Orientation		Compartments	3
Shape	Rectangle			Cells	0
				Orientation	162
				Shape	Simple

GEOLOGY		SOIL		LAND USE CAPABILITY	
Site	Sandstone	Site	Gleys	Site	Class 4
Water	3	Water	3	Water	3
Sandstone	74	Podzols	69	Class 3	13
Peat	4	Podzolic Com.	0	Class 4	33
Boulder Clay	19	Gleys	26	Class 5	26
Miscellaneous	0	Gleyic Com.	0	Class 6	25
		Peat	2	Class 7	0
		Miscellaneous	0	Miscellaneous	0

Visibility

D 032-045
I 045-134
R 134-301
I 301-032

Altitude

Site	20
High	76
Low	0

Coast

Nature	Low rock
Distance	980

Approaches: Easy

Drainage: Fair

Topography: Valley bottom

Vegetation: Unimproved pasture

Intervisibility

ORK 23

ORK 53

BRAESIDE ORK 5

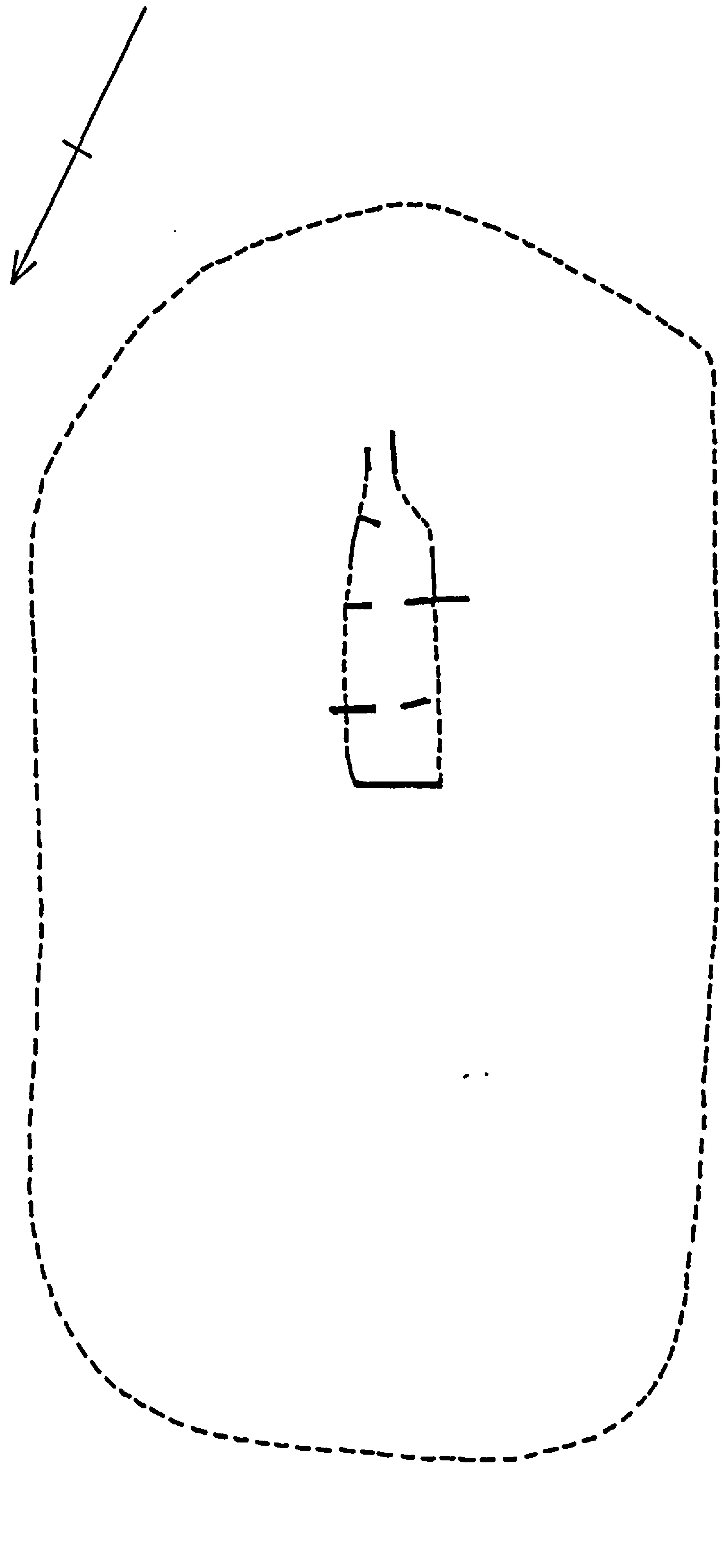
In the centre of north Eday, the monument can be approached across boggy ground from the farm of Carrick or by a longer but drier route past the Stone of Setter from the road by Mill Loch.

The monument now consists of a long low mound of stones, hollowed out along the spine, and much overgrown. At least seven massive earthfast stones form the pattern of a tri-partite chamber. This chamber is centred in the southern half of the cairn: there are no obvious signs of another chamber but Henshall suggests there may have been one in the northern half of the cairn. The very large size of the cairn places Braeside in cluster II.

Within a kilometre of the monument are two more chambered cairns and the complex of standing stone, structures and cists around Setter.

RCAMS 2: 59-60

*CTS 1: 186-7



5 BRAESIDE

BURGAR	ORK 6

Map Reference	Ordnance Survey
HY 34802782	HY 32 NW 15

Island	Parish	RCAMS Inventory
Mainland	Evie and Rendall	274

Category	Landranger Sheet	Orkney Heritage Society
Beta	6	-

Excavations	Plans	Visited
-	1955: Henshall	10/6/80 18/5/81

CAIRN

Length	17.0
Width	16.5
Area	222
Orientation	-
Shape	Round

PASSAGE

Length	
Width	
Area	
Orientation	

CHAMBER

Length	4.0
Width	2.8
Area	8.0
Compartments	2
Cells	0
Orientation	030
Shape	Simple

GEOLOGY

Site Sandstone

Water	48
Sandstone	35
Peat	0
Boulder Clay	17
Miscellaneous	0

SOIL

Site Podzols

Water	48
Podzols	34
Podzolic Com.	0
Gleys	18
Gleyic Com.	0
Peat	0
Miscellaneous	0

LAND USE CAPABILITY

Site Class 3

Water	48
Class 3	31
Class 4	21
Class 5	0
Class 6	0
Class 7	0
Miscellaneous	0

Visibility

I 038-129
R 129-289
I 289-330
D 330-038

Altitude

Site	10
High	105
Low	0

Coast

Nature	Low rock
Distance	30

Approaches Easy

Drainage Good

Topography Coastal plain

Vegetation Improved pasture

Intervisibility

ORK 3
ORK 28
ORK 30
ORK 32

BURGAR ORK 6

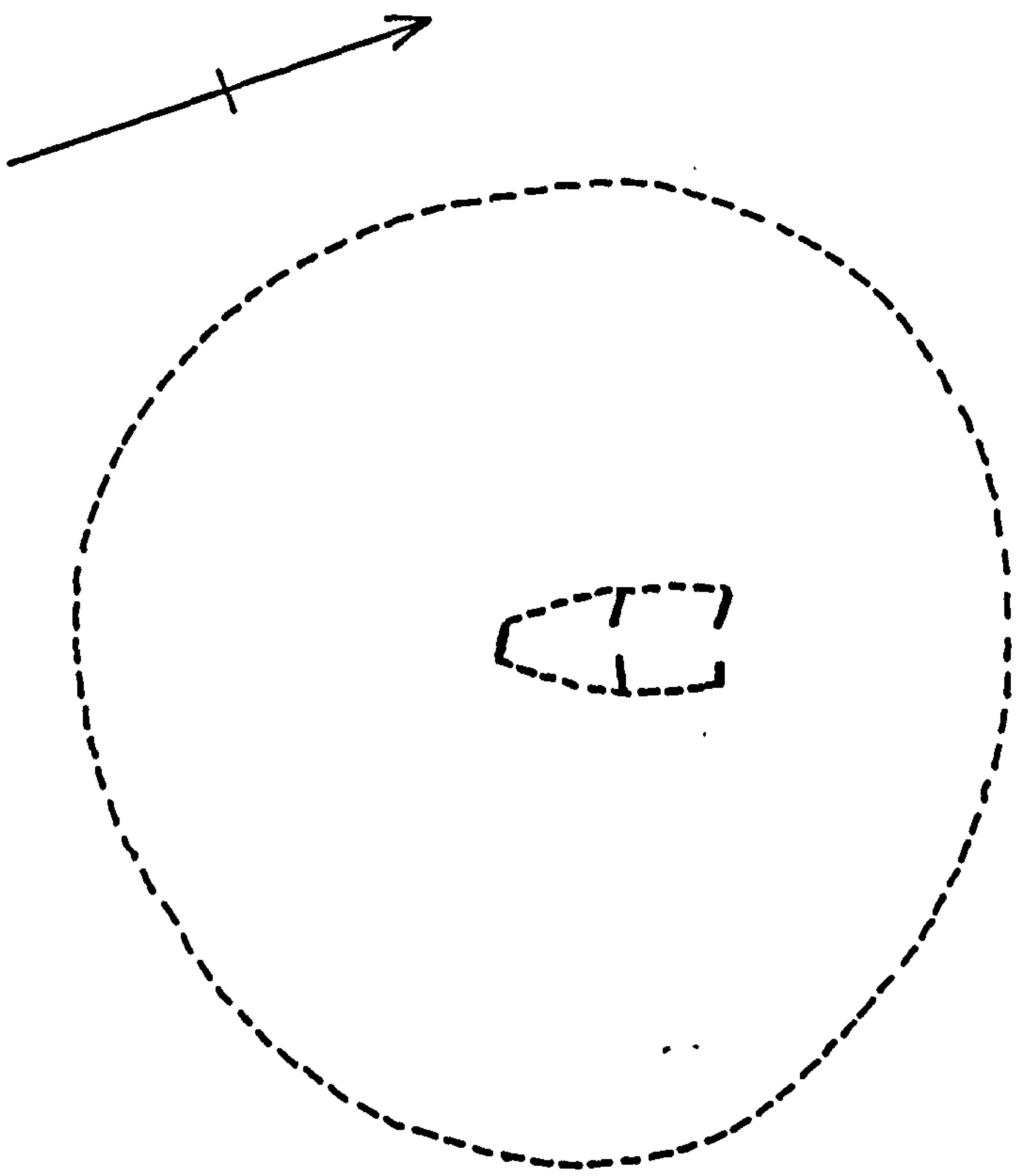
Located close to the shore facing Rousay, in the Costa district of the West Mainland, Burgar can be seen from the road and is best approached across fields to the west of the farm of the same name.

The site is now much ruined and consists of a roughly circular cairn, hollowed out in the centre and mostly covered with vegetation. Five upright stones protrude through the turf forming two pairs of opposing orthostats and a single back-slab, suggesting a bi-partite chamber with entrance to the east of north. This is one of the two cairns with bi-partite chambers in cluster III.

From Burgar can be seen four of the cairns on the south coast of Rousay but the island of Eynhallow obscures the view across to the complex around Midhowe. The nearest prehistoric site is the well-preserved broch of Burgar, 400 m to the east.

RCAMS 2: 81

*CTS 1: 187



6 BURGAR

BURRAY	ORK 7

Map Reference	Ordnance Survey
ND 48839881	ND 49 NE 3

Island	Parish	RCAMS Inventory
Burray	South Ronaldsay	864

Category	Landranger Sheet	Orkney Heritage Society
Alpha	6,7	-

Excavations	Plans	Visited
1863: Petrie	1863: Petrie	11/6/80

CAIRN

Length	14.4
Width	12.4
Area	211
Orientation	-
Shape	Complex

PASSAGE

Length	
Width	
Area	
Orientation	

CHAMBER

Length	4.3
Width	2.4
Area	11
Compartments	4
Cells	0
Orientation	047-227
Shape	Simple

GEOLOGY

Site	Sandstone
Water	69
Sandstone	8
Peat	0
Boulder Clay	4
Miscellaneous	19

SOIL

Site	Podzols
Water	69
Podzols	7
Podzolic Com.	0
Gleys	7
Gleyic Com.	16
Peat	0
Miscellaneous	1

LAND USE CAPABILITY

Site	Class 3
Water	69
Class 3	8
Class 4	7
Class 5	0
Class 6	16
Class 7	0
Miscellaneous	0

Visibility

R 113-271
D 271-288
I 288-307
D 307-342
I 342-113

Altitude

Site	5
High	30
Low	0

Coast

Nature	Low rock
Distance	30

Approaches: Easy

Drainage: Fair

Topography: Coastal plain

Vegetation: Arable

Intervisibility: ORK 46

BURRAY ORK 7

Nothing remains to be seen of this monument close to the shore in north-east Burray, but the site can be approached across fields from Northfield farm.

Petrie's notebook records a short horned cairn such as is found in Caithness. A central chamber consisted of at least three compartments demarcated by four pairs of opposed orthostats. One more pair of orthostats to the south-east marked either a side cell or the beginning of an entrance passage.

Up to 23 human skeletons were found distributed in all parts of the chamber. In addition seven dog skeletons, also widely distributed, were recovered.

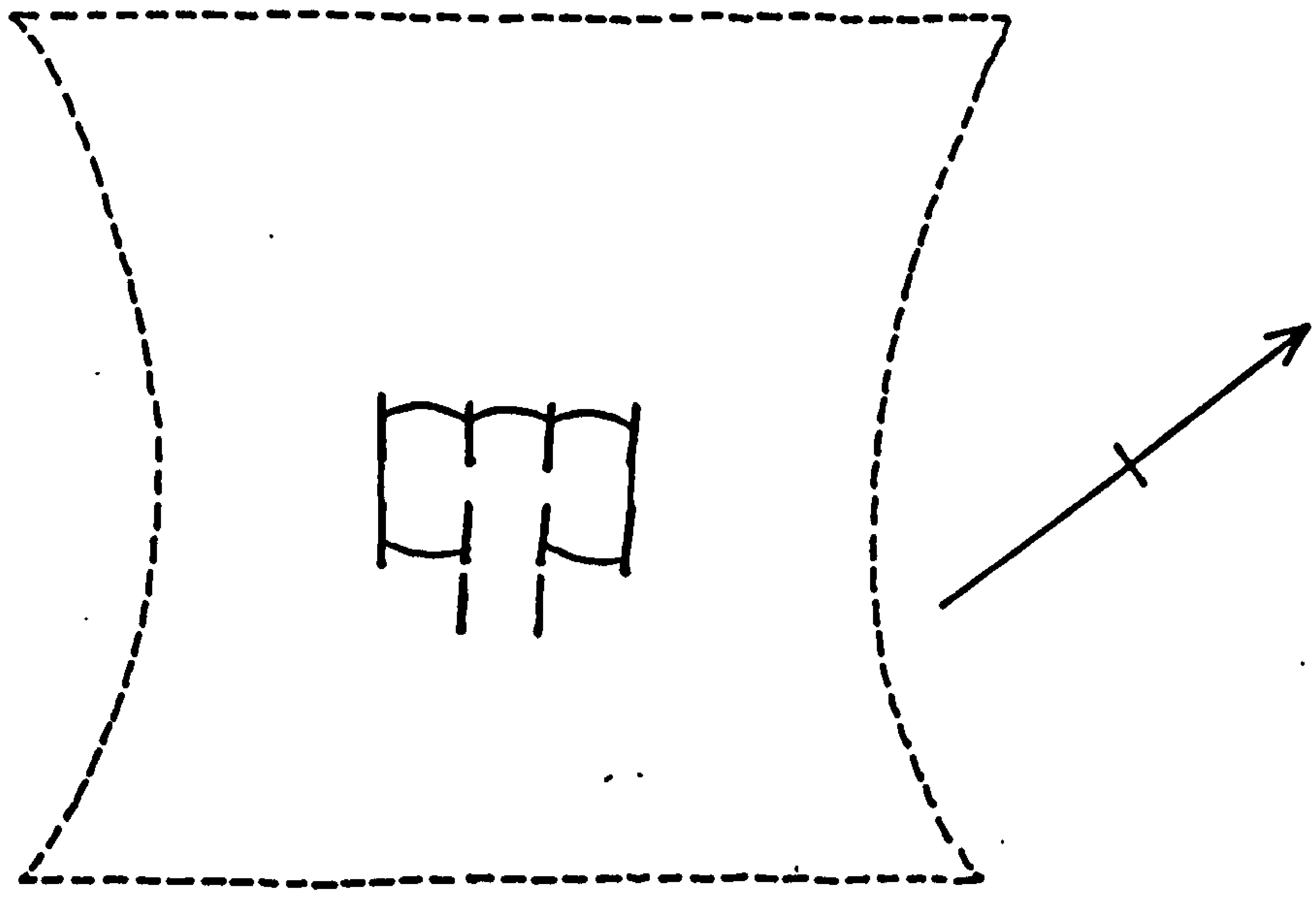
This is the only known chambered cairn on Burray. It looks north towards Rose Ness, a peninsula of the Mainland with a prominent cairn.

Antiq Ms 487(3)

*Anderson (1886): 290-1

RCAMS 2: 295

CTS 1: 188



7 BURRAY

CALF OF EDAY LONG	ORK 8

Map Reference: HY 57893866		Ordnance Survey: HY 53 NE 18
Island: Calf of Eday	Parish: Eday	RCAMS Inventory: 245
Category: Alpha	Landranger Sheet: 5	Orkney Heritage Society: -
Excavations: 1936: Calder	Plans: 1936: Calder	Visited: 25/6/80

CAIRN		PASSAGE West	PASSAGE East	CHAMBER West	CHAMBER East
Length	20.1	1.5	Length 3.4	3.0	Length 7.0
Width	8.2	1.2	Width 0.7	2.1	Width 2.1
Area	150	1.5	Area 2.4	6	Area 12
Orientation	065-245	110	Orientation 060	2	Compartments 4
Shape	Rectangle			0	Cells 0
				110	Orientation 062
				Simple	Shape Simple

GEOLOGY		SOIL		LAND USE CAPABILITY	
Site	Sandstone	Site	Podzols	Site	Class 5
Water	31	Water	31	Water	31
Sandstone	32	Podzols	31	Class 3	0
Peat	36	Podzolic Com.	0	Class 4	15
Boulder Clay	1	Gleys	2	Class 5	10
Miscellaneous	0	Gleyic Com.	0	Class 6	44
		Peat	36	Class 7	0
		Miscellaneous	0	Miscellaneous	0

Visibility: D 134-183, I 183-134	Altitude: Site 20, High 49, Low 0	Topography: Small island
		Vegetation: Unimproved pasture
	Coast: Nature Low rock, Distance 100	Intervisibility: ORK 9, ORK 53, ORK T8
	Approaches: Easy	
	Drainage: Good	

CALF OF EDAY LONG ORK 8

On the south-west coast of the Calf, a small holm lying off Eday, the site and its neighbours are best reached by small boat from the settlement of Calfsound in Eday.

The monument has been left open after excavation and, although overgrown, many details of cairn and chamber are still visible. The cairn is rectangular with bowed sides and covered two chambers. The south-west chamber appears to have been primary and consists of two compartments surrounded by an inner wall with a passage leading out to the east. This chamber was later enclosed by the long cairn, orientated differently, and covering the north-east chamber divided by orthostats into four compartments. The latter chamber had a passage leading to the north-east and facing into the body of the island.

Finds were numerous, including pottery, flint, stone, and a small quantity of human bone. Among the pots were carinated bowls of classic Unstan form and a few simple round-bottomed undecorated bowls.

The Calf contains three chambered cairns in all: ORK 9 and 10 are less than 250 m distant. This monument was reused as a domestic settlement in later prehistoric times and is in close proximity to several structures of that period.

Plate Q is a view of the Calf of Eday taken from above the Sound looking towards the east.

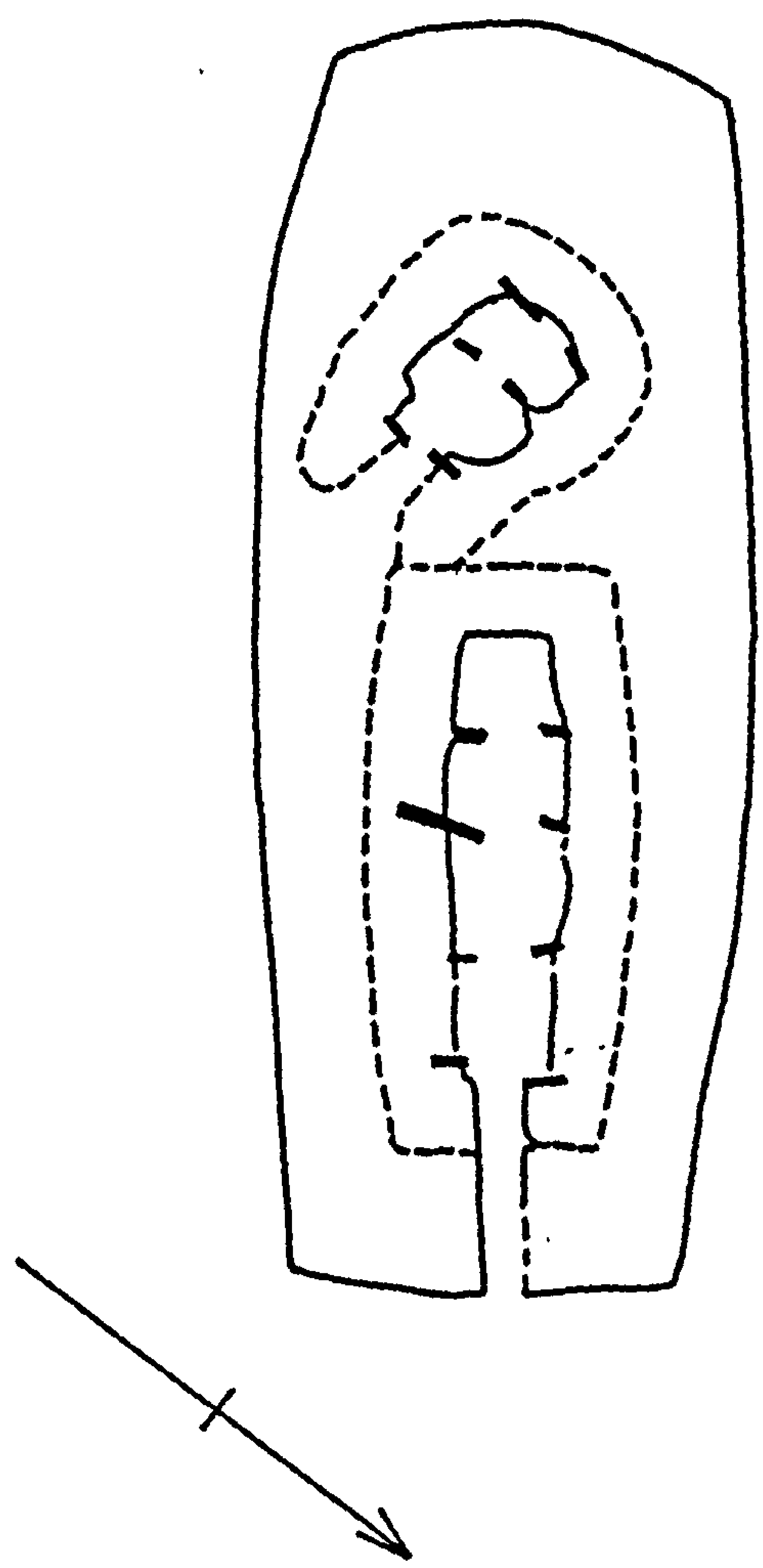
*PSAS 71(1937): 115-29, 151-2

Jessen and Helbaek (1944): 18

PSAS 79(1945): 167

RCAMS 2: 65-7

CTS 1: 188-191



8 CALF OF EDAY LONG

CALF OF EDAY NORTH-WEST	ORK 9

Map Reference		Ordnance Survey
HY 57883858.		HY 53 NE 2
Island	**Parish**	**RCAMS Inventory**
Calf of Eday	Eday	246
Category	**Landranger Sheet**	**Orkney Heritage Society**
Alpha	5	-
Excavations	**Plans**	**Visited**
1855: Farrer	1863: Petrie 1928: Calder	25/6/80

CAIRN		PASSAGE		CHAMBER	
Length	8.0	Length	1.8	Length	3.4
Width	7.6	Width	0.7	Width	2.1
Area	50	Area	1.3	Area	6
Orientation	-	Orientation	219	Compartments	5
Shape	Round			Cells	0
				Orientation	220
				Shape	Simple

GEOLOGY		SOIL		LAND USE CAPABILITY	
Site	Sandstone	Site	Podzols	Site	Class 5
Water	31	Water	31	Water	31
Sandstone	34	Podzols	23	Class 3	1
Peat	34	Podzolic Com.	0	Class 4	18
Boulder Clay	1	Gleys	13	Class 5	12
Miscellaneous	0	Gleyic Com.	0	Class 6	38
		Peat	33	Class 7	0
		Miscellaneous	0	Miscellaneous	0

Visibility	Altitude	Topography
R 005-100 I 100-134 D 134-183 I 183-005	Site 15 High 48 Low 0	Small island
	Coast Nature: Low rock Distance: 80	**Vegetation** Unimproved pasture
	Approaches Easy	**Intervisibility** ORK 8 ORK 10 ORK 53 ORK T8
	Drainage Good	

CALF OF EDAY NORTH-WEST ORK 9

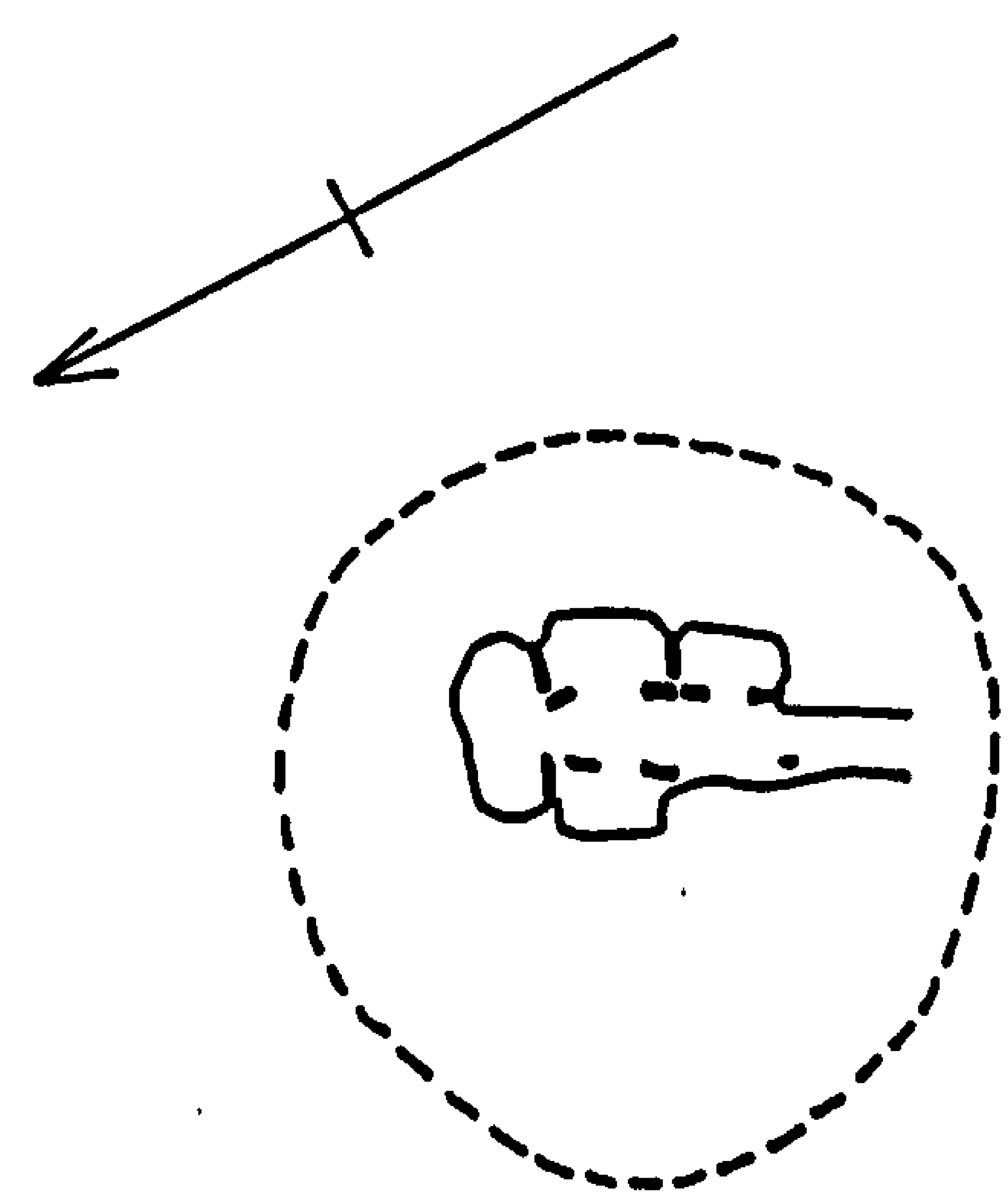
On the south-west coast of the Calf, a small holm lying off Eday, the site and its neighbours are best reached by small boat from the settlement of Calfsound in Eday.

Much of the cairn is under peat but access can be gained to the chamber through the roof. A passage enters from the south into a rectangular central compartment surrounded by four smaller rectangular compartments: two to the east, and one each to the north and west. The resulting arrangement conforms to Henshall's Bookan type and falls into cluster III. This is one of the smallest chambered cairns in Orkney.

The monument is the middle of three close together on the island, and is very similar in size and design to its nearest neighbour, Calf of Eday South-East (ORK 10).

Plate Q is a view of the Calf of Eday from the west.

TO 8 December 1855
TO 12 January 1856
*PSAS 2(1857): 155-6
Arch J. 20(1863): 36-7
Antiq Ms 487(3): 6
POAS 5(1927): 19-20
PSAS 70(1936): 226-7
RCAMS 2: 69-70
CTS 1: 192



9 CALF OF EDAY NORTH-WEST

CALF OF EDAY SOUTH-EAST	ORK 10

Map Reference		Ordnance Survey
HY 57923852		HY 53 NE 3
Island	**Parish**	**RCAMS Inventory**
Calf of Eday	Eday	247
Category	**Landranger Sheet**	**Orkney Heritage Society**
Alpha	5	-
Excavations	**Plans**	**Visited**
1855: Hebden and Farrer 1936: Calder	1936: Calder	25/6/80

CAIRN		PASSAGE		CHAMBER	
Length	11.0	Length	2.9	Length	2.6
Width	10.5	Width	0.6	Width	2.2
Area	82	Area	1.7	Area	5
Orientation	-	Orientation	214	Compartments	5
Shape	Round			Cells	0
				Orientation	226
				Shape	Simple

GEOLOGY		SOIL		LAND USE CAPABILITY	
Site	Sandstone	Site	Podzols	Site	Class 5
Water	32	Water	32	Water	32
Sandstone	35	Podzols	32	Class 3	1
Peat	32	Podzolic Com.	0	Class 4	20
Boulder Clay	1	Gleys	2	Class 5	12
Miscellaneous	0	Gleyic Com.	0	Class 6	35
		Peat	34	Class 7	0
		Miscellaneous	0	Miscellaneous	0

Visibility	Altitude	Topography
I 081-133 D 133-182 I 182-327 R 327-081	Site 10 High 48 Low 0	Small island
	Coast Nature: Low rock Distance: 40	**Vegetation** Unimproved pasture
	Approaches Easy	**Intervisibility** ORK 9 ORK 53 ORK T8
	Drainage Good	

CALF OF EDAY SOUTH-EAST ORK 10

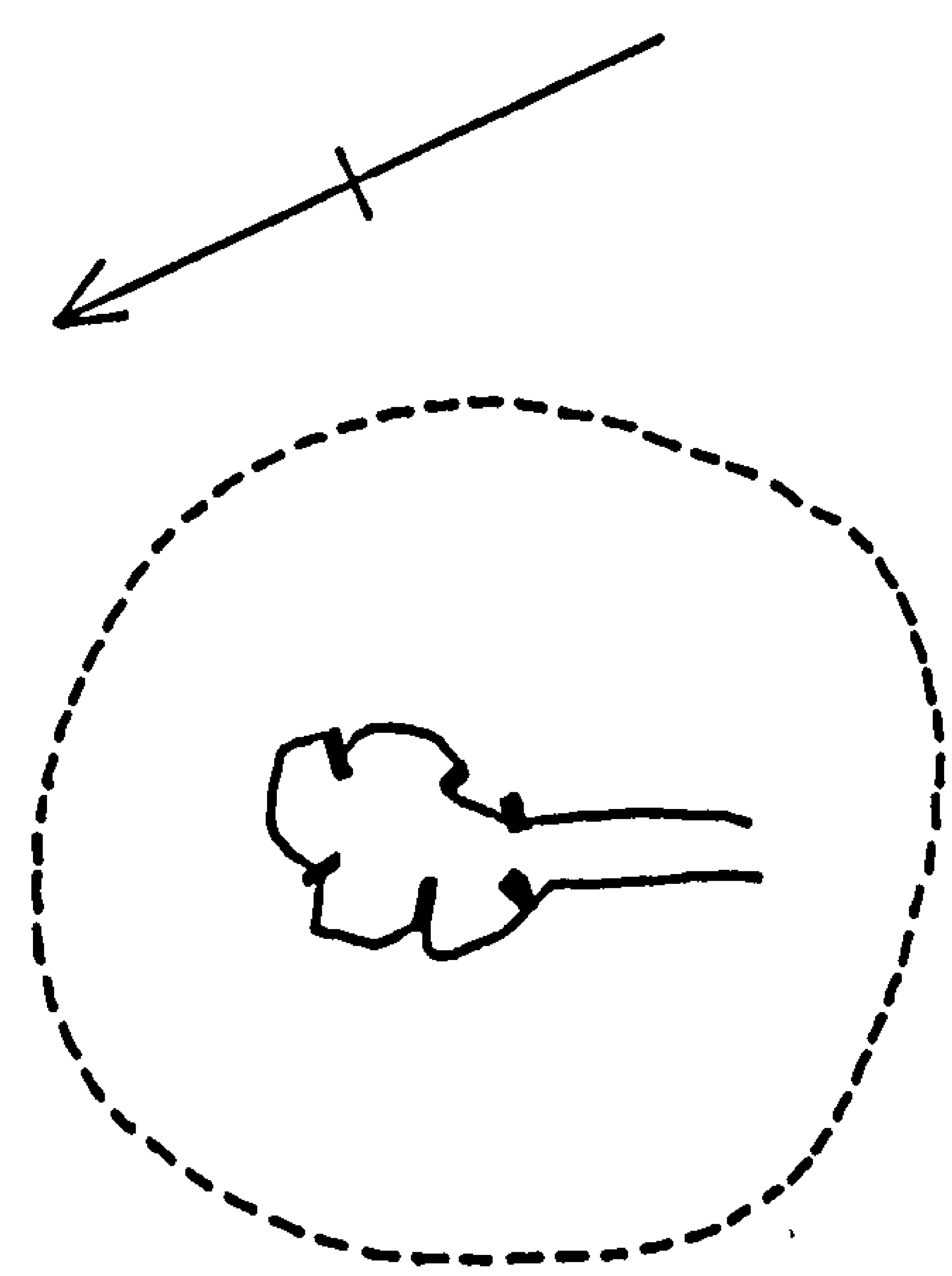
On the south-west coast of the Calf, a small holm lying off Eday, the site and its neighbours are best reached by small boat from the settlement of Calfsound in Eday.

The original covering cairn has been swamped by peat but access to the chamber is still possible by the passage, which leads from the south-west. A rectangular central compartment is surrounded by four smaller rectangular compartments: two to the west, one to the north, and one to the east. The resulting arrangement conforms to Henshall's Bookan type and falls into cluster III. Although very small, this chambered cairn is larger than its immediate neighbour, Calf of Eday North-West, about 65 m away and a little further up the hill.

The only find during excavation was a polished stone axe.

In addition to the three chambered cairns, this small area of Calf of Eday has extensive remains of later prehistoric settlement.

TO 12 January 1856
PSAS 2(1857): 156-7
POAS 5(1927): 19
*PSAS 72(1938): 209-13
RCAMS 2: 70-71
CTS 1: 193-4



10 CALF OF EDAY SOUTH-EAST

COBBIE ROW'S BURDEN	ORK 11

Map Reference: HY 43922798		Ordnance Survey: HY 42 NW 23
Island: Rousay	Parish: Rousay	RCAMS Inventory: 574
Category: Beta	Landranger Sheet: 5,6	Orkney Heritage Society: -
Excavations: -	Plans: 1959: Henshall	Visited: 6/6/80

CAIRN		PASSAGE		CHAMBER	
Length	16.0	Length		Length	3.0
Width	15.8	Width		Width	2.0
Area	195	Area		Area	5
Orientation	-	Orientation		Compartments	2
Shape	Round			Cells	0
				Orientation	187
				Shape	Simple

GEOLOGY		SOIL		LAND USE CAPABILITY	
Site	Sandstone	Site	Podzols	Site	Class 4
Water	29	Water	29	Water	29
Sandstone	41	Podzols	49	Class 3	7
Peat	12	Podzolic Com.	0	Class 4	31
Boulder Clay	18	Gleys	10	Class 5	24
Miscellaneous	0	Gleyic Com.	0	Class 6	9
		Peat	12	Class 7	0
		Miscellaneous	0	Miscellaneous	0

Visibility	Altitude	Topography
D 090-264 I 264-284 R 284-090	Site 55 High 190 Low 0	Hillslope
		Vegetation: Heathland
	Coast: Nature Low rock; Distance 340	Intervisibility: ORK 49
	Approaches: Easy	
	Drainage: Good	

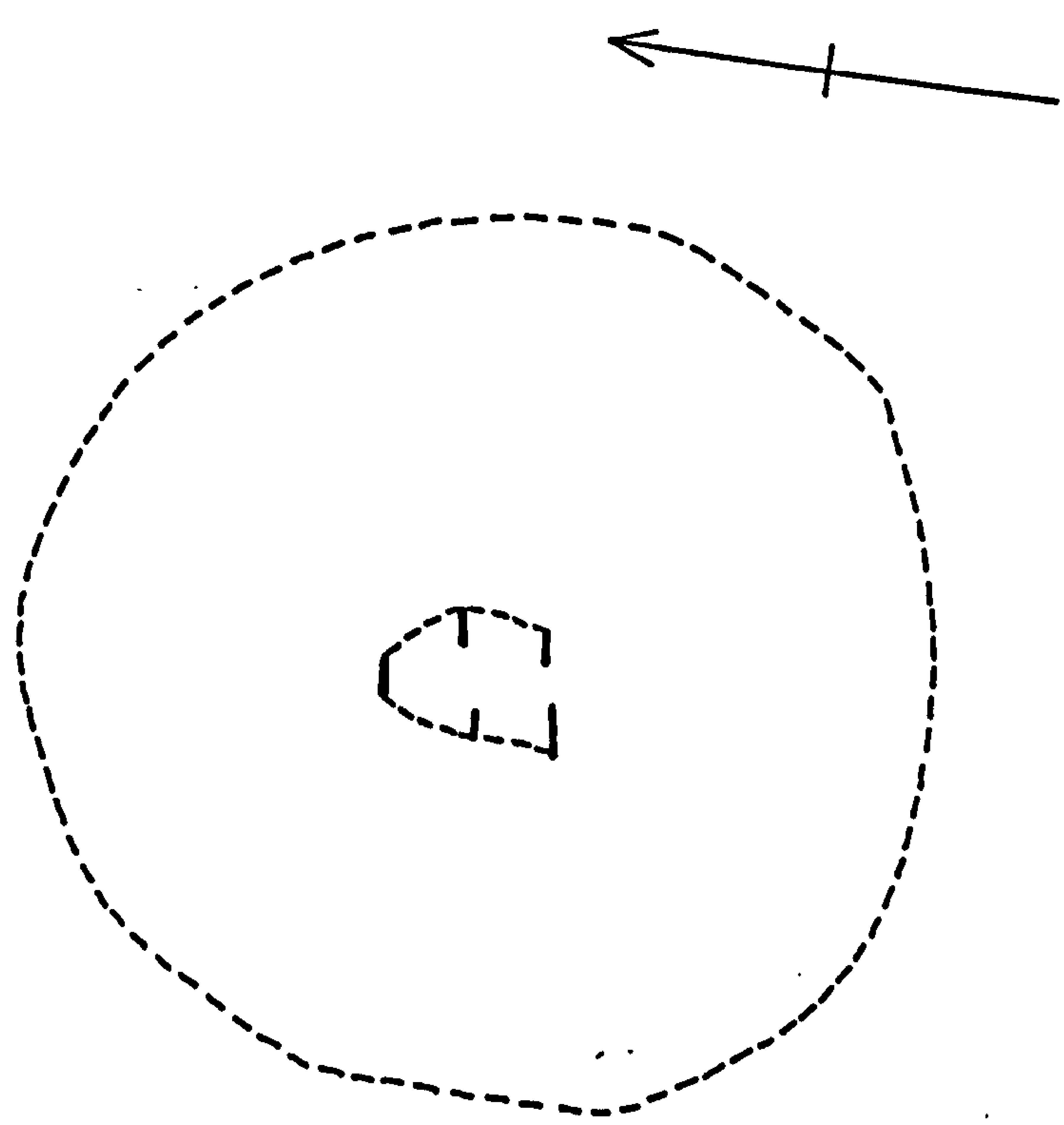
COBBIE ROW'S BURDEN ORK 11

The site is in a field immediately north of the main road in the south-east corner of Rousay. The name comes from a local tale (not now extant) about a giant called Cobbie Row - possibly the Norseman Kolbein Hruga of Cubbie Roo's Castle on Wyre - who dropped a load of material.

Today all that is visible is a vegetation-covered mound with a hollowed-out centre in which can be seen the tops of five upright stones, the tallest standing 0.55 m high. They are arranged in two opposed pairs with a single back-slab suggesting a chamber of at least two compartments with an entrance in the south facing the island of Wyre.

RCAMS 2: 213

*CTS 1: 194



11 COBBIE ROW'S BURDEN

CUWEEN HILL		ORK 12
Map Reference: HY 36361271		Ordnance Survey: HY 31 SE 1
Island: Mainland	Parish: Firth	RCAMS Inventory: 340
Category: Alpha	Landranger Sheet: 6	Orkney Heritage Society: -
Excavations: 1888: Cursiter; 1901: Charleson	Plans: 1928: Calder	Visited: 10/6/80; 9/8/81

CAIRN		PASSAGE		CHAMBER	
Length	16.5	Length	5.5	Length	3.6
Width	15.5	Width	0.7	Width	1.7
Area	211	Area	3.8	Area	6.1
Orientation	-	Orientation	089	Compartments	1
Shape	Round			Cells	5
				Orientation	160-340
				Shape	Complex

GEOLOGY		SOIL		LAND USE CAPABILITY	
Site	Sandstone	Site	Podzols	Site	Class 5
Water	12	Water	12	Water	12
Sandstone	42	Podzols	51	Class 3	28
Peat	2	Podzolic Com.	18	Class 4	8
Boulder Clay	28	Gleys	12	Class 5	39
Miscellaneous	0	Gleyic Com.	0	Class 6	13
		Peat	7	Class 7	0
		Miscellaneous	0	Miscellaneous	0

Visibility	Altitude	Topography
D 059-104 I 104-196 R 196-335 I 335-059	Site 80 High 140 Low 0	Hillslope
	Coast: Nature Low rock; Distance 630	Vegetation: Unimproved pasture
	Approaches: Restricted	Intervisibility: ORK 43, ORK 54
	Drainage: Good	

CUWEEN HILL ORK 12

In the central Mainland, 1.5 km south-east of Finstown, the site is a guardianship monument and is sign-posted from the road between Finstown and Kirkwall.

The cairn is grass-covered and is set in a slight hollow in the hillside. It may contain an internal construction wall in addition to the outer revetment. A long low passage leads from the east into a chamber remarkable for the quality of its masonry. The walls (originally at least 2.3 m high) are constructed of long, thin flagstones, many of them several metres in length. The design of the chamber is like that of Wideford Hill (ORK 54), another cluster IV cairn, visible about five km to the east. There is a central compartment, roughly rectangular in plan, from which lead four low passages leading to three single cells and one double cell. All of these cells are corbelled at a height of about 1.7 m.

At least eight human individuals were found. Other finds of bone included no less than 24 dog skulls from the floor of the central chamber. Finds of artefacts included some pottery and a carved stone ball.

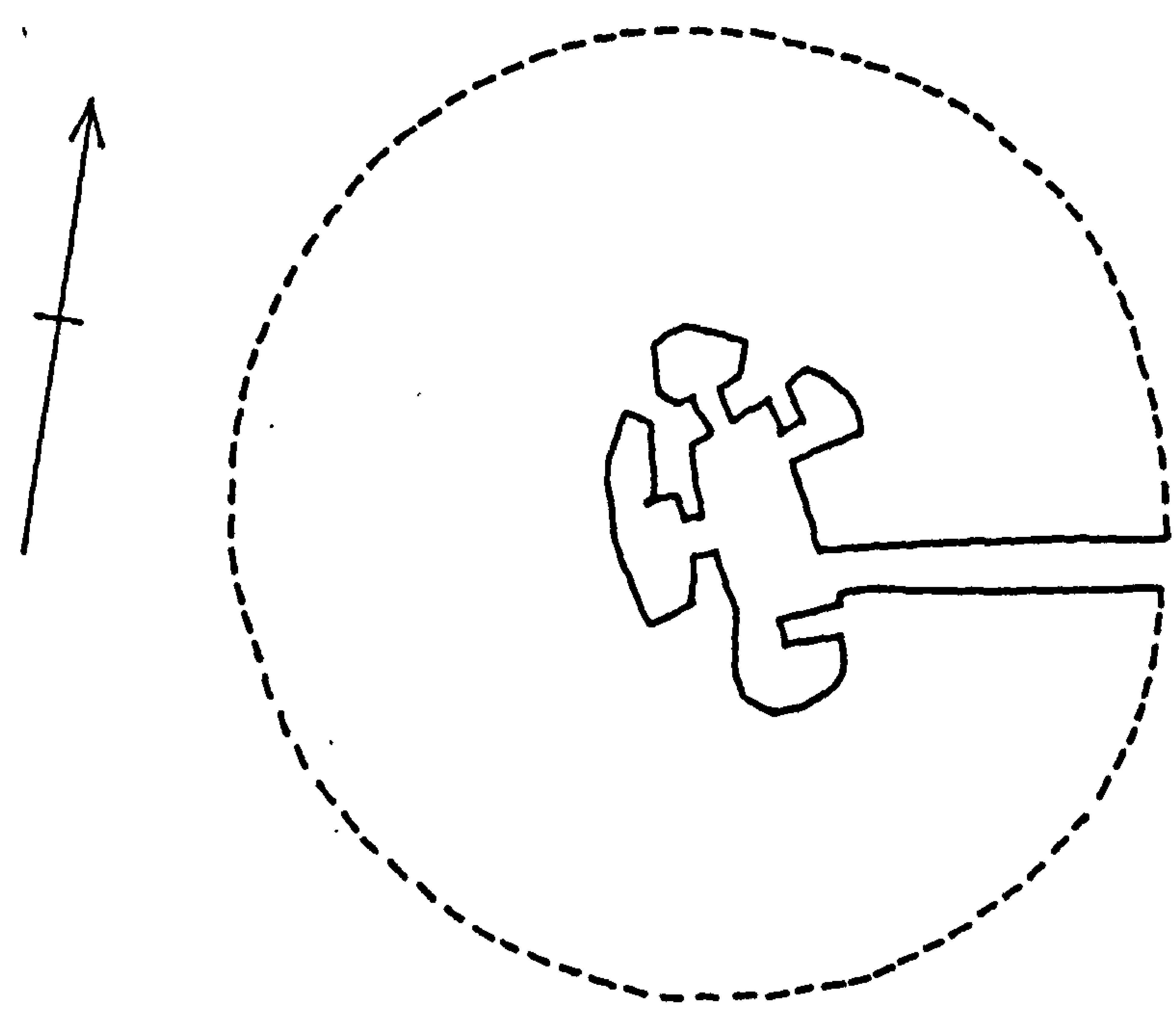
OH 20 June 1882

TO 23 June 1888

*PSAS 36(1902): 733-8

RCAMS 2: 97-8

CTS 1: 194-5



12 CUWEEN HILL

EARL'S KNOLL	ORK 14

Map Reference	Ordnance Survey
HY 66822920	HY 62 SE 13

Island	Parish	RCAMS Inventory
Papa Stronsay	Stronsay	998

Category	Landranger Sheet	Orkney Heritage Society
Beta	5	OR 170

Excavations	Plans	Visited
1792	1981: Fraser	19/5/81

CAIRN		PASSAGE		CHAMBER	
	Length 77.6		Length		Length
	Width 21.2		Width		Width
	Area 1048		Area		Area
	Orientation 090-270		Orientation		Compartments
	Shape Rectangle				Cells
					Orientation
					Shape

GEOLOGY		SOIL		LAND USE CAPABILITY	
Site	Sandstone	Site	Podzols	Site	Class 3
Water	73	Water	73	Water	73
Sandstone	21	Podzols	10	Class 3	8
Peat	0	Podzolic Com.	0	Class 4	18
Boulder Clay	3	Gleys	15	Class 5	0
Miscellaneous	3	Gleyic Com.	0	Class 6	1
		Peat	0	Class 7	0
		Miscellaneous	2	Miscellaneous	0

Visibility	Altitude	Topography
I 166-291 F 291-166	Site 8 High 13 Low 0	Small island
		Vegetation: Improved pasture
	Coast: Nature Low rock; Distance 100	Intervisibility: ORK 38, ORK 44, ORK 50, ORK 55, ORK T21
	Approaches: Easy	
	Drainage: Good	

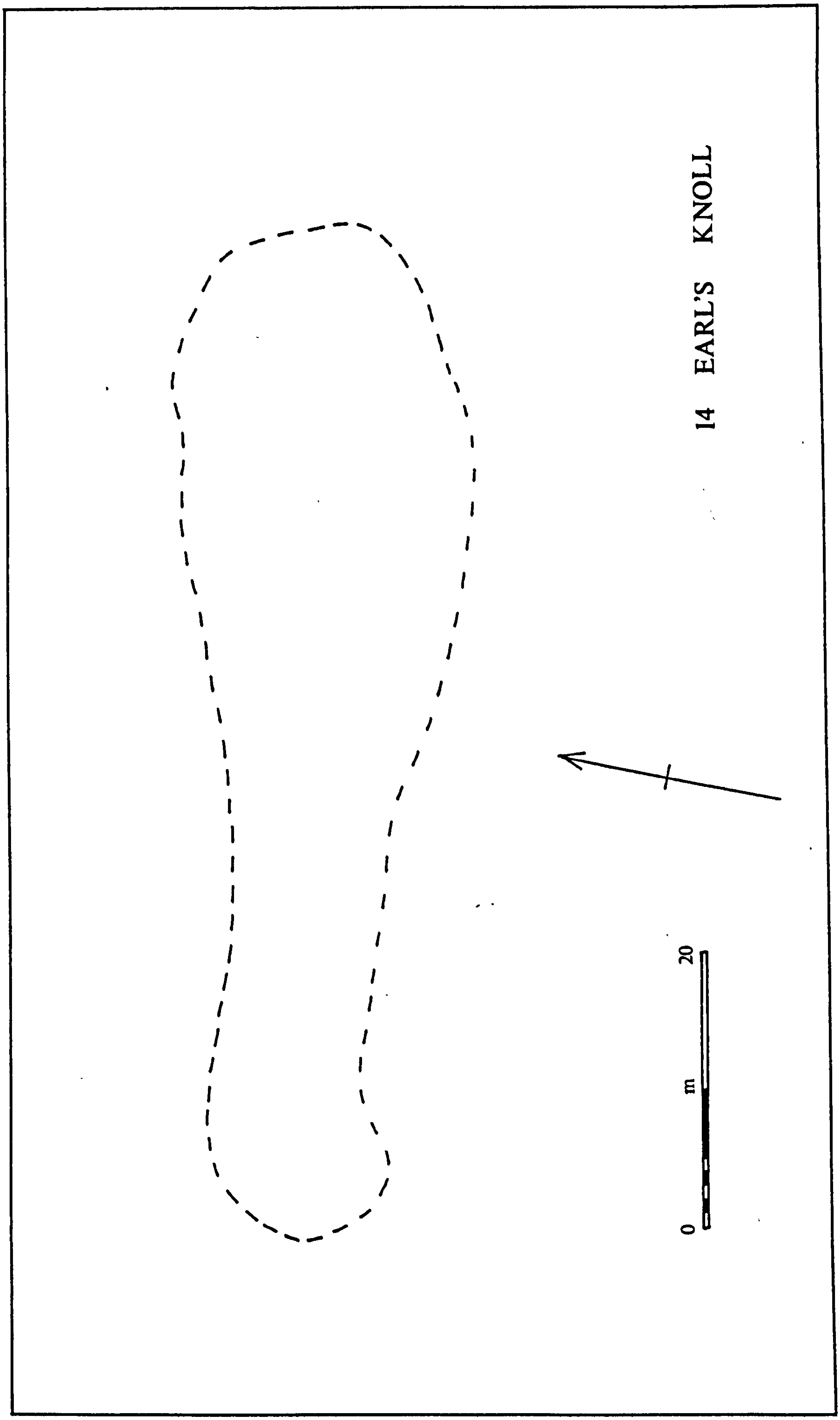
EARL'S KNOLL ORK 14

Situated in the south-east of Papa Stronsay, a low-lying island to the north-east of Stronsay, the site can best be reached by small boat from the village of Whitehall in Stronsay.

The mound is elongated, with the eastern end being higher and wider. The edges have been obscured by ploughing, making their exact positions difficult to define. Both ends appear to be rounded although the west end has certainly been disturbed by the addition of a circular platform on which stood a (now ruined) windmill. The east end stands 2.0 m high while the west end is about 0.8 m above the ground immediately to the south of the mound. Exposures caused by ploughing and sheep suggest the mound material is predominantly stone.

There are no visible signs of a chamber today. A historical account from the late eighteenth century reports an exploration of the cairn which revealed stonework and human bones, the description suggesting a burial chamber larger than a cist. Two patches of hummocky ground visible today in the east end of the cairn may mark the location of this exploration.

*OSA (1978): 19, 326-7
RCAMS 2: 336
CTS 1: 197


14 EARL'S KNOLL
0
m
20

EDAY CHURCH	ORK 15

Map Reference: HY 56043344	Ordnance Survey: HY 53 SE 5

Island: Eday	Parish: Eday	RCAMS Inventory: 223
Category: Beta	Landranger Sheet: 5,6	Orkney Heritage Society: -
Excavations: -	Plans: 1935: Calder 1957: Henshall	Visited: 24/6/80 29/5/81

CAIRN		PASSAGE		CHAMBER	
Length	19.5	Length		Length	4.7
Width	16.5	Width		Width	2.0
Area	277	Area		Area	11
Orientation	-	Orientation		Compartments	3
Shape	Complex			Cells	0
				Orientation	110-290
				Shape	Simple

GEOLOGY		SOIL		LAND USE CAPABILITY	
Site	Sandstone	Site	Peat	Site	Class 5
Water	28	Water	28	Water	28
Sandstone	31	Podzols	10	Class 3	6
Peat	4	Podzolic Com.	0	Class 4	0
Boulder Clay	27	Gleys	8	Class 5	38
Miscellaneous	10	Gleyic Com.	0	Class 6	28
		Peat	36	Class 7	0
		Miscellaneous	18	Miscellaneous	0

Visibility	Altitude / Coast / Approaches / Drainage	Topography / Vegetation / Intervisibility
I 003-053 D 053-110 R 110-169 I 169-205 R 205-327 D 327-003	Altitude: Site 20, High 55, Low 0 Coast: Nature Low rock, Distance 630 Approaches: Easy Drainage: Good	Topography: Valley bottom Vegetation: Heathland Intervisibility: ORK 16, ORK 47, ORK 53, ORK 55

EDAY CHURCH ORK 15

About 300 m to the west of a road junction in central Eday, the site is to the south of, and visible from, the West Side road.

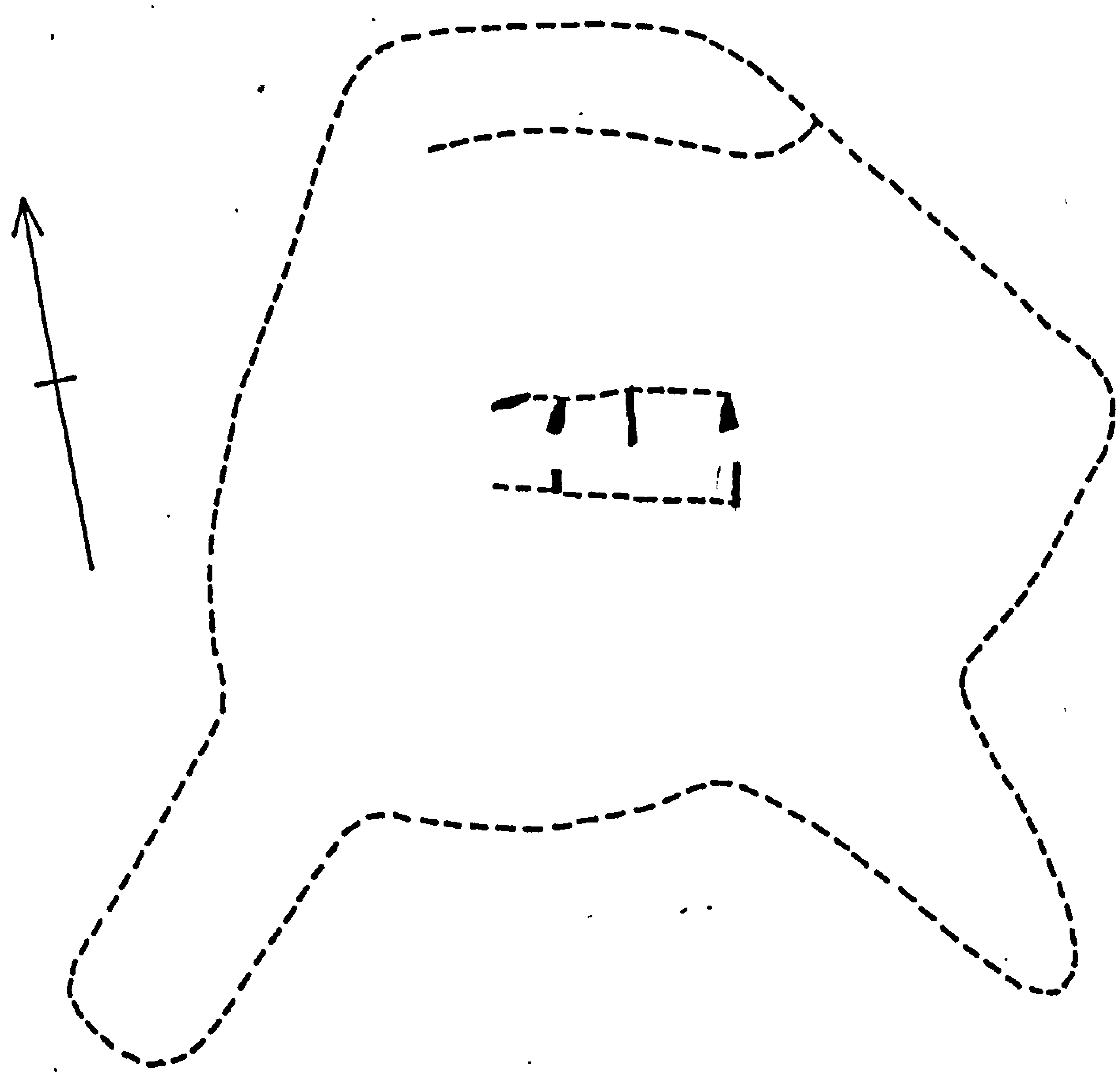
Consisting of a vegetation covered mound of stones, the monument is not clearly defined but it is possible to discern two projections, in the south-east and south-west, from the central mass of cairn material. Henshall interprets these as two horns and suggests the mound originally had four such projections. Another possibility, supported by the extreme hummocky nature of the ground in all directions, is that they are part of a secondary structure.

In the central hollow of the mound can be seen six prominent earth-fast stones protruding through the vegetation. Four of these are in two opposed pairs and all six are characteristically arranged in the form of a tri-partite chamber with passage entering from the east.

The monument overlooks the waist of central Eday, an area which may well have been the focus of much farming activity in prehistoric times.

RCAMS 2: 60-61

*CTS 1: 197-8



15 EDAY CHURCH

EDAY MANSE	ORK 16

Map Reference	Ordnance Survey
HY 56023242	HY 53 SE 7

Island	Parish	RCAMS Inventory
Eday	Eday	225

Category	Landranger Sheet	Orkney Heritage Society
Alpha	5,6	

Excavations	Plans	Visited
1860: Hebden	-	24/6/80 29/5/81

CAIRN		PASSAGE		CHAMBER	
Length	18.5	Length		Length	
Width	9.3	Width		Width	
Area		Area		Area	
Orientation		Orientation		Compartments	
Shape				Cells	
				Orientation	
				Shape	

GEOLOGY		SOIL		LAND USE CAPABILITY	
Site	Sandstone	Site	Peat	Site	Class 6
Water	0	Water	0	Water	0
Sandstone	57	Podzols	13	Class 3	17
Peat	31	Podzolic Com.	1	Class 4	4
Boulder Clay	12	Gleys	24	Class 5	14
Miscellaneous	0	Gleyic Com.	0	Class 6	65
		Peat	61	Class 7	0
		Miscellaneous	1	Miscellaneous	0

Visibility	Altitude	Topography
D 000-008 I 008-047 D 047-153 R 153-241 I 241-325 D 325-341 I 341-000	Site 50 High 77 Low 0	Hillslope
		Vegetation Heathland
	Coast Nature: Low rock Distance: 830	**Intervisibility** ORK 15 ORK 20 ORK 47 ORK 53 ORK 55
	Approaches Easy	
	Drainage Good	

EDAY MANSE ORK 16

Situated in central Eday, to the west of the main road, in the grounds of a ruined church, this site is best approached by following an old track through rough ground from the road.

Today, the only remains of the cairn is an extensive area of disturbed ground with no obvious patterns. There is no trace of a chamber in the field but a historical report describes a long passage leading to a central compartment from which other passages led into small sub-circular cells. The description conforms to that of a chambered cairn of clusters IV-VI - Henshall's Maes Howe type.

In addition to a pot and flint flakes, the site produced a stone with pecked spirals, illustrated in Figure 15.21.

The report by Hebden implies that the chambered cairn may have been surrounded by a complex of cairns, burial mounds and walling, all covered by peat and presumably of prehistoric date.

*PSAS 5(1862): 185-6
PSAS 6(1866): Appendix 39
RCAMS 2: 62
CTS 1: 198

FARA	ORK 17

Map Reference	Ordnance Survey
HY 52743797	HY 53 NW 1

Island	Parish	RCAMS Inventory
Faray	Eday	254
Category	**Landranger Sheet**	**Orkney Heritage Society**
Beta	5	-
Excavations	**Plans**	**Visited**
-	1957: Henshall	26/5/81

CAIRN		PASSAGE		CHAMBER	
Length	14.5	Length		Length	4.5
Width	14.0	Width		Width	2.5
Area	153	Area		Area	9
Orientation	-	Orientation		Compartments	4
Shape	Complex			Cells	0
				Orientation	081-261
				Shape	Simple

GEOLOGY		SOIL		LAND USE CAPABILITY	
Site	Sandstone	Site	Gleys	Site	Class 5
Water	83	Water	83	Water	83
Sandstone	17	Podzols	0	Class 3	0
Peat	0	Podzolic Com.	0	Class 4	7
Boulder Clay	0	Gleys	17	Class 5	6
Miscellaneous	0	Gleyic Com.	0	Class 6	4
		Peat	0	Class 7	0
		Miscellaneous	0	Miscellaneous	0

Visibility

I 001-029
D 029-082
I 082-131
R 131-206
D 206-001

Altitude

Site	5
High	29
Low	0

Coast

Nature	Low rock
Distance	20

Approaches Easy

Drainage Good

Topography Coastal plain

Vegetation Improved pasture

Intervisibility

ORK 42

ORK 53

ORK T5

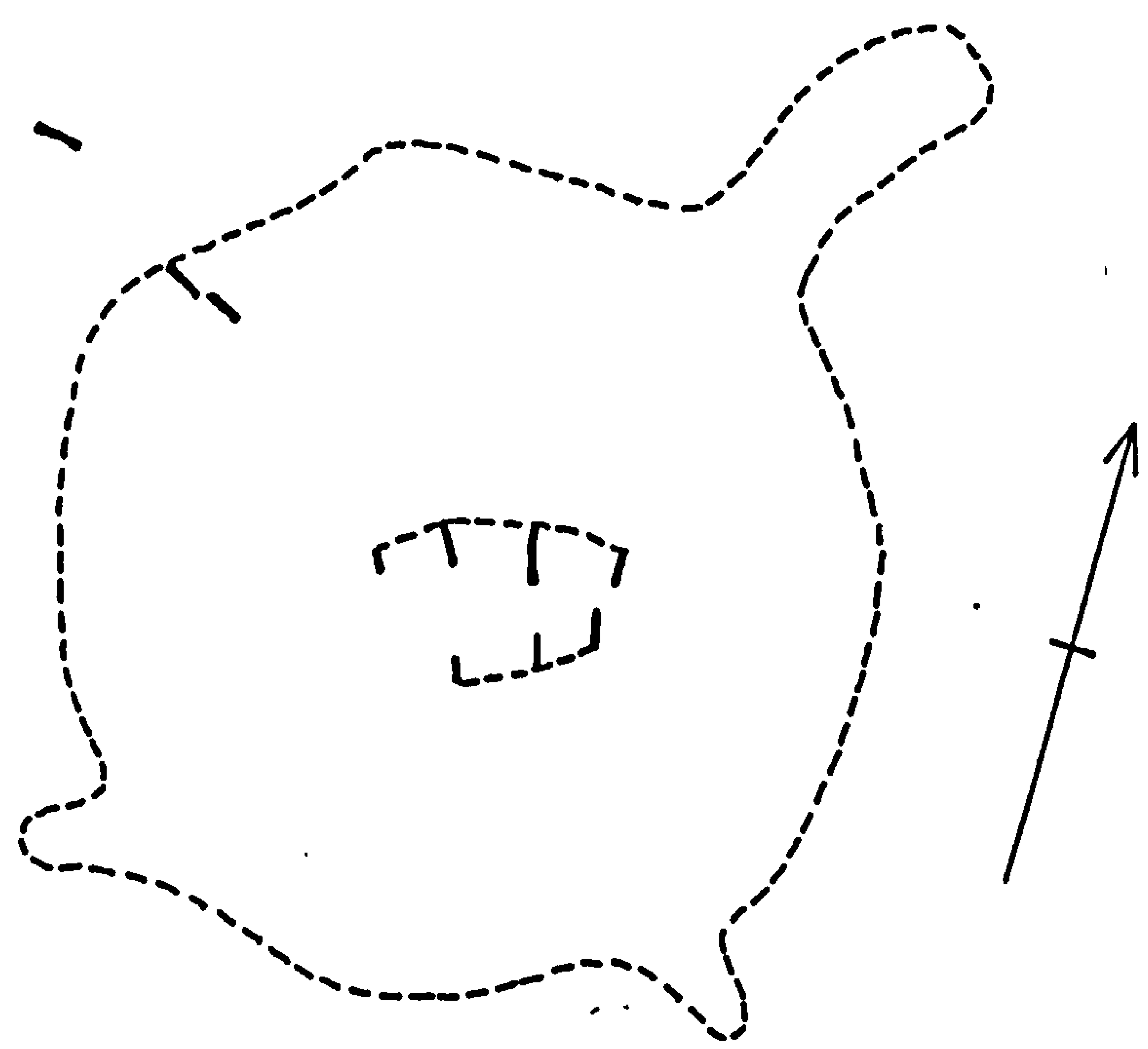
FARA ORK 17

The site is at the north end of Faray (or Fara), a deserted island which is most easily reached by small boat from Westray or Eday.

The cairn is grass-covered but the edges of the central mass and three short projections or horns in the north-east, south-west, and south-east, are clearly visible. A fourth horn is suggested by a line of three earth-fast stones in the north-west. In an irregular excavated hollow in the centre can be seen at least seven earth-fast slabs, including three opposed pairs. These suggest a tri-partite chamber. The Commission noted the remains of an entrance passage to the east with a midden deposit at its inner end.

RCAMS 2:72

*CTS 1:198-99



17 FARA

HEAD OF WORK	ORK 18

Map Reference	Ordnance Survey
HY 48341382	HY 41 SE 1

Island	Parish	RCAMS Inventory
Mainland	Kirkwall and St.Ola	414

Category	Landranger Sheet	Orkney Heritage Society
Beta	6	-

Excavations	Plans	Visited
-	1928: Calder 1981: Henshall, Davidson and Fraser	31/7/80 17/8/80 22/5/81

CAIRN

Length	46.6
Width	14.0
Area	405
Orientation	116-296
Shape	Complex

PASSAGE

Length	
Width	
Area	
Orientation	

CHAMBER

Length	
Width	
Area	
Compartments	
Cells	
Orientation	
Shape	

GEOLOGY

Site Sandstone

Water	78
Sandstone	17
Peat	0
Boulder Clay	5
Miscellaneous	0

SOIL

Site Gleys

Water	78
Podzols	2
Podzolic Com.	0
Gleys	20
Gleyic Com.	0
Peat	0
Miscellaneous	0

LAND USE CAPABILITY

Site Class 4

Water	78
Class 3	1
Class 4	19
Class 5	2
Class 6	0
Class 7	0
Miscellaneous	0

Visibility

D 095-141
I 141-261
D 261-341
I 341-095

Altitude

Site	15
High	15
Low	0

Topography: Peninsula

Vegetation: Heathland

Coast

Nature	Low rock
Distance	80

Approaches: Easy

Drainage: Good

Intervisibility

ORK 19
ORK T6
ORK T7

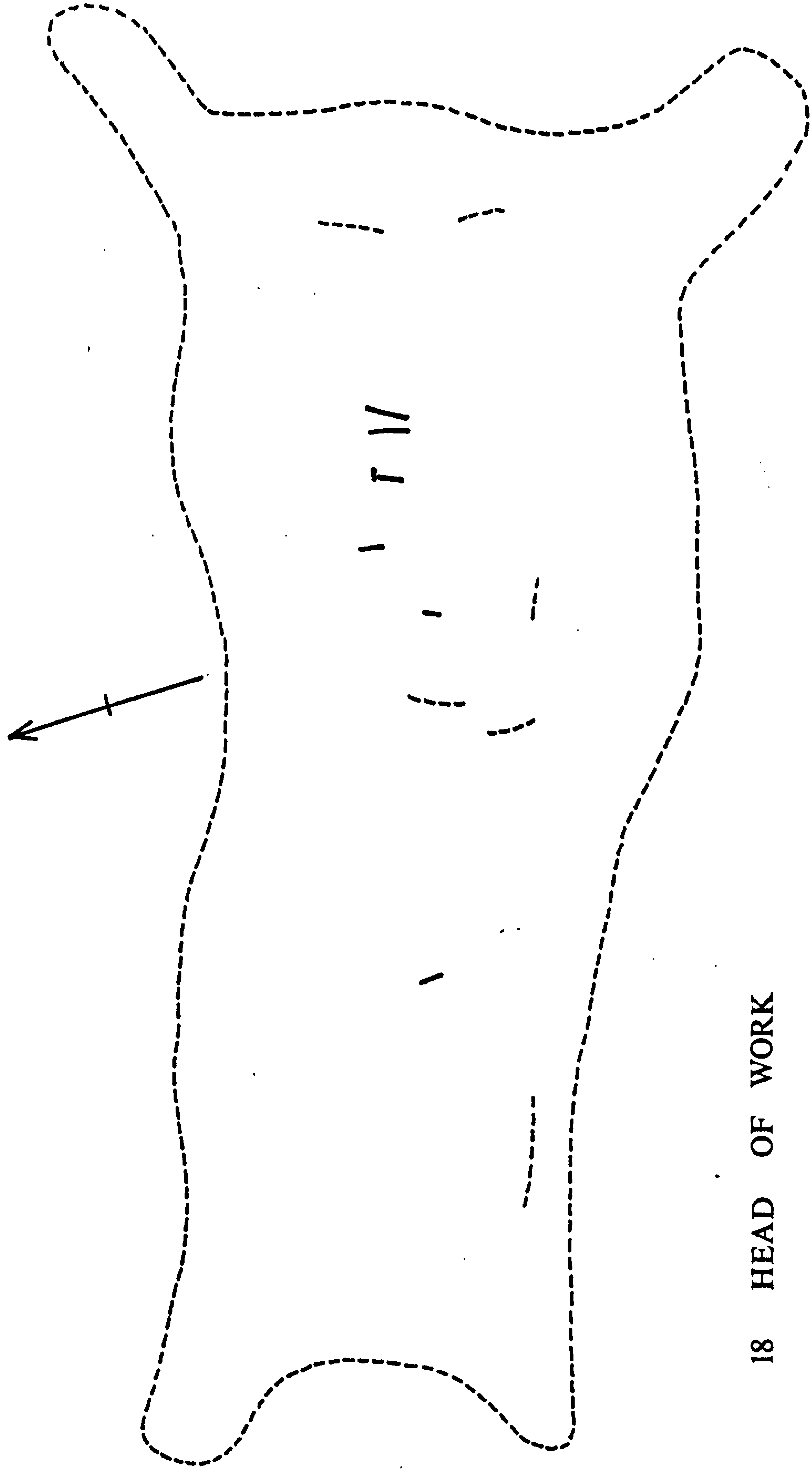
HEAD OF WORK ORK 18

On a peninsula, 4.5 km north-west of Kirkwall, the site can be reached across fields and rough ground from the farm of Work.

The cairn is long with four squat projections in the style of the long horned cairns of Caithness. The western end is now considerably reduced but the eastern end is about 3.4 m above ground level. Traces of walling can be seen suggesting one or more circular internal walls within the eastern half of the cairn. In a hollow at the highest point can be seen the tops of several cairn-fast stones, their pattern corresponding to that of a compartmented chamber. They are surrounded by rubble which may be deliberate in-filling to protect grazing animals but may also be the remnants of a collapsed corbelled roof.

*RCAMS 2: 160

CTS 1: 200



18 HEAD OF WORK

HELLIAR HOLM	ORK 19

Map Reference: HY 48431534		Ordnance Survey: HY 41 NE 2
Island: Helliar Holm	Parish: Shapinsay	RCAMS Inventory: 807
Category: Beta	Landranger Sheet: 6	Orkney Heritage Society: -
Excavations: -	Plans: 1980: Fraser and Morrison; 1981: Henshall and Davidson	Visited: 1/8/80

CAIRN		PASSAGE		CHAMBER	
Length	27.2	Length		Length	
Width	20.0	Width		Width	
Area	410	Area		Area	
Orientation	120-300	Orientation		Compartments	
Shape	Oval			Cells	
				Orientation	
				Shape	

GEOLOGY		SOIL		LAND USE CAPABILITY	
Site	Sandstone	Site	Podzols	Site	Class 5
Water	89	Water	89	Water	89
Sandstone	11	Podzols	4	Class 3	0
Peat	0	Podzolic Com.	0	Class 4	7
Boulder Clay	0	Gleys	7	Class 5	4
Miscellaneous	0	Gleyic Com.	0	Class 6	0
		Peat	0	Class 7	0
		Miscellaneous	0	Miscellaneous	0

Visibility	Altitude	Topography
I 001-115 D 115-185 I 185-239 D 239-001	Site 28 High 28 Low 0	Small island
	Coast: Nature Low rock; Distance 130	Vegetation: Unimproved pasture
	Approaches: Easy	Intervisibility: ORK 18, ORK 26, ORK 43, ORK T6, ORK T7
	Drainage: Good	

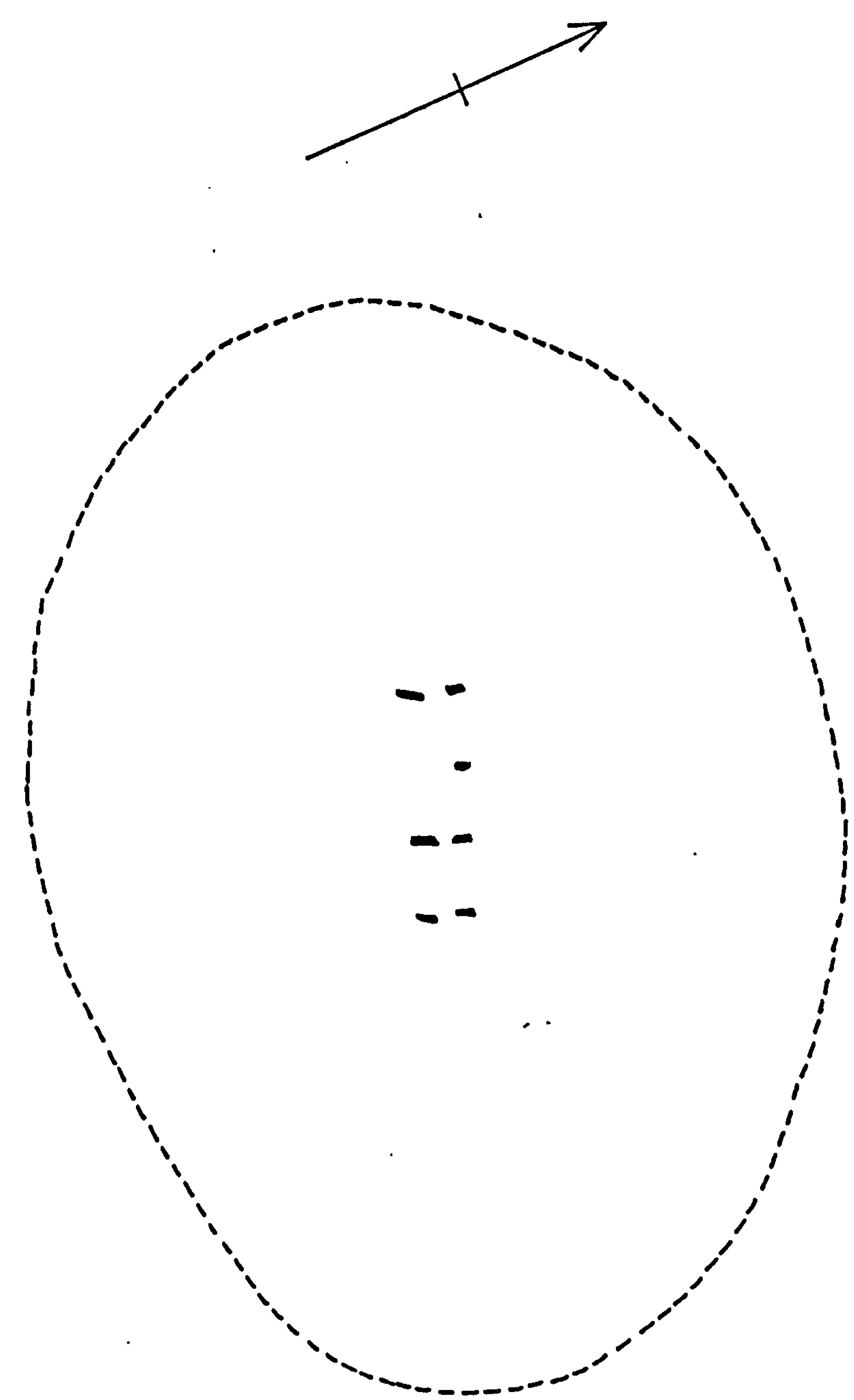
HELLIAR HOLM ORK 19

The site is on the highest point of the island of Helliar Holm, between Shapinsay and the Mainland, and is reached by small boat from Shapinsay.

The cairn is large and oval, and is a prominent feature standing about 2.6 m high. It is only lightly covered with vegetation and the stone cairn material is everywhere apparent. Along the axis of the cairn protrude the tops of eight cairn-fast stones, arranged in four opposed pairs suggesting a compartmented chamber of three or more divisions. The monument falls into cluster II.

The island of Helliar Holm, on which there also stands the remains of a broch, may be linked to Shapinsay at the time of extreme low tides.

*RCAMS 2: 280
CTS 1: 200



19 HELLIAR HOLM

HOLM OF HUIP	ORK 20

Map Reference		Ordnance Survey
HY 62823116		HY 63 SW 4
Island	**Parish**	**RCAMS Inventory**
Holm of Huip	Stronsay	995
Category	**Landranger Sheet**	**Orkney Heritage Society**
Gamma	5	-
Excavations	**Plans**	**Visited**
-	1981: Fraser	19/5/81

CAIRN		PASSAGE		CHAMBER	
Length	22.8	Length		Length	
Width	18.8	Width		Width	
Area	346	Area		Area	
Orientation	-	Orientation		Compartments	
Shape	Round			Cells	
				Orientation	
				Shape	

GEOLOGY		SOIL		LAND USE CAPABILITY	
Site	Boulder clay	Site	Gleys	Site	Class 5
Water	92	Water	92	Water	92
Sandstone	6	Podzols	0	Class 3	0
Peat	0	Podzolic Com.	0	Class 4	0
Boulder Clay	2	Gleys	8	Class 5	8
Miscellaneous	0	Gleyic Com.	0	Class 6	0
		Peat	0	Class 7	0
		Miscellaneous	0	Miscellaneous	0

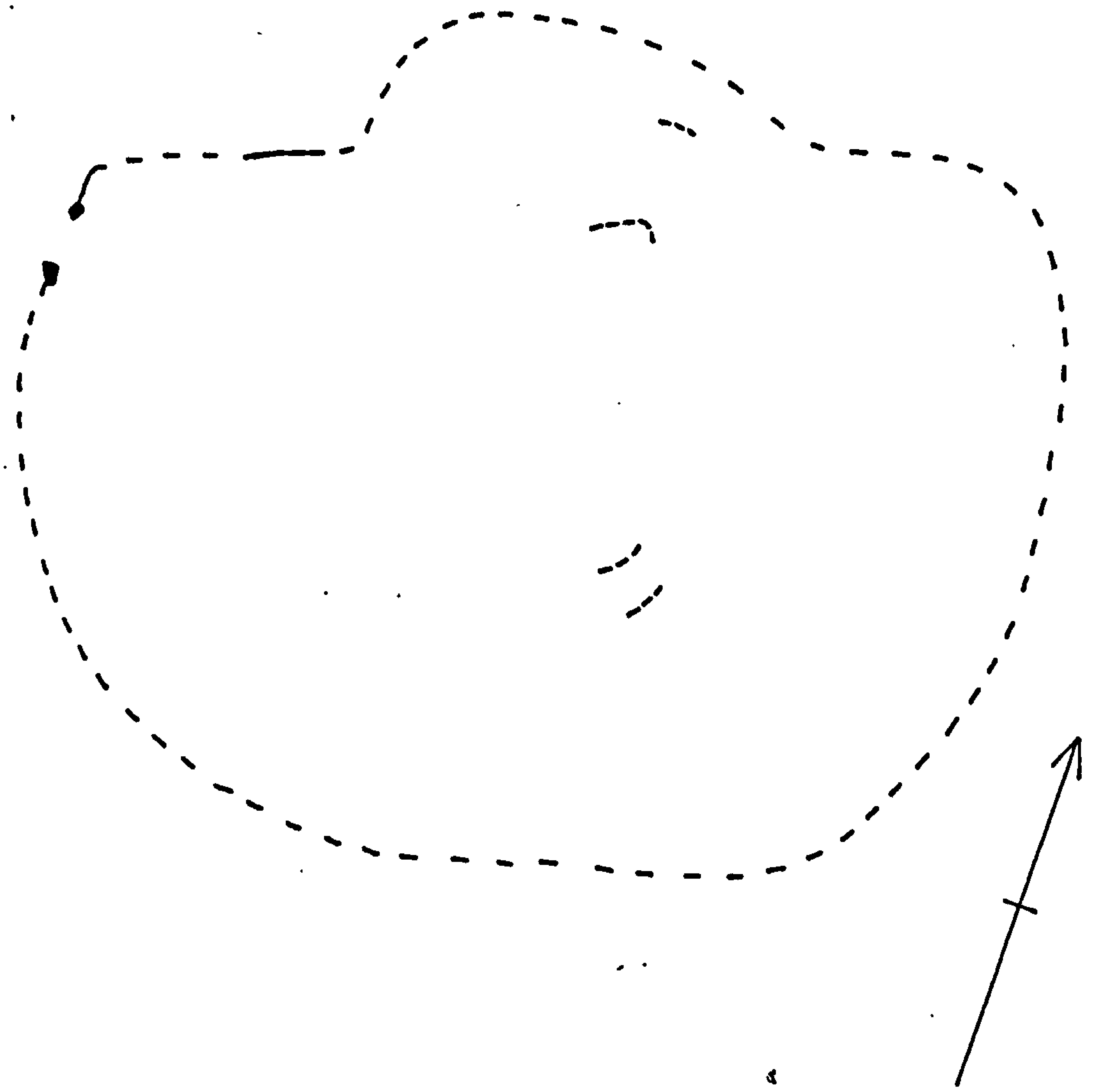
Visibility	Altitude	Topography
D 019-141 I 141-224 D 224-329 I 329-019	Site 18 High 18 Low 0	Small island
	Coast Nature: Low rock Distance: 140	**Vegetation** Heathland
	Approaches Easy	**Intervisibility** ORK 14, ORK 16, ORK 38, ORK 47, ORK 50, ORK 53, ORK 55, ORK T10, ORK T21
	Drainage Good	

HOLM OF HUIP ORK 20

In the centre, and on the highest point, of the Holm of Huip, an island off the farm of Huip in the north of Stronsay, the site can only be reached by small boat but is readily visible from the North Isles passenger ferry.

A large mound of irregular shape, the monument has a maximum height of perhaps 2.5 m and is strewn with many large flat stones. Within the body of the cairn at least five short stretches of walling, none higher than 0.4 m or containing more than four courses of stone, may be seen. No intelligible pattern emerges from these wall-faces. In the west side of the cairn two stones, which are earth-fast, stand 1.05 m apart but do not, *contra* the Commission report, suggest the existence of a passage. The large size and singular position of the monument are, however, very suggestive of a prehistoric burial cairn.

*RCAMS 2: 336
CTS 1: 200



20 HOLM OF HUIP

HOLM OF PAPA WESTRAY NORTH	ORK 21

Map Reference	Ordnance Survey
HY 50445228	HY 55 SW 2

Island	Parish	RCAMS Inventory
Holm of Papa Westray	Papa Westray	545

Category	Landranger Sheet	Orkney Heritage Society
Alpha	5	-

Excavations	Plans	Visited
1854: Petrie 1982: A. Ritchie	1928: Calder	5/7/80

CAIRN

Length	12.1
Width	9.1
Area	93
Orientation	141-321
Shape	Oval

PASSAGE

Length	3.2
Width	0.8
Area	2.6
Orientation	320

CHAMBER

Length	5.2
Width	1.8
Area	9.4
Compartments	4
Cells	0
Orientation	318
Shape	Simple

GEOLOGY

Site Sandstone

Water	89
Sandstone	11
Peat	0
Boulder Clay	0
Miscellaneous	0

SOIL

Site Gleys

Water	89
Podzols	0
Podzolic Com.	0
Gleys	11
Gleyic Com.	0
Peat	0
Miscellaneous	0

LAND USE CAPABILITY

Site Class 5

Water	89
Class 3	0
Class 4	0
Class 5	11
Class 6	0
Class 7	0
Miscellaneous	0

Visibility

D 024-085
R 085-178
I 178-024

Altitude

Site	5
High	15
Low	0

Topography

Small island

Vegetation

Unimproved pasture

Coast

Nature	Low rock
Distance	30

Intervisibility

ORK 22
ORK T9
ORK T18

Approaches

Easy

Drainage

Fair

HOLM OF PAPA WESTRAY NORTH ORK 21

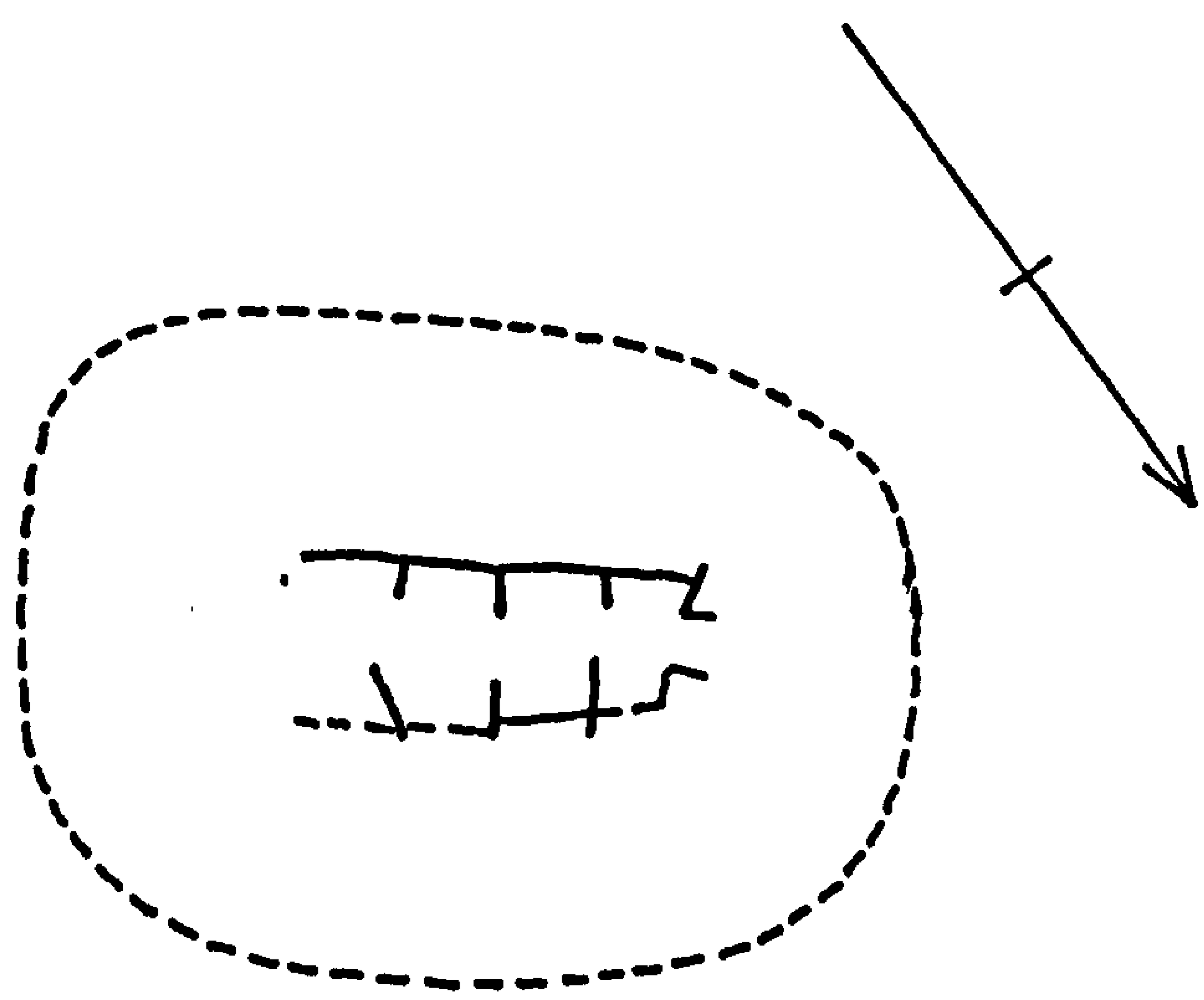
The Holm of Papa Westray, a small island to the east of Papa Westray, can be reached by small boat from that island or from Westray. This site is close to the shore in the north of the Holm.

The edge of the cairn is indeterminate, being overgrown and obscured by later building. Some details of the chamber were revealed by Petrie: there are at least four compartments demarcated by opposed pairs of orthostats and suggestions of a passage leading to the north-west.

In addition to a small amount of pottery and the remains of six or more human skeletons, a variety of animal bones, including more than thirteen deer antlers, were found.

The monument is one of three on the Holm, and is the nearest chambered cairn, in a direct line, to Knap of Howar. It is currently under excavation by Dr Anna Ritchie.

TO 26 January 1856
*PSAS 2(1857): 62
Antiq Ms 545: 9-10
RCAMS 2: 189
CTS 1: 200-201



21 HOLM OF PAPA WESTRAY NORTH

HOLM OF PAPA WESTRAY SOUTH		ORK 22
Map Reference: HY 50915183		Ordnance Survey: HY 55 SW 1
Island: Holm of Papa Westray	Parish: Papa Westray	RCAMS Inventory: 544
Category: Alpha	Landranger Sheet: 5	Orkney Heritage Society: -
Excavations: 1849: Thomas	Plans: 1849: Thomas	Visited: 5/7/80

CAIRN		PASSAGE		CHAMBER	
Length	35.0	Length	5.5	Length	20.4
Width	16.8	Width	0.5	Width	4.0
Area	514	Area	2.8	Area	56
Orientation	028-208	Orientation	120	Compartments	3
Shape	Rectangle			Cells	14
				Orientation	031-211
				Shape	Complex

GEOLOGY		SOIL		LAND USE CAPABILITY	
Site	Sandstone	Site	Gleys	Site	Class 5
Water	89	Water	89	Water	89
Sandstone	11	Podzols	0	Class 3	0
Peat	0	Podzolic Com.	0	Class 4	0
Boulder Clay	0	Gleys	11	Class 5	11
Miscellaneous	0	Gleyic Com.	0	Class 6	0
		Peat	0	Class 7	0
		Miscellaneous	0	Miscellaneous	0

Visibility	Altitude	Topography
D 011-211 I 211-011	Site 15 High 15 Low 0	Small island
		Vegetation: Unimproved pasture
	Coast: Nature Low rock; Distance 60	Intervisibility: ORK 21 ORK T9 ORK T18
	Approaches: Easy	
	Drainage: Good	

HOLM OF PAPA WESTRAY SOUTH ORK 22

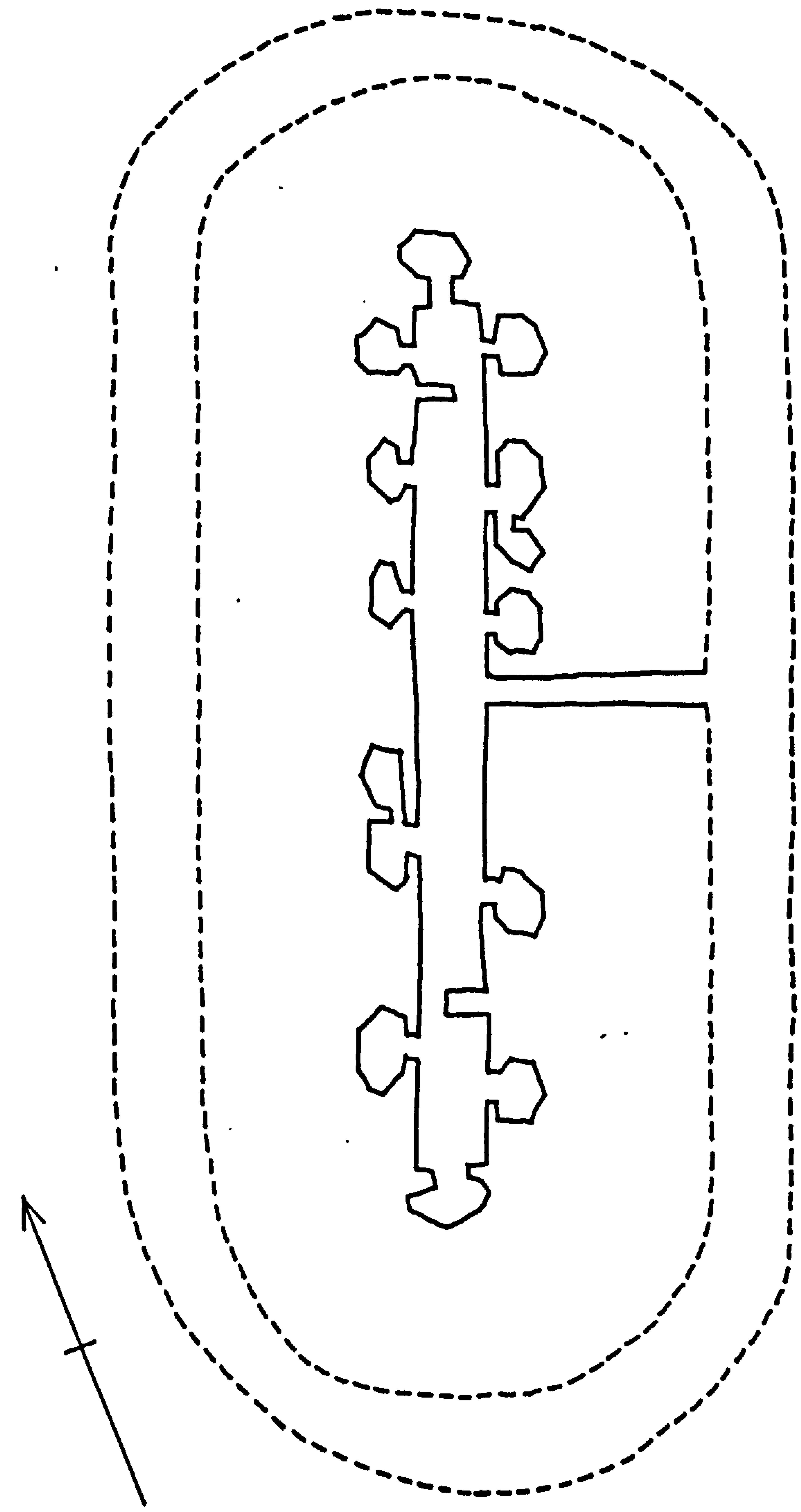
The Holm of Papa Westray is most easily reached by small boat from Papa Westray or Westray. This site is on the highest point of the island, close to the eastern shore at the south end. This singular and remarkable monument is under the guardianship of the state.

The cairn is long and rectangular, conforming to the shape of the chamber. Entered today through a hole in the modern roof, the chamber was originally entered by a passage leading from the middle of the south-east outer wall to a central compartment - one of three rectangular compartments running down the long axis of the cairn. Opening from these three compartments are twelve short passages leading to ten single cells and two double cells with corbelled roofs. The two end-most compartments each have three cells and are similar in layout to Maes Howe. This is the only member of cluster V.

No artefacts or human bones were found during the nineteenth century excavation but several decorated stones are incorporated in the chamber walls. The decorations include "eye-brow" motifs and zig-zags, and are illustrated in Figure 15.24.

Despite the Holm of Papa Westray being less than a kilometre long, this monument is one of three chambered cairns on the island. None are known on Papa Westray itself.

Arch 34 (1852): 127-9
TO 19 January 1856
PSAS 2(1857): 60-61
Wilson (1863): 1,115
MASL (1866): 222-23
Anderson (1886): 281-83
*RCAMS 2: 186-89
CTS 1: 202-3



22 HOLM OF PAPA WESTRAY SOUTH

HUNTERSQUOY	ORK 23

Map Reference	Ordnance Survey
HY 56263774	HY 53 NE 1

Island	Parish	RCAMS Inventory
Eday	Eday	217
Category	**Landranger Sheet**	**Orkney Heritage Society**
Alpha	5	-
Excavations	**Plans**	**Visited**
1937: Calder	1937: Calder	25/6/80 30/5/81

CAIRN		PASSAGE Lower	PASSAGE Upper	CHAMBER Lower	CHAMBER Upper
Length	11.0	4.1	3.0	3.9	3.5
Width	10.0	0.8	0.7	1.8	2.0
Area	81	2.8	1.8	6	7.0
Orientation	-	090	265		
Compartments				3	3
Shape	Round				
Cells				0	0
Orientation				011-191	093-273
Shape				Simple	Simple

GEOLOGY		SOIL		LAND USE CAPABILITY	
Site	Sandstone	Site	Podzols	Site	Class 4
Water	6	Water	6	Water	6
Sandstone	73	Podzols	61	Class 3	15
Peat	3	Podzolic Com.	0	Class 4	37
Boulder Clay	18	Gleys	27	Class 5	19
Miscellaneous	0	Gleyic Com.	0	Class 6	23
		Peat	6	Class 7	0
		Miscellaneous	0	Miscellaneous	0

Visibility

I 029-034
D 034-049
I 049-195
R 195-029

Altitude

Site	25
High	76
Low	0

Coast

Nature: Low rock
Distance: 870

Approaches: Easy

Drainage: Poor

Topography: Valley bottom

Vegetation: Unimproved pasture

Intervisibility

ORK 5
ORK 53
ORK 55

HUNTERSQUOY ORK 23

In the central valley of northern Eday, the monument can be approached across boggy ground from the farm of Carrick or by the longer but drier route from the road to Cusbay.

The cairn is small and round. It is unusual in containing two chambers, one above ground level and now greatly ruined, and one subterranean and largely complete. The upper chamber had a passage entering from the west and appears to have consisted of three compartments delimited by pairs of orthostats. The lower chamber had a long passage, its outer portion consisting of a trench outwith the limits of the cairn with the foundation course of the outer revetment serving as a passage lintel. This chamber itself is unusual, since the passage enters laterally into the middle of three compartments. Henshall regarded the lower chamber as being of Bookan type: the monument as a whole falls into cluster III.

Pottery of carinated and round-bottomed forms were found as were artefacts of stone and flint.

The area is dense with prehistoric monuments including three more chambered cairns, and the complex in the vicinity of the Stone of Setter.

*PSAS 72 (1938): 193-204, 213

RCAMS 2: 56-9

CTS 1: 203-5


23 HUNTERSQUOY
UPPER CHAMBER
LOWER CHAMBER

IPHS	ORK 24

Map Reference		Ordnance Survey
HY 42204910		HY 44 NW 14
Island	**Parish**	**RCAMS Inventory**
Westray	Westray	1042
Category	**Landranger Sheet**	**Orkney Heritage Society**
Beta	5	-
Excavations	**Plans**	**Visited**
-	1981: Fraser and Clark	24/7/80 31/7/81

CAIRN		PASSAGE		CHAMBER	
Length	16.8	Length		Length	
Width	13.7	Width		Width	
Area	174	Area		Area	
Orientation	-	Orientation		Compartments	
Shape	Round			Cells	
				Orientation	
				Shape	

GEOLOGY		SOIL		LAND USE CAPABILITY	
Site	Sandstone	Site	Podzolic com.	Site	Class 5
Water	27	Water	27	Water	27
Sandstone	58	Podzols	14	Class 3	0
Peat	0	Podzolic Com.	40	Class 4	23
Boulder Clay	2	Gleys	13	Class 5	43
Miscellaneous	13	Gleyic Com.	0	Class 6	1
		Peat	0	Class 7	6
		Miscellaneous	6	Miscellaneous	0

Visibility	Altitude	Topography
I 163-196 R 196-313 D 313-163	Site 60 High 108 Low 0	Terrace edge
		Vegetation
		Improved pasture
	Coast	**Intervisibility**
	Nature Cliff Distance 460	ORK 33
	Approaches	
	Restricted	
	Drainage	
	Good	

IPHS ORK 24

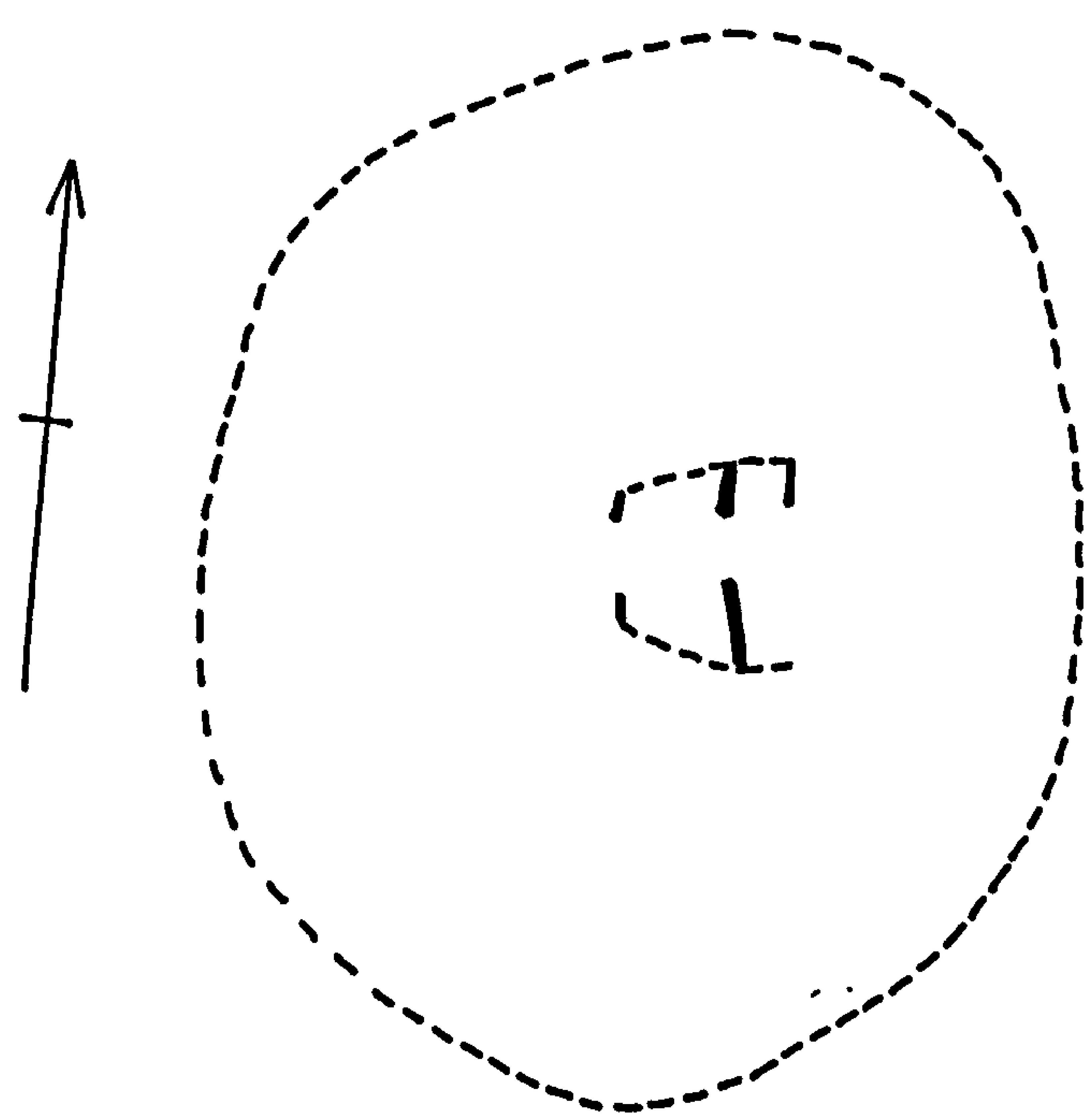
Also known as the Lum Head, this site is on the edge of a terrace two fields away from the farm-house of Iphs in north-west Westray.

Now a grass-covered mound, the cairn is sub-circular and does not appear to have suffered much robbing. At the centre of the mound is an irregular hollow, perhaps caused by the collapse of an internal chamber. Five stones protrude through the turf in this hollow, four of them arranged as opposed pairs, with the whole suggesting a small chamber of two or more compartments.

The location of Iphs is of especial importance. It overlooks the major machair system of northern Westray and is only 600 m distant from the Grooved Ware settlement of Links of Noltland.

RCAMS 2: 352

*CTS 1: 205



24 IPHS

ISBISTER		ORK 25
Map Reference ND 47048447		**Ordnance Survey** ND 48 SE 1
Island South Ronaldsay	**Parish** South Ronaldsay	**RCAMS Inventory** -
Category Alpha	**Landranger Sheet** 7	**Orkney Heritage Society** -
Excavations 1958: Simison 1976: Simison	**Plans** 1958: Ritchie 1978: Hedges	**Visited** 16/8/80 9/8/81

CAIRN		PASSAGE		CHAMBER	
Length	40.3	Length	4.0	Length	8.4
Width	16.4	Width	0.7	Width	1.6
Area	564	Area	2.8	Area	13
Orientation	000-180	Orientation	085	Compartments	5
Shape	Complex			Cells	3
				Orientation	175-355
				Shape	Complex

GEOLOGY		SOIL		LAND USE CAPABILITY	
Site	Sandstone	Site	Gleyic Com.	Site	Class 5
Water	47	Water	47	Water	47
Sandstone	18	Podzols	1	Class 3	22
Peat	0	Podzolic Com.	3	Class 4	11
Boulder Clay	35	Gleys	49	Class 5	20
Miscellaneous	0	Gleyic Com.	0	Class 6	0
		Peat	0	Class 7	0
		Miscellaneous	0	Miscellaneous	0

Visibility	Altitude	Topography
D 047-179 R 179-233 I 233-264 D 264-284 I 284-047	Site 5 High 38 Low 0	Coastal plain
	Coast Nature: Low rock Distance: 40	**Vegetation** Improved pasture
	Approaches Easy	**Intervisibility** -
	Drainage Good	

ISBISTER ORK 25

Situated on the east coast of South Ronaldsay, this chambered cairn can best be approached across fields past the deserted farm of Isbister.

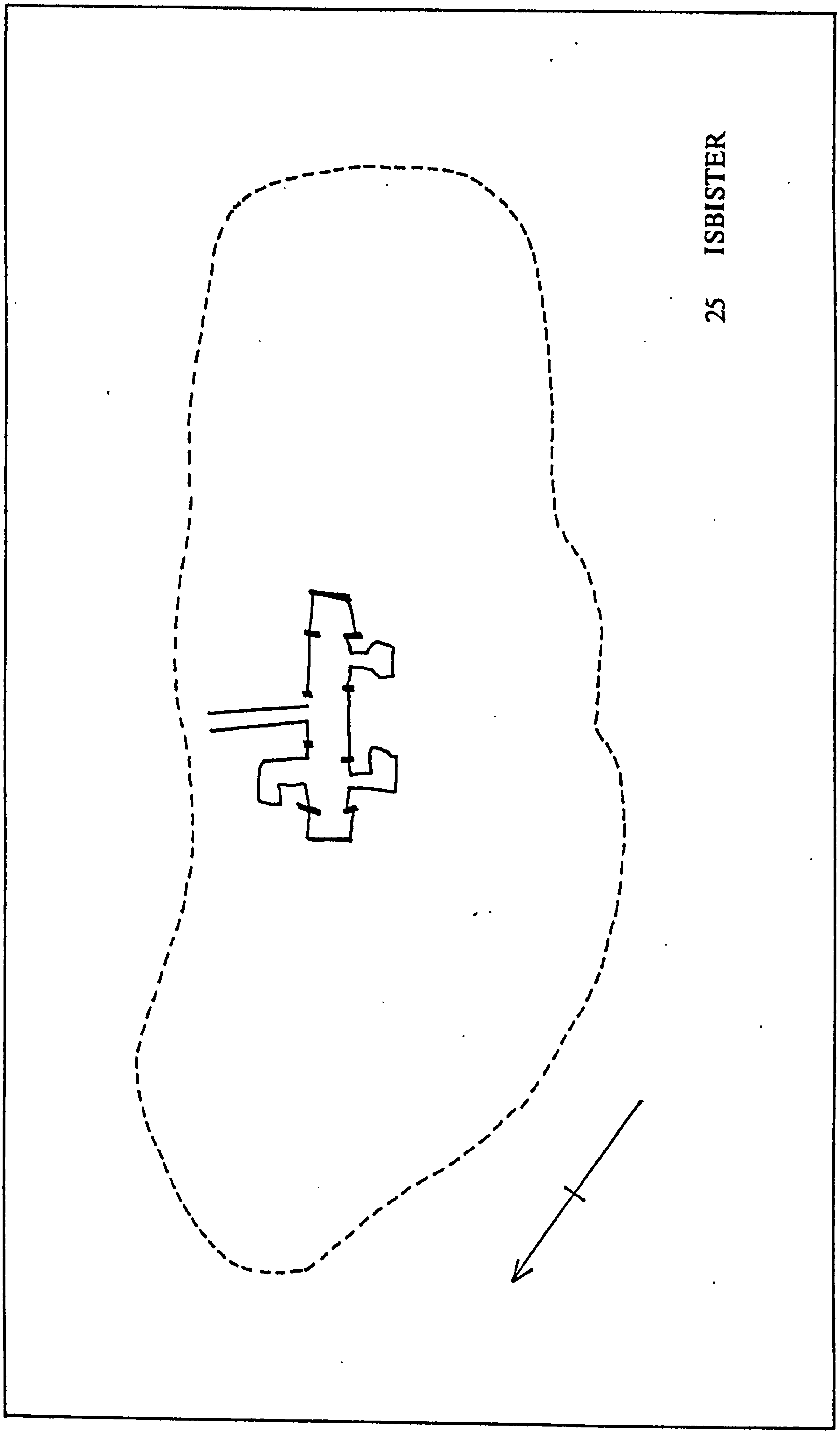
The site has been excavated in recent years and the forthcoming report will greatly enhance our knowledge of Neolithic Orkney. The original shape of the cairn is unclear, but it seems to have consisted of a circular structure containing the chamber, with curved horn-works extending north and south following the line of the coast and bordering a natural amphitheatre in the rocky shore. The chamber is also unusual, consisting of a rectangular space divided into five compartments by opposed pairs of upright stones. In places the dry-stone walling stands more than 2.0 m high. The two end-most compartments contained shelves about a metre above the floor. Three small cells, connected to the compartments by low passages, are reminiscent of the cells of clusters IV-VI, although Isbister is a member of cluster II. A passage leads from the central compartment eastwards towards the sea.

A large quantity of artefactual material, including bowls of Unstan type, was found. Bone material included the remains of at least 341 humans and a number of specimens of white-tailed eagle. These are all dealt with in depth in the forthcoming report.

PSAS 92 (1959): 25-32

CTS 1: 205-6

*Hedges (forthcoming)


25 ISBISTER

KIERFEA HILL	ORK 26

Map Reference	Ordnance Survey
HY 42423196	HY 43 SW 18

Island	Parish	RCAMS Inventory
Rousay	Rousay	-

Category	Landranger Sheet	Orkney Heritage Society
Alpha	5,6	-

Excavations	Plans	Visited
1940: Grant	1940: Wilson	7/6/80

CAIRN		PASSAGE		CHAMBER	
Length	8.2	Length	2.4	Length	3.7
Width	8.2	Width	0.6	Width	1.5
Area	55	Area	1.4	Area	5.5
Orientation	-	Orientation	115	Compartments	3
Shape	Round			Cells	0
				Orientation	098-278
				Shape	Rectangle

GEOLOGY		SOIL		LAND USE CAPABILITY	
Site	Sandstone	Site	Podzolic Com.	Site	Class 6
Water	4	Water	4	Water	4
Sandstone	71	Podzols	14	Class 3	12
Peat	10	Podzolic Com.	56	Class 4	4
Boulder Clay	15	Gleys	4	Class 5	24
Miscellaneous	0	Gleyic Com.	16	Class 6	54
		Peat	6	Class 7	2
		Miscellaneous	0	Miscellaneous	0

Visibility	Altitude	Topography / Vegetation
D 077-178 I 178-281 R 281-077	Site 180 High 235 Low 0	Topography: Hillslope Vegetation: Heathland
	Coast Nature: Cliff Distance: 800	Intervisibility ORK 19 ORK 27 ORK 55 ORK T3 ORK T6
	Approaches: Restricted	
	Drainage: Good	

KIERFEA HILL ORK 26

On the southern slopes of Kierfea Hill, in north-east Rousay, the site can be approached across rough ground from the farm of Digro. This is the highest known chambered cairn in Orkney.

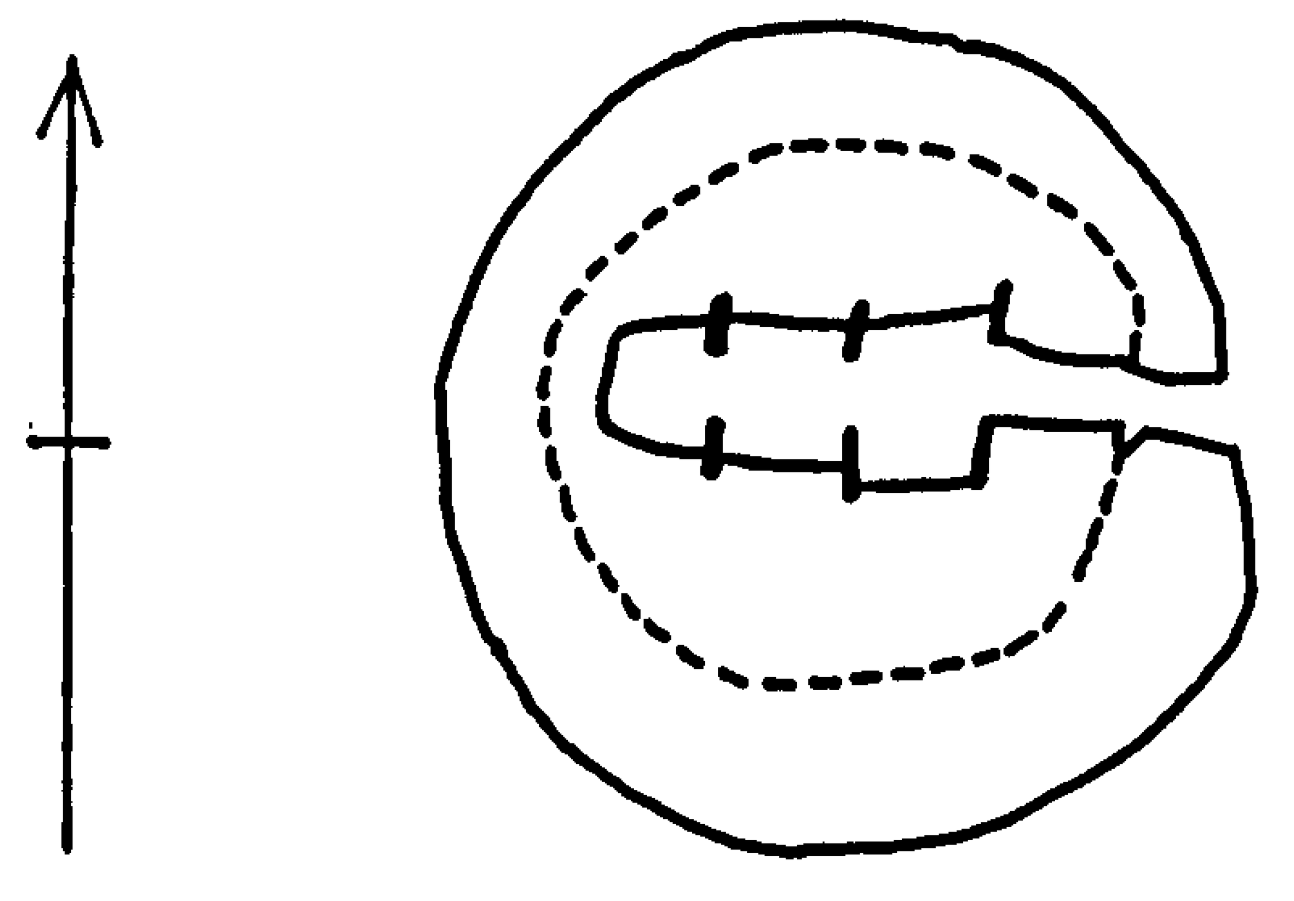
The monument has been untouched since the 1940 excavation. Most of the cairn material has been removed to reveal parts of a sub-circular outer revetment. There are suggestions of an inner wall around the chamber. Many details of the chamber are still visible: entered from the east by a short passage, it consists of three compartments demarcated by pairs of opposed orthostats.

Finds from the excavation were meagre, consisting of the remains of four pots, three of them of Unstan type and two with bored holes, and a worked flint object.

Despite being within a mile of the complex of Neolithic monuments around Bigland, these sites are hidden by the shoulder of Kierfea Hill: the cairn does have, however, extensive views to the east and south.

PSAS 81 (1947): 190

*CTS 1: 207-8



26 KIERFEA HILL

KNOWE OF CRAIE	ORK 27

Map Reference	Ordnance Survey
HY 41963152	HY 43 SW 19

Island	Parish	RCAMS Inventory
Rousay	Rousay	568

Category	Landranger Sheet	Orkney Heritage Society
Alpha	5,6	-

Excavations	Plans	Visited
1941: Grant	1941: Wilson	7/6/80

CAIRN		PASSAGE		CHAMBER	
Length	11.5	Length	2.4	Length	4.5
Width	10.8	Width	0.7	Width	2.5
Area	92	Area	1.7	Area	11
Orientation	-	Orientation	094	Compartments	3
Shape	Round			Cells	0
				Orientation	096-276
				Shape	Simple

GEOLOGY		SOIL		LAND USE CAPABILITY	
Site	Sandstone	Site	Podzols	Site	Class 3
Water	0	Water	0	Water	0
Sandstone	36	Podzols	15	Class 3	13
Peat	48	Podzolic Com.	21	Class 4	6
Boulder Clay	16	Gleys	15	Class 5	19
Miscellaneous	0	Gleyic Com.	10	Class 6	61
		Peat	39	Class 7	1
		Miscellaneous	0	Miscellaneous	0

Visibility	Altitude	Topography
D 083-144 I 144-249 R 249-083	Site 110 High 235 Low 40	Valley bottom
	Coast Nature Cliff Distance 1210	Vegetation Improved pasture
	Approaches Easy	Intervisibility ORK 26 ORK T3
	Drainage Fair	

KNOWE OF CRAIE ORK 27

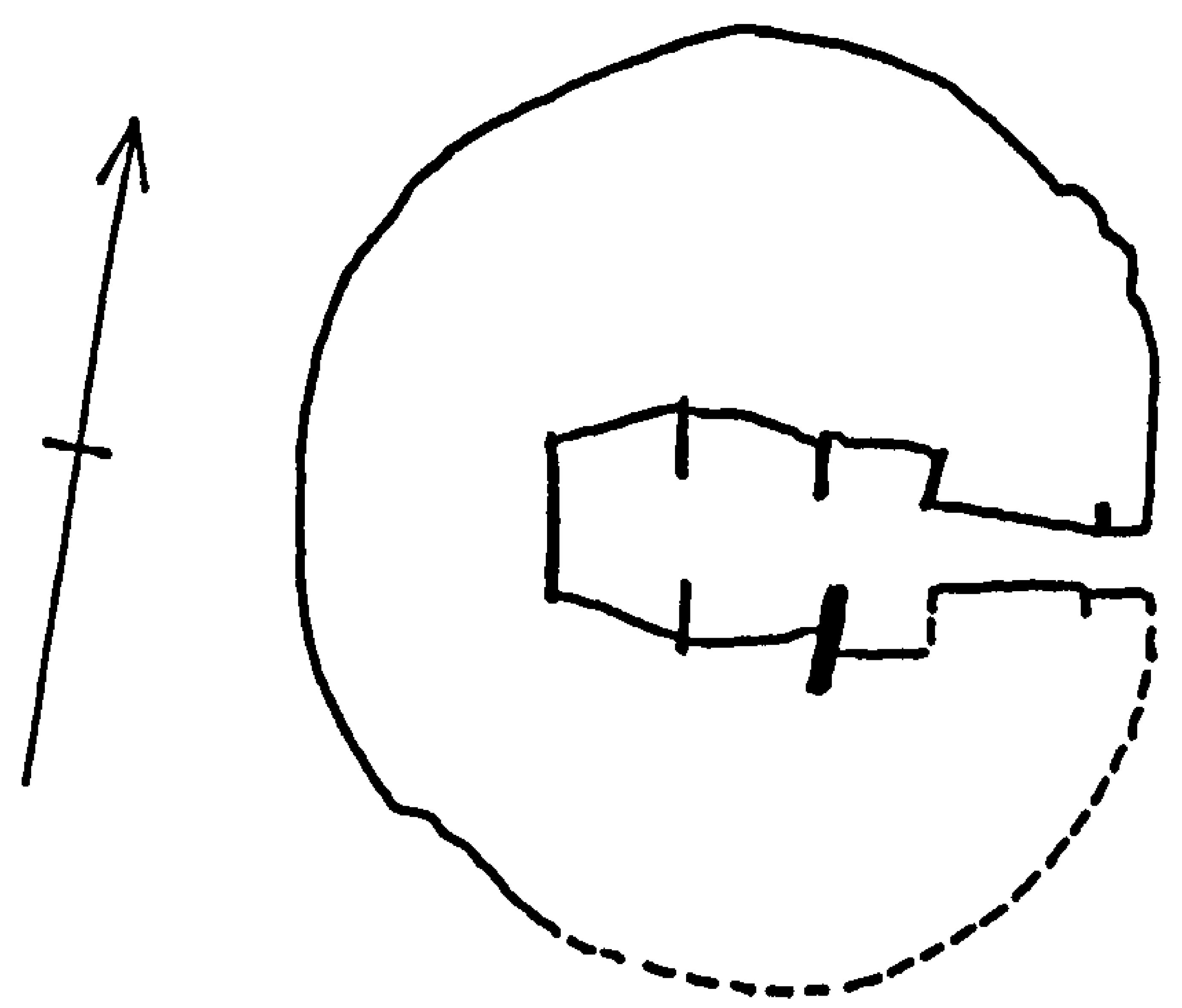
Approaching across fields from the farm of Curquoy, this monument is easily visible on the northern slopes of the Suso valley in north-east Rousay.

The cairn was greatly reduced and ruined before excavation and is now a vegetation-covered indeterminate mound. In plan the chamber is very similar to its near neighbour, Kierfea Hill (ORK 26), with three compartments demarcated by three pairs of opposed orthostats and a massive back-slab. In all three compartments there is evidence of low shelves. The passage opens to the east.

Pottery from the site consisted of undecorated round-bottomed bowls, one with lugs, and a curious flat sherd with at least five perforations. In addition, several pieces of worked flint and one human skull were found.

RCAMS 2: 206

*CTS 1: 208-9



27 KNOWE OF CRAIE

KNOWE OF LAIRO	ORK 28

Map Reference	Ordnance Survey
HY 39882796	HY 32 NE 6

Island	Parish	RCAMS Inventory
Rousay	Rousay	577
Category	**Landranger Sheet**	**Orkney Heritage Society**
Alpha	6	-
Excavations	**Plans**	**Visited**
1936: Grant	1942: Wilson	6/6/80

CAIRN		PASSAGE		CHAMBER	
Length	45.7	Length	5.6	Length	5.2
Width	21.9	Width	0.6	Width	2.5
Area	602	Area	3.3	Area	13
Orientation	114-294	Orientation	095	Compartments	3
Shape	Complex			Cells	0
				Orientation	102-282
				Shape	Simple

GEOLOGY		SOIL		LAND USE CAPABILITY	
Site	Sandstone	Site	Podzolic Com.	Site	Class 5
Water	30	Water	30	Water	30
Sandstone	67	Podzols	0	Class 3	0
Peat	3	Podzolic Com.	55	Class 4	18
Boulder Clay	0	Gleys	10	Class 5	9
Miscellaneous	0	Gleyic Com.	4	Class 6	43
		Peat	1	Class 7	0
		Miscellaneous	0	Miscellaneous	0

Visibility

D 136-301
I 301-340
R 340-136

Altitude

Site	20
High	170
Low	0

Coast

Nature	Low rock
Distance	290

Approaches: Easy

Drainage: Good

Topography: Terrace edge

Vegetation: Improved pasture

Intervisibility

ORK 6
ORK 30
ORK 56
ORK 57
ORK T20

KNOWE OF LAIRO ORK 28

In the Frotoft district on the south coast of Rousay, this chambered cairn is a conspicuous feature in a field to the east of Newhouse farm.

The mound is long and covered with vegetation, rising to about 5.0 m at the massive eastern end but is considerably reduced at the western end. Traces of two projections characteristic of other horned long cairns can still be seen and it is probable there were originally four horns. The eastern forecourt has been disturbed by secondary building.

A long curving passage that can still be entered with difficulty leads from the south-east into a chamber which has undergone remodelling at some period. The original plan appears to have been a large tri-partite chamber with pairs of opposed orthostats. The rear-most compartment and the sides of the front two compartments have been carefully blocked off with secondary masonry to form a long narrow rectangular space. This masonry contains four recesses and seven high transverse slabs spanning the chamber. A notable feature about the chamber is its height: side walling survives to a height of about 4.0 m.

Finds were meagre, consisting of a stone axe, two pottery sherds, and the remains of perhaps two humans.

*PSAS 77 (1943): 17-26

RCAMS 2: 216-8

CTS 1: 209-11

28 KNOWE OF LAIRO

KNOWE OF LINGRO		ORK 29
Map Reference HY 39643238		**Ordnance Survey** HY 33 SE 22
Island Rousay	**Parish** Rousay	**RCAMS Inventory** 562
Category Beta	**Landranger Sheet** 6	**Orkney Heritage Society** -
Excavations -	**Plans** 1969: Henshall	**Visited** 8/6/80

CAIRN		PASSAGE		CHAMBER	
Length	21.3	Length		Length	6.7
Width	12.2	Width		Width	2.2
Area	234	Area		Area	14.7
Orientation	092-272	Orientation		Compartments	5
Shape	Rectangle			Cells	0
				Orientation	092-272
				Shape	Simple

GEOLOGY		SOIL		LAND USE CAPABILITY	
Site	Sandstone	Site	Podzolic Com.	Site	Class 5
Water	3	Water	3	Water	3
Sandstone	44	Podzols	32	Class 3	0
Peat	6	Podzolic Com.	22	Class 4	53
Boulder Clay	47	Gleys	30	Class 5	29
Miscellaneous	0	Gleyic Com.	0	Class 6	15
		Peat	11	Class 7	0
		Miscellaneous	2	Miscellaneous	0

Visibility

D 004-021
I 021-030
D 030-088
I 088-143
R 143-185
I 185-004

Altitude

Site	50
High	170
Low	8

Coast

Nature: Low rock
Distance: 1100

Approaches: Easy

Drainage: Good

Topography: Hillslope

Vegetation: Improved pasture

Intervisibility

ORK 42
ORK T5

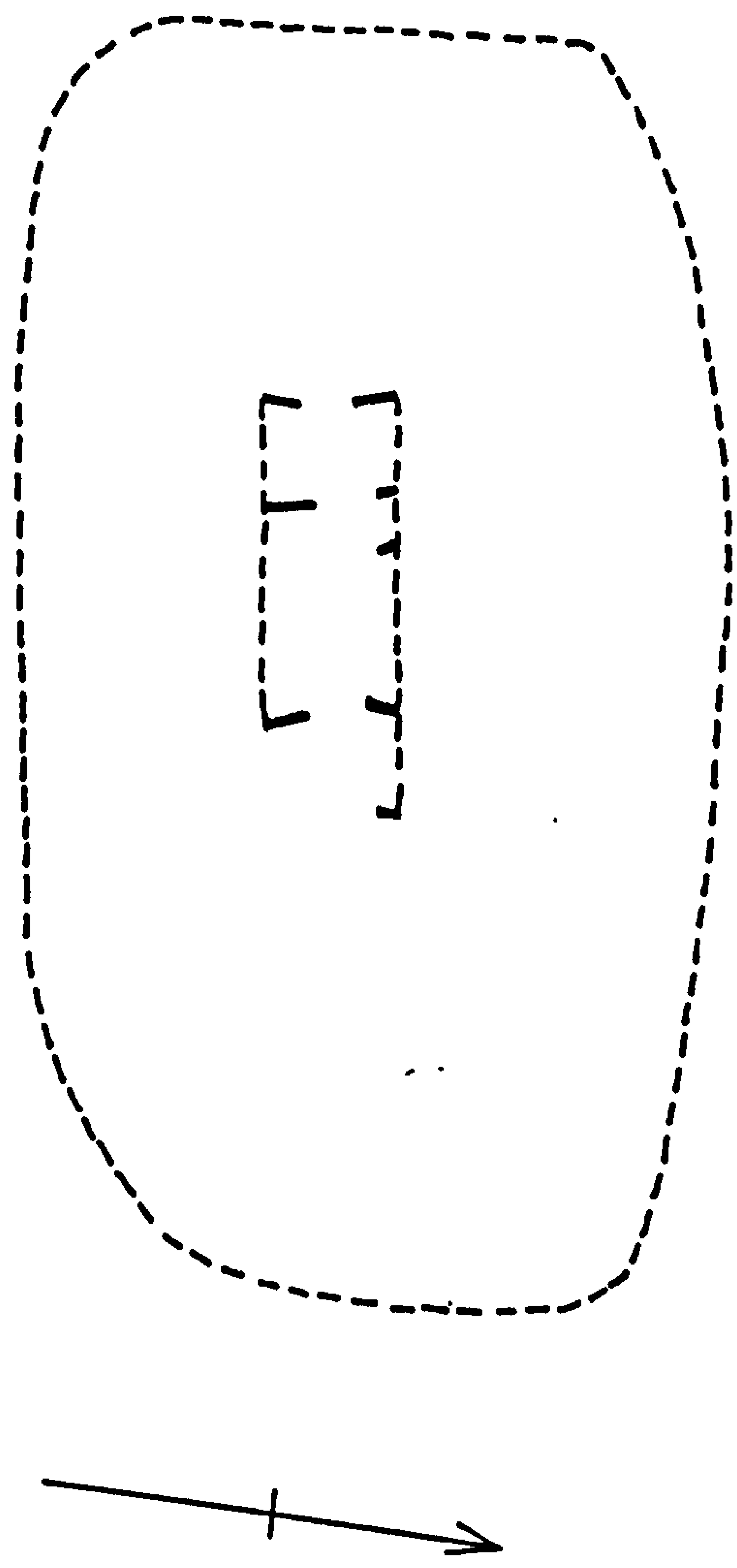
KNOWE OF LINGRO ORK 29

In the Wasbister district of north-east Rousay, this isolated chambered cairn can be reached across fields south of the farm of Feolquoy.

The cairn is a rectangular mound with well delimited edges, covered with vegetation and hollowed out along the spine. In this hollow, following the long axis of the mound can be seen the tops of a number of upright stones - eight were visible in 1959 but only six in 1980. They form a distinctive pattern of opposed pairs suggesting a rectangular chamber with at least five compartments. There is no sign of a passage.

RCAMS 2: 203

*CTS 1: 212



29 KNOWE OF LINGRO

KNOWE OF RAMSAY	ORK 30

Map Reference	Ordnance Survey
HY 40042800	HY 42 NW 22

Island	Parish	RCAMS Inventory
Rousay	Rousay	576
Category	**Landranger Sheet**	**Orkney Heritage Society**
Alpha	5,6	-
Excavations	**Plans**	**Visited**
1935: Callander and Grant	1935: Wilson	6/6/80

CAIRN		PASSAGE		CHAMBER	
Length	31.4	Length	2.0	Length	26.8
Width	7.3	Width	0.5	Width	2.0
Area	18.7	Area	1.0	Area	43
Orientation	124-304	Orientation	124	Compartments	14
Shape	Rectangle			Cells	0
				Orientation	123-303
				Shape	Simple

GEOLOGY		SOIL		LAND USE CAPABILITY	
Site	Sandstone	Site	Podzolic Com.	Site	Class 6
Water	24	Water	24	Water	24
Sandstone	69	Podzols	1	Class 3	0
Peat	7	Podzolic Com.	56	Class 4	15
Boulder Clay	0	Gleys	11	Class 5	8
Miscellaneous	0	Gleyic Com.	8	Class 6	53
		Peat	0	Class 7	0
		Miscellaneous	0	Miscellaneous	0

Visibility	Altitude	Topography
D 131-311 I 311-340 R 340-131	Site 60 High 205 Low 0	Terrace edge
		Vegetation Improved pasture
	Coast Nature: Low rock Distance: 470	**Intervisibility** ORK 6 ORK 28 ORK 32 ORK 56 ORK 57 ORK T20
	Approaches Restricted	
	Drainage Good	

KNOWE OF RAMSAY ORK 30

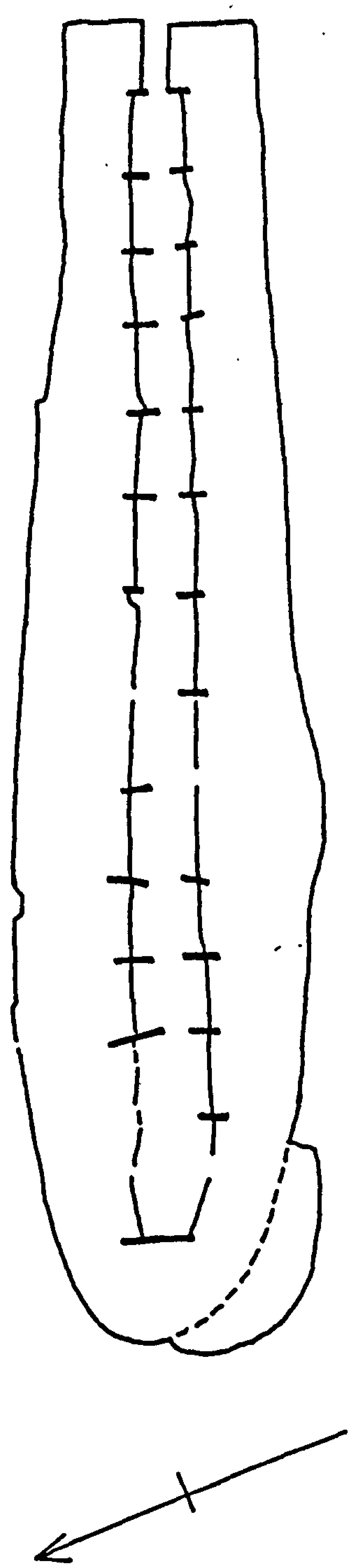
In the Frotoft district on the south coast of Rousay, the Knowe of Ramsay is on the edge of the first terrace above the Knowe of Lairo (ORK 28) and can be reached across fields from the farm of Newhouse.

The monument consists of a long low grass-covered mound with a hollowed-out spine in which a number of earth-fast upright stones protrude above the turf. The excavation revealed that the cairn has orthogonal corners at the south-east end, where the passage enters, is wider towards the north-west and ends in a rounded construction to which an extra skin of masonry has been added on the western side. There is no internal wall-face and there must be a suspicion that the present outer revetment was designed to be enclosed with a complete second wall.

The chamber contains no less than 14 compartments arranged in a line down the cairn axis and separated by pairs of opposed uprights. This is the largest number of serially-arranged compartments known from Orkney or Scotland. The Knowe of Ramsay is typical of Callander's long stalled cairns and falls into cluster I.

Finds of pottery or flint were few but remains of bone included those of three humans and a large number of animals and birds.

*PSAS 70 (1936): 407-19.
RCAMS 2: 214-16
CTS 1: 212-13



30 KNOWE OF RAMSAY

KNOWE OF ROWIEGAR	ORK 31

Map Reference	Ordnance Survey
HY 37332978	HY 32 NE 1

Island	Parish	RCAMS Inventory
Rousay	Rousay	578
Category	**Landranger Sheet**	**Orkney Heritage Society**
Alpha	6	-
Excavations	**Plans**	**Visited**
1937: Grant	1938: Wilson	8/6/80

CAIRN		PASSAGE		CHAMBER	
Length	27.4	Length		Length	22.5
Width	6.6	Width		Width	1.8
Area	171	Area		Area	40
Orientation	150-330	Orientation		Compartments	12
Shape	Rectangle			Cells	0
				Orientation	150-330
				Shape	Simple

GEOLOGY		SOIL		LAND USE CAPABILITY	
Site	Sandstone	Site	Gleys	Site	Class 4
Water	52	Water	52	Water	52
Sandstone	48	Podzols	20	Class 3	0
Peat	0	Podzolic Com.	23	Class 4	27
Boulder Clay	0	Gleys	5	Class 5	8
Miscellaneous	0	Gleyic Com.	0	Class 6	13
		Peat	0	Class 7	0
		Miscellaneous	0	Miscellaneous	0

Visibility	Altitude	Topography
D 160-181 I 181-290 D 290-340 I 340-160	Site 5 High 195 Low 0	Coastal plain
	Coast Nature: Low rock Distance: 50	**Vegetation** Improved pasture
	Approaches Easy	**Intervisibility** ORK 37 ORK 56 ORK 57 ORK T20
	Drainage Good	

KNOWE OF ROWIEGAR ORK 31

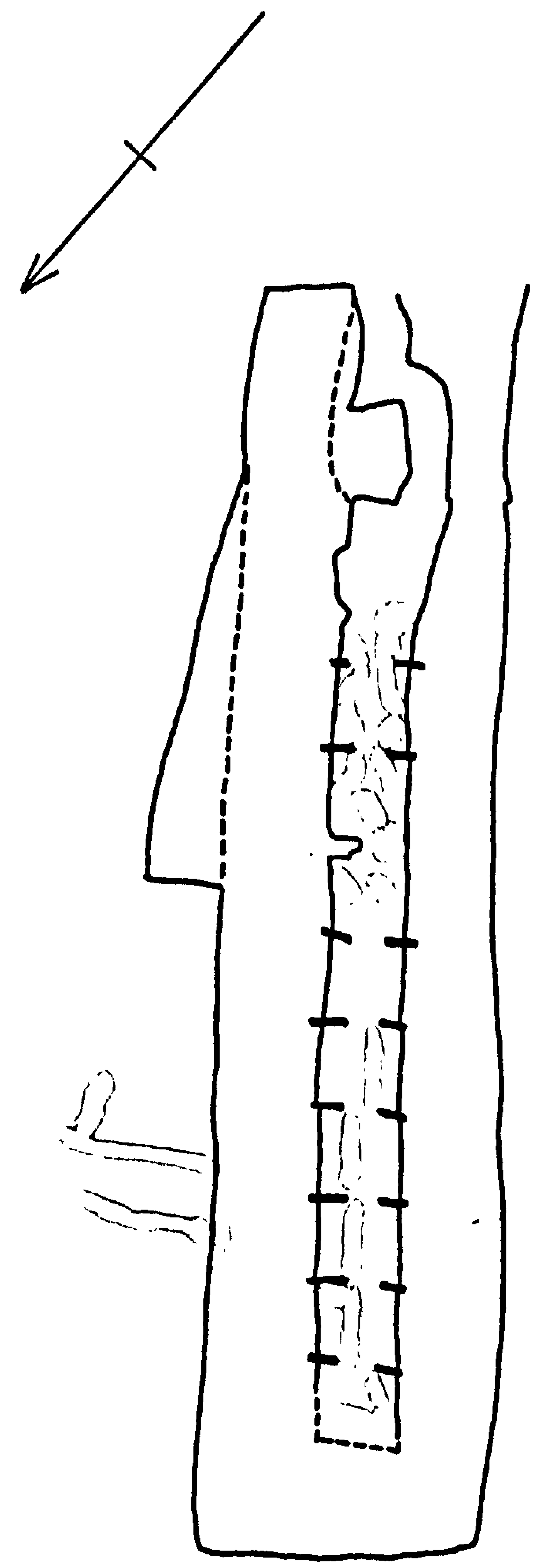
Situated in the Westside district on the south coast of Rousay, this monument may be approached along the shore south of the guardianship site of Midhowe (ORK 37).

Now the site is a long low rectangular mound, overgrown with vegetation, with a number of upright stones protruding through the turf. The excavation revealed a complex series of occupation, with the chambered cairn being partly converted into an earth-house before later constructions of Iron Age date were added. These alterations have considerably disturbed the original structure but enough remains to surmise that the cairn had orthogonal corners and, like Knowe of Ramsay (ORK 30) consisted of a complete outer revetment with a short section of a second masonry revetment.

The chamber is long and was originally divided into perhaps 11 compartments separated by pairs of opposed orthostats. Most of the compartments contained low shelves between the orthostats. No trace remains of the original passage. The monument belongs to cluster I.

Numerous pottery sherds from shallow carinated bowls were found along with artefacts of bone and flint. Bones of humans and animals were also recovered.

PSAS 76 (1942): 132
*RCAMS 2: 218-20
CTS 1: 214



31 KNOWE OF ROWIEGAR

KNOWE OF YARSO	ORK 32

Map Reference: HY 40462795	Ordnance Survey: HY 42 NW 1

Island	Parish	RCAMS Inventory
Rousay	Rousay	575

Category	Landranger Sheet	Orkney Heritage Society
Alpha	5,6	-

Excavations	Plans	Visited
1934: Callander and Grant	1934: Wilson	6/6/80

CAIRN

Length	15.2
Width	7.8
Area	109
Orientation	136-316
Shape	Rectangle

PASSAGE

Length	4.0
Width	0.7
Area	2.8
Orientation	136

CHAMBER

Length	7.3
Width	1.8
Area	13
Compartments	4
Cells	0
Orientation	137
Shape	Simple

GEOLOGY

Site Sandstone

Water	9
Sandstone	78
Peat	13
Boulder Clay	0
Miscellaneous	0

SOIL

Site Podzolic Com.

Water	9
Podzols	4
Podzolic Com.	61
Gleys	8
Gleyic Com.	12
Peat	6
Miscellaneous	0

LAND USE CAPABILITY

Site Class 6

Water	9
Class 3	2
Class 4	19
Class 5	6
Class 6	61
Class 7	3
Miscellaneous	0

Visibility

D 091-315
R 315-091

Altitude

Site	100
High	235
Low	0

Topography: Terrace edge

Vegetation: Unimproved pasture

Coast

Nature	Low rock
Distance	610

Approaches: Restricted

Drainage: Good

Intervisibility

ORK 6
ORK 30
ORK 56
ORK 57
ORK T20

KNOWE OF YARSO ORK 32

In the Frotoft district in the south of Rousay, this guardianship monument is sign-posted from the coast road.

Since the excavation, the Knowe of Yarso appears as a rectangular grassy mound. The outer wall of the cairn encloses an elongated area paralleling the nearby terrace edge. The outer wall is best displayed at the entrance to the passage in the south-east where slanted stones add a decorative element to the cairn revetment and suggest that this wall was intended to be seen when the cairn was in use (Figure 6.7). There is a second internal wall about 1.0 m within the body of the cairn which could not have been visible.

The passage leads into the first compartment of a rectangular chamber divided by pairs of opposed orthostats into four compartments. The dividing stones between the third and fourth compartments are less than 0.6 m high, but the other dividing stones stand as high as 1.6 m and the intervening dry-stone walls reach a height of 1.8 m.

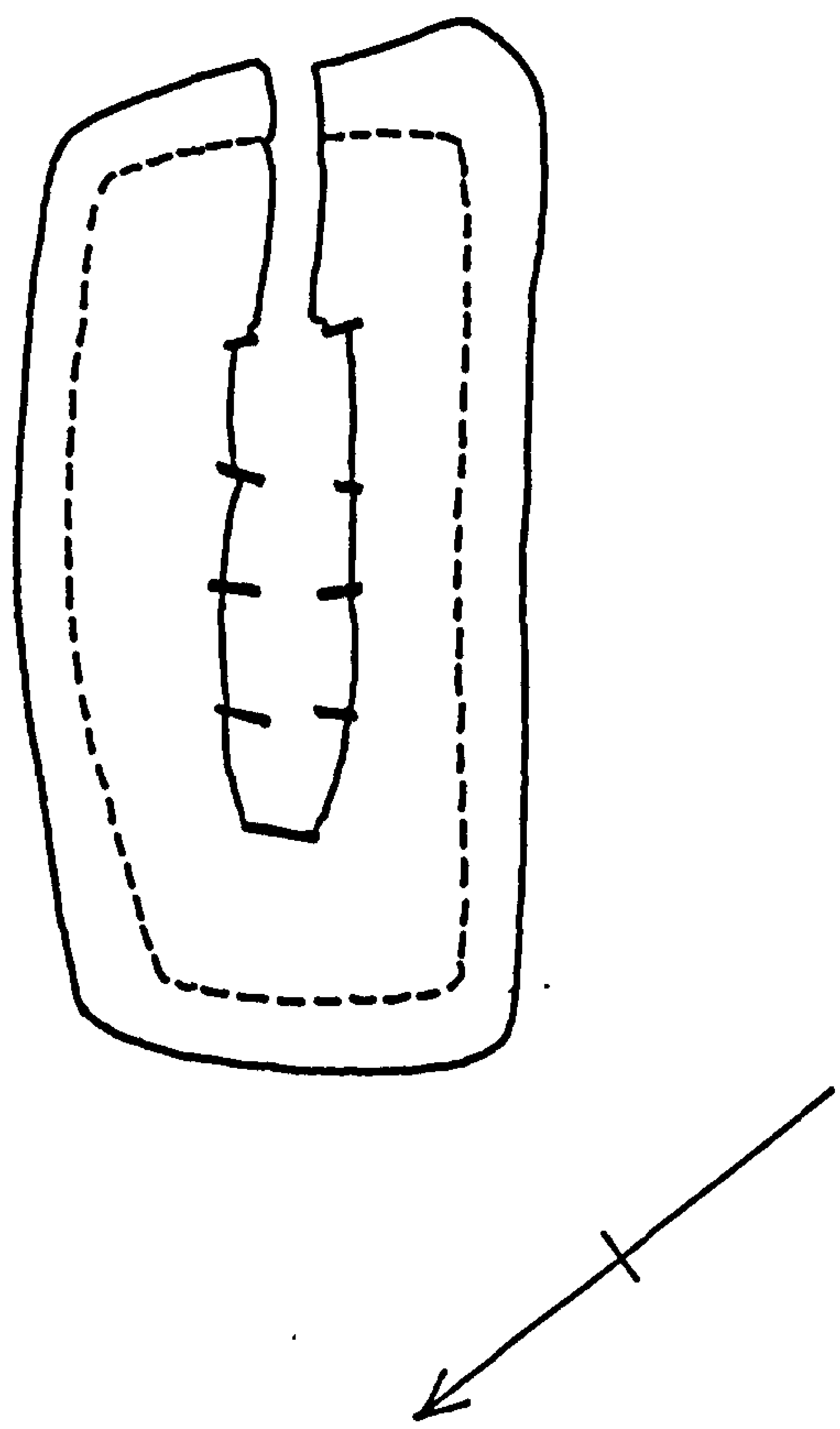
For an early excavation, the Knowe of Yarso produced a large amount of human skeletal material: in all, at least 29 individuals were represented. A large quantity of flint and bone tools were found and parts of three or four pottery vessels of Bronze Age type.

*PSAS 69 (1935): 325-51

RCAMS 2: 213-14

CTS 1: 215-218

32 KNOWE OF YARSO



KNUCKER HILL		ORK 33
Map Reference: HY 42864705		Ordnance Survey: HY 44 NW 16
Island: Westray	Parish: Westray	RCAMS Inventory: 1053
Category: Beta	Landranger Sheet: 5	Orkney Heritage Society: -
Excavations: -	Plans: 1928: Calder	Visited: 28/3/81 27/7/81

CAIRN		PASSAGE		CHAMBER	
Length	12.2	Length		Length	8.0
Width	10.4	Width		Width	2.3
Area	106	Area		Area	18
Orientation	176-356	Orientation		Compartments	7
Shape	Oval			Cells	0
				Orientation	176-356
				Shape	Rectangle

GEOLOGY		SOIL		LAND USE CAPABILITY	
Site	Sandstone	Site	Podzolic Com.	Site	Class 6
Water	3	Water	3	Water	3
Sandstone	81	Podzols	14	Class 3	0
Peat	0	Podzolic Com.	20	Class 4	21
Boulder Clay	14	Gleys	63	Class 5	23
Miscellaneous	2	Gleyic Com.	0	Class 6	48
		Peat	0	Class 7	5
		Miscellaneous	0	Miscellaneous	0

Visibility	Altitude	Topography / Vegetation
R 174-203 D 203-174	Site 113 High 113 Low 5	Topography: Hilltop Vegetation: Heathland
	Coast: Nature Cliff; Distance 1010	Intervisibility: ORK 24, ORK 41, ORK 53
	Approaches: Restricted	
	Drainage: Good	

KNUCKER HILL ORK 33

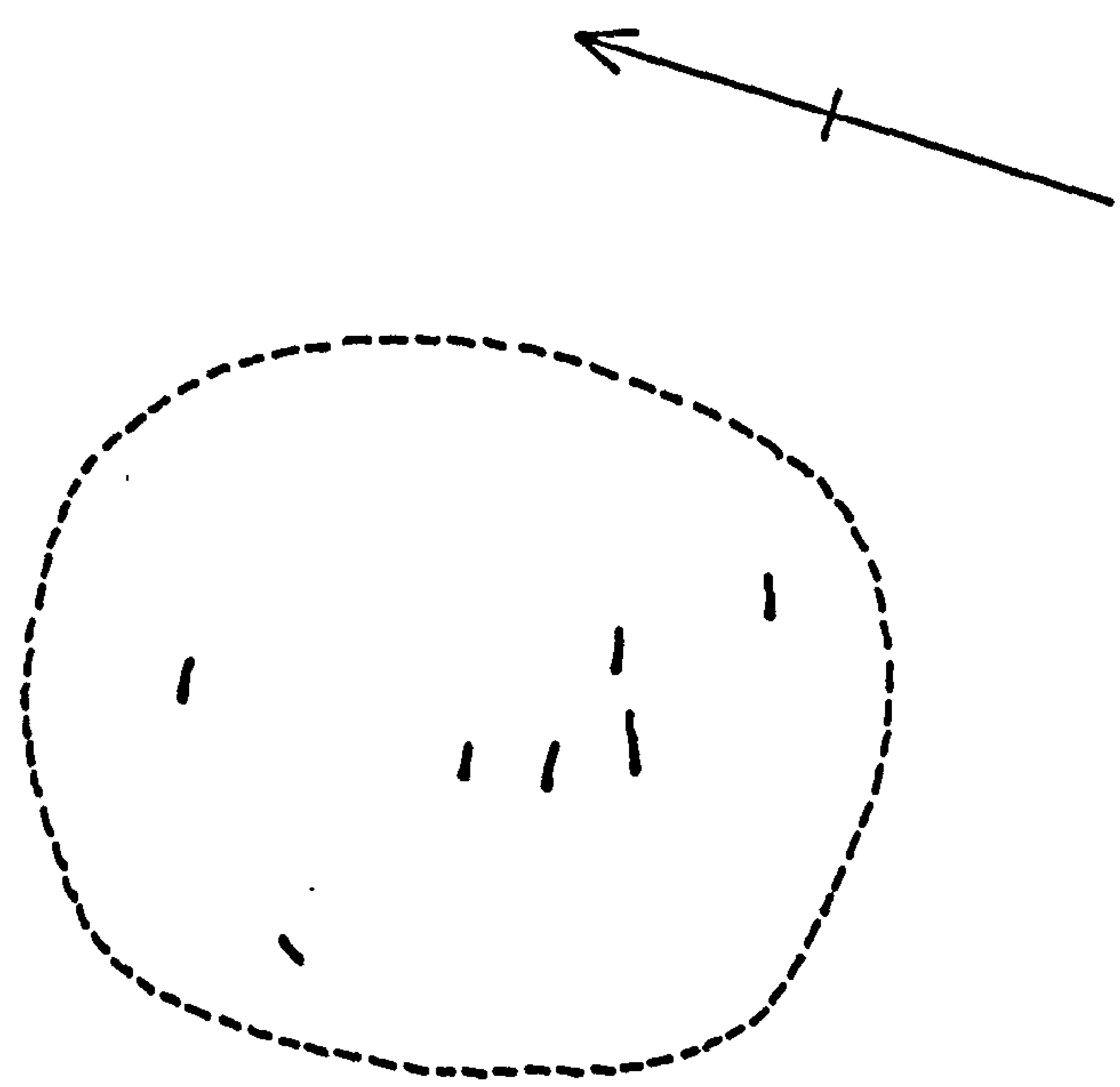
Near to the summit of Knucker Hill in north Westray, the site can be reached across rough ground from the farm of Knugdale.

The monument consists of an oval mound reaching about 0.6 m in height and with indistinct edges. Within the mound can be seen the tops of several upright slabs, arranged down the long axis of the cairn in such a way as to suggest a many-compartmented chamber with entrance either to the north or south. The number of compartments may have been seven.

This site has been identified with that of Korkquoy (ORK 34). The identification is erroneous, since the latter cairn was reported to be 100' (30.5 m) long with a chamber which was unlike that of Knucker Hill.

*RCAMS 2: 358

CTS 1: 218



33 KNUCKER HILL

KORKQUOY	ORK 34

Map Reference		Ordnance Survey
HY 429474		HY 44 NW 17
Island	**Parish**	**RCAMS Inventory**
Westray	Westray	(1053)
Category	**Landranger Sheet**	**Orkney Heritage Society**
Gamma	5	-
Excavations	**Plans**	**Visited**
-	-	28/3/81

CAIRN		PASSAGE		CHAMBER	
Length	30.5	Length		Length	
Width	15.2	Width		Width	
Area		Area		Area	
Orientation		Orientation		Compartments	
Shape				Cells	
				Orientation	
				Shape	

GEOLOGY		SOIL		LAND USE CAPABILITY	
Site	Sandstone	Site	Podzols	Site	Class 6
Water	11	Water	11	Water	11
Sandstone	77	Podzols	15	Class 3	0
Peat	0	Podzolic Com.	25	Class 4	40
Boulder Clay	10	Gleys	47	Class 5	24
Miscellaneous	2	Gleyic Com.	0	Class 6	25
		Peat	0	Class 7	0
		Miscellaneous	2	Miscellaneous	0

Visibility	Altitude	Topography
D 020-165 R 165-280 I 280-120	Site 70 High 113 Low 5	Hillslope
		Vegetation Heathland
	Coast Nature Cliff Distance 1100	**Intervisibility** -
	Approaches Easy	
	Drainage Good	

KORKQUOY ORK 34

Our only knowledge of this curious site is from a historical account at second-hand by Petrie. Its location has been identified by Henshall as being at the foot and to the north-west of the summit of Knucker Hill in northern Westray, and hence close to the chambered cairn of that name (ORK 33).

The cairn was a long mound orientated north/south. Towards the north end were two graves or cists, with a similar orientation, and lying parallel to each other. In both graves human skeletons were stacked in tiers, with five or six tiers in each grave and six skulls in each tier, giving a total of between 60 and 72 burials. The large size of mound and the quantity of burials suggest this was a collective tomb of early prehistory.

The only find was a stone ball.

Antiq Ms 545: 17-18
RCAMS 2: 358
*CTS 1: 218

LINKERTAING	ORK 35

Map Reference	Ordnance Survey
HY 55393937	HY 53 NE 7

Island	Parish	RCAMS Inventory
Eday	Eday	215

Category	Landranger Sheet	Orkney Heritage Society
Beta	5	-

Excavations	Plans	Visited
-	1928: Calder	25/6/80

CAIRN		PASSAGE		CHAMBER	
	Length		Length		Length
	Width		Width		Width
	Area		Area		Area
	Orientation		Orientation		Compartments
	Shape				Cells
					Orientation
					Shape

GEOLOGY

Site	Peat
Water	52
Sandstone	33
Peat	10
Boulder Clay	5
Miscellaneous	0

SOIL

Site	Podzols
Water	52
Podzols	27
Podzolic Com.	0
Gleys	11
Gleyic Com.	0
Peat	10
Miscellaneous	0

LAND USE CAPABILITY

Site	Class 5
Water	52
Class 3	0
Class 4	9
Class 5	20
Class 6	19
Class 7	0
Miscellaneous	0

Visibility

I 039-071
R 071-235
D 235-039

Altitude

Site	25
High	65
Low	0

Topography: Coastal plain

Vegetation: Unimproved pasture

Coast

Nature	Low rock
Distance	140

Intervisibility

ORK 42
ORK T5

Approaches: Easy

Drainage: Good

LINKERTAING ORK 35

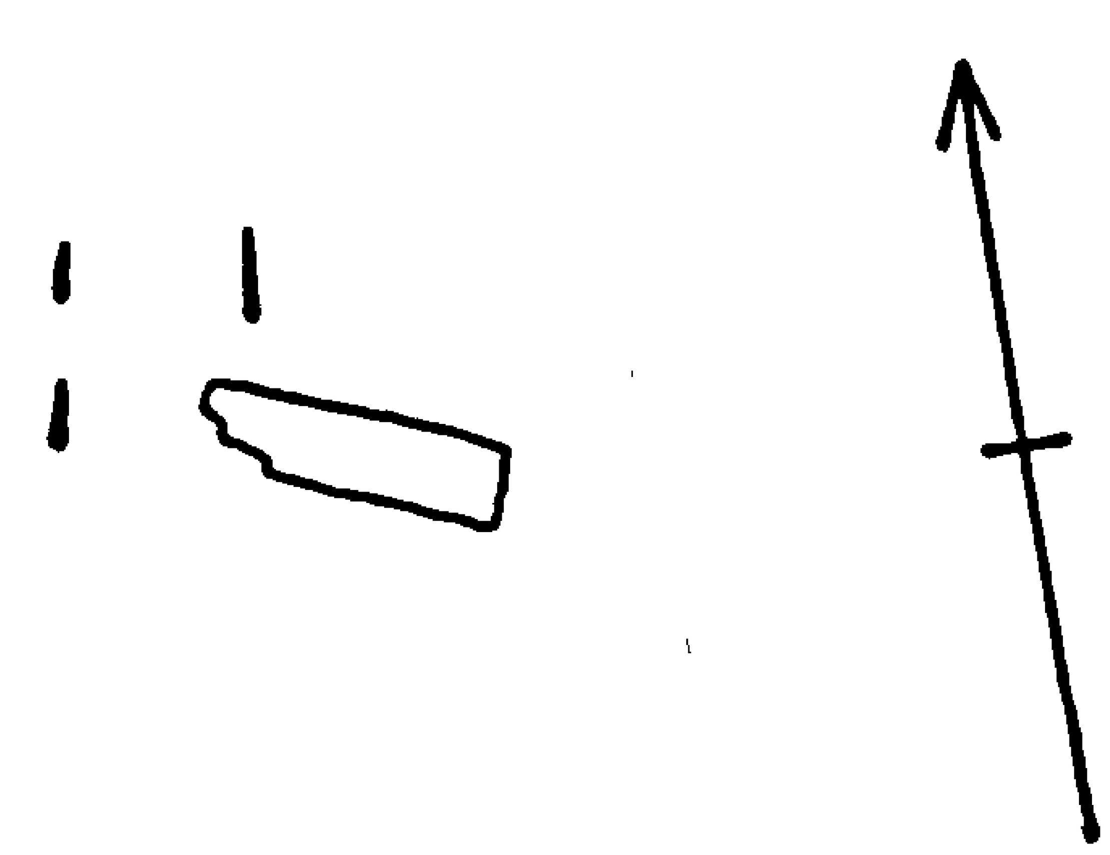
Near the coast in north-west Eday, this conspicuous site can be reached by a track from the farm of North Linkertaing.

There is no evidence of a covering cairn, unusual in Orkney where most chambered cairns appear to have retained much of their original volume. The site consists of three upstanding orthostats and one fallen stone. The tallest upright stands 2.0 m high and the fallen stone is 3.3 m long. The arrangement of these stones suggest they were originally part of a chamber divided into compartments by pairs of opposed orthostats.

Within 100 m of the monument there are a prehistoric domestic settlement with a saddle quern, and a length of curving field-wall buried under peat.

*RCAMS 2: 54

CTS 1: 219



35 LINKERTAING

MAES HOWE	ORK 36

Map Reference	Ordnance Survey
HY 31821277	HY 31 SW 1

Island	Parish	RCAMS Inventory
Mainland	Stenness	886

Category	Landranger Sheet	Orkney Heritage Society
Alpha	6	-

Excavations	Plans	Visited
1861: Farrer 1954-5: Childe 1973-74: Renfrew	1861: Farrer 1929: Calder 1974: Renfrew	10/6/80 4/8/80 16/8/81

CAIRN

Length	35.1
Width	35.1
Area	964
Orientation	-
Shape	Round

PASSAGE

Length	16.3
Width	0.9
Area	14.7
Orientation	221

CHAMBER

Length	8.8
Width	7.0
Area	31
Compartments	1
Cells	3
Orientation	-
Shape	Complex

GEOLOGY

Site Boulder clay

Water	6
Sandstone	7
Peat	0
Boulder Clay	87
Miscellaneous	0

SOIL

Site Podzolic Com.

Water	6
Podzols	0
Podzolic Com.	74
Gleys	20
Gleyic Com.	0
Peat	0
Miscellaneous	0

LAND USE CAPABILITY

Site Class 4

Water	6
Class 3	59
Class 4	35
Class 5	0
Class 6	0
Class 7	0
Miscellaneous	0

Visibility

I 000-000

Altitude

Site	20
High	30
Low	2

Topography

Valley bottom

Vegetation

Improved pasture

Coast

Nature	Low rock
Distance	500

Intervisibility

ORK 4

ORK 51

Approaches

Easy

Drainage

Fair

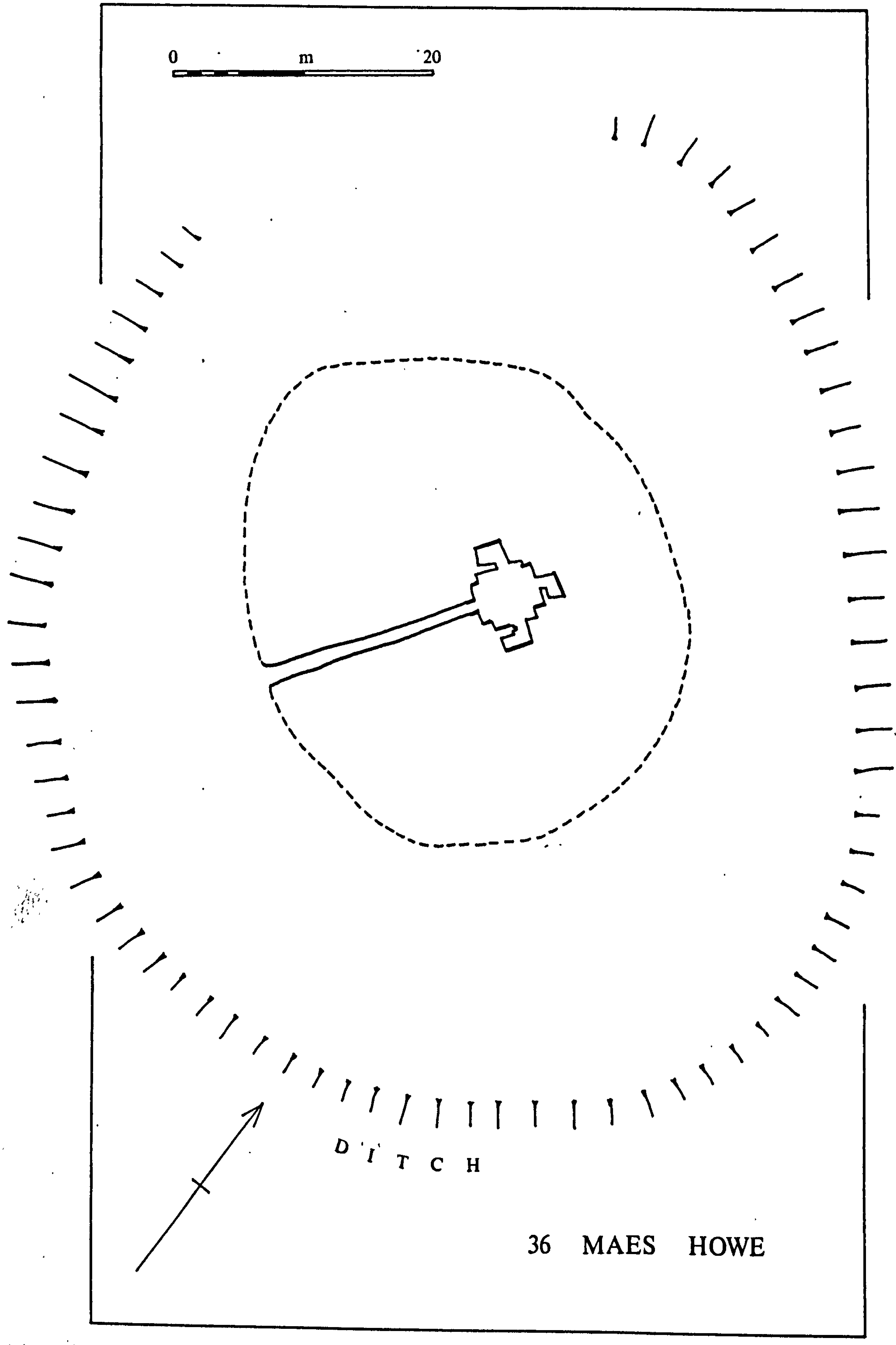
MAES HOWE ORK 36

In the central Mainland, in a field to the west of Tormiston Mill, this guardianship site is sign-posted from the Stromness-Finstown road.

The grass-covered mound of Maes Howe is not composed solely of stones, but of earth and stones. It is surrounded by another uncommon feature - a circular ditch and bank which may be contemporary with the mound. The central mound was explored in 1861 and a chamber found at its heart. The chamber consists of a room 4.5 m square with four massive corner buttresses supporting a corbelled vault 3.8 m high. In three of the dry-stone walls of this room are the square entrances to cells, the largest of which is over 2.0 m long. The cells may have been sealed originally by three massive sandstone blocks now to be found on the floor of the central compartments. From the fourth wall, a long passage leads to the outside. The outer 7 m is unroofed, but the inner passage contains some of the largest stones in the monument, one of which may weigh over three tons.

There are no certain finds of prehistoric age from Maes Howe. Much of the published literature on the monument relates to the carvings, including runic inscriptions, left by Norsemen in the twelfth century.

Arch J. 18(1861)
Farrer (1862)
*PSAS 5 (1864): 247-79
MASL 2 (1866): 223-4
POAS 8 (1930): 27-30
RCAMS 2:306-13
Piggott (1954): 253-4
*PSAS 88 (1956): 155-72
*CTS 1: 219-222
Renfrew (1979): 31-38.



36 MAES HOWE

MIDHOWE	ORK 37

Map Reference	Ordnance Survey
HY 37193052	HY 33 SE 1

Island	Parish	RCAMS Inventory
Rousay	Rousay	583

Category	Landranger Sheet	Orkney Heritage Society
Alpha	6	-

Excavations	Plans	Visited
1932-4: Craw, Callander and Grant	1935: Wilson	8/6/80

CAIRN		PASSAGE		CHAMBER	
Length	32.5	Length	3.9	Length	23.2
Width	13.0	Width	0.9	Width	2.4
Area	392	Area	4	Area	53
Orientation	150-330	Orientation	153	Compartments	12
Shape	Rectangle			Cells	0
				Orientation	150-330
				Shape	Simple

GEOLOGY		SOIL		LAND USE CAPABILITY	
Site	Sandstone	Site	Podzols	Site	Class 4
Water	36	Water	36	Water	36
Sandstone	64	Podzols	13	Class 3	0
Peat	0	Podzolic Com.	40	Class 4	26
Boulder Clay	0	Gleys	11	Class 5	22
Miscellaneous	0	Gleyic Com.	0	Class 6	16
		Peat	0	Class 7	0
		Miscellaneous	0	Miscellaneous	0

Visibility	Altitude	Topography
D 166-181 I 181-296 D 296-313 I 313-166	Site 10 High 175 Low 0	Coastal plain
	Coast Nature: Low rock Distance: 40	**Vegetation** Improved pasture
	Approaches Easy	**Intervisibility** ORK 31 ORK 56 ORK 57 ORK T20
	Drainage Fair	

MIDHOWE ORK 37

On the coast in south-east Rousay, Midhowe is a guardianship site and is displayed inside a specially constructed building with an overhead walk-way.

The rectangular cairn is orientated south-east/north-west and parallel to the shore. In places, an intricate herring-bone pattern has been executed in the stonework of the outer wall. There is a second line of walling two metres inside the outer revetment. A passage leads from the south-east into a large central chamber, divided into 12 compartments by pairs of upright stones projecting from the dry-stone walls. Along the north-east wall of the chamber low shelves have been inserted in seven of the compartments. On these shelves were found many of the bones from the 25 individuals interred in the building. The rear-most compartment also contains a shelf, but at a higher level.

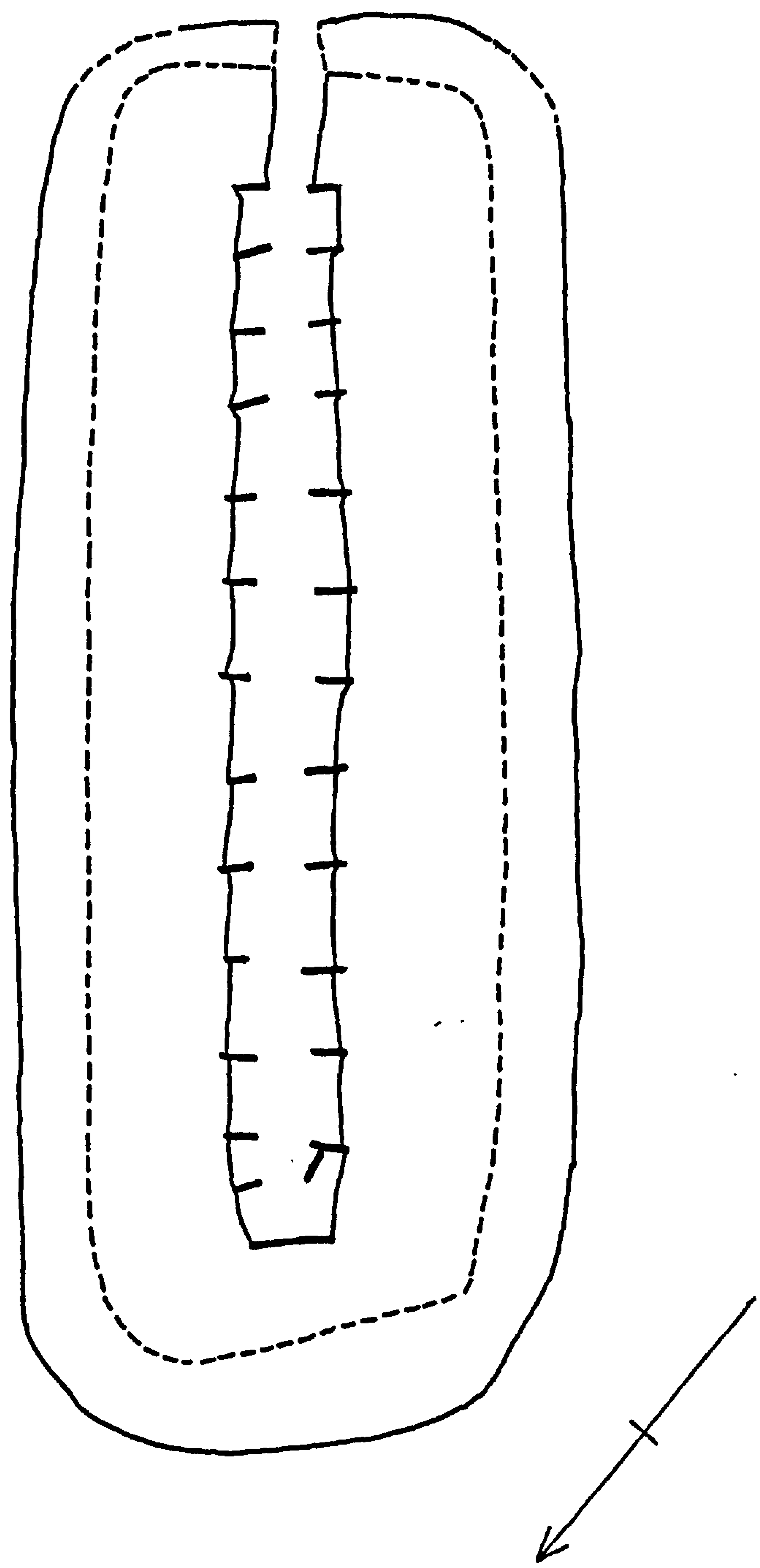
In addition to the skeletal material, the excavation recovered pottery of carinated form and animal bones from the primary deposits. The chamber had been deliberately filled with stones and the entrance passage blocked but the site was reused later in prehistoric times.

*PSAS 68 (1934): 320-50

PSAS 71 (1937): 303

RCAMS 2: 221-5

CTS 1: 222-5



37 MIDHOWE

MOUNT MISERY	ORK 38

Map Reference	Ordnance Survey
HY 78314351	HY 74 SE 4

Island	Parish	RCAMS Inventory
Start Island	Lady	445
Category	**Landranger Sheet**	**Orkney Heritage Society**
Beta	5	OR 291
Excavations	**Plans**	**Visited**
-	-	7/8/80

CAIRN

Length	22.2
Width	22.2
Area	387
Orientation	-
Shape	Round

PASSAGE

Length	
Width	
Area	
Orientation	

CHAMBER

Length	
Width	
Area	
Compartments	
Cells	
Orientation	
Shape	

GEOLOGY

Site Sandstone

Water	93
Sandstone	5
Peat	0
Boulder Clay	0
Miscellaneous	2

SOIL

Site Podzols

Water	93
Podzols	3
Podzolic Com.	0
Gleys	0
Gleyic Com.	0
Peat	0
Miscellaneous	4

LAND USE CAPABILITY

Site Class 4

Water	93
Class 3	0
Class 4	3
Class 5	3
Class 6	1
Class 7	0
Miscellaneous	0

Visibility

I 291-350
D 350-291

Altitude

Site	8
High	8
Low	0

Topography

Small island

Vegetation

Improved pasture

Coast

Nature	Low rock
Distance	90

Approaches

Easy

Drainage

Good

Intervisibility

ORK 14
ORK 20
ORK 50
ORK T21

MOUNT MISERY ORK 38

The uncorrupted form of this name would appear to be "Maesry", with the "Maes-" element, as in Maes Howe, being a survival from a language older than Old Norse.

The site is a prominent mound near the centre of Start Point, a tidal island in the extreme east of Sanday. It is advisable to seek local advice on the state of the tides before crossing to the island.

The mound is circular and rises to over 4.2 m at its highest point, from where the whole island can be surveyed. There is ample evidence that it is composed of stone in the form of exposures of cairn packing material. There are no clear signs of an entrance passage or chamber but there is a historical report of a large well-constructed chamber which has seen use as a potato store.

*RCAMS 2: 168
CTS 1: 225

NEWAN	ORK 39

Map Reference	Ordnance Survey
HY 27102777	HY 22 NE 22

Island	Parish	RCAMS Inventory
Mainland	Birsay and Harray	42
Category	**Landranger Sheet**	**Orkney Heritage Society**
Gamma	6	-
Excavations	**Plans**	**Visited**
-	1980: Fraser	10/6/80 12/6/80

CAIRN

Length	15.8
Width	14.3
Area	170
Orientation	-
Shape	Round

PASSAGE

Length	
Width	
Area	
Orientation	

CHAMBER

Length	
Width	
Area	
Compartments	
Cells	
Orientation	
Shape	

GEOLOGY

Site Sandstone

Water	0
Sandstone	75
Peat	0
Boulder Clay	22
Miscellaneous	3

SOIL

Site Podzols

Water	0
Podzols	54
Podzolic Com.	0
Gleys	37
Gleyic Com.	0
Peat	9
Miscellaneous	0

LAND USE CAPABILITY

Site Class 4

Water	0
Class 3	45
Class 4	53
Class 5	2
Class 6	0
Class 7	0
Miscellaneous	0

Visibility

I 092-260
D 260-345
R 345-092

Altitude

Site	90
High	102
Low	30

Topography

Hillslope

Vegetation

Improved pasture

Coast

Nature Low rock
Distance 1110

Intervisibility

-

Approaches

Easy

Drainage

Good

NEWAN ORK 39

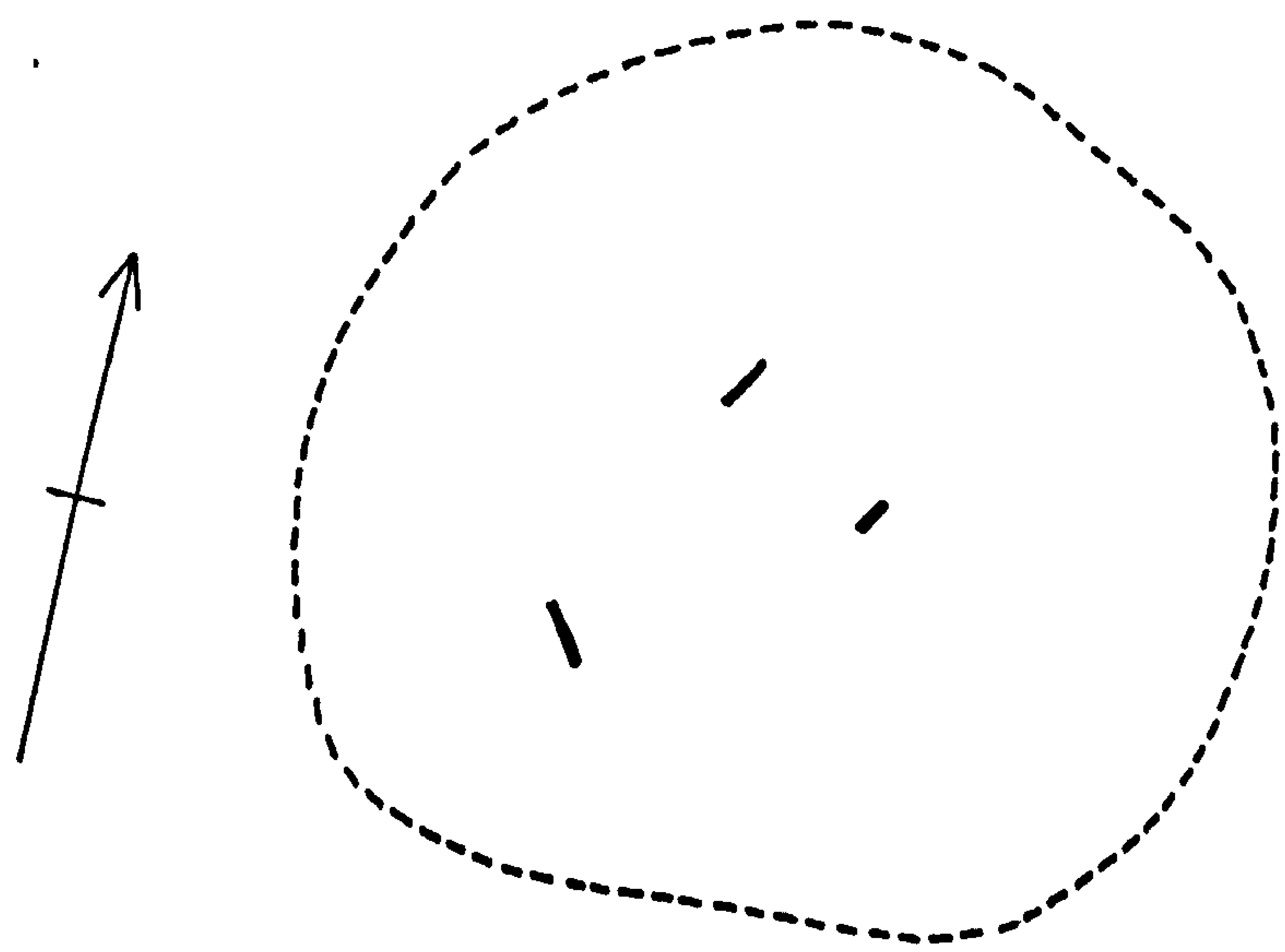
In the Barony district of the north-west Mainland, Newan stands in a field to the west of a track past the farm of Hillhead.

The field is cultivated and the mound is reduced from the 4' (1.2 m) reported in 1930. It is roughly circular and has a well-defined edge, possibly as a result of modern ploughing. In the centre are three cairn-fast stones, the tallest standing 0.45 m high. Two of them may be the dividing orthostats of a many-compartmented chamber.

The area has a dense concentration of artificial mounds and the standing stones of Stanerandy are only 400 m to the south-east.

*RCAMS 2: 24

CTS 1: 225



39 NEWAN

POINT OF COTT	ORK 41

Map Reference		Ordnance Survey
HY 46544746		HY 44 NE 3
Island	**Parish**	**RCAMS Inventory**
Westray	Westray	1047
Category	**Landranger Sheet**	**Orkney Heritage Society**
Beta	5	-
Excavations	**Plans**	**Visited**
-	1928: Calder 1957: Henshall	28/6/80 14/3/81 26/3/81 24/8/81

CAIRN		PASSAGE		CHAMBER	
Length	30.5	Length		Length	
Width	13.7	Width		Width	
Area		Area		Area	
Orientation		Orientation		Compartments	
Shape				Cells	
				Orientation	
				Shape	

GEOLOGY		SOIL		LAND USE CAPABILITY	
Site	Boulder clay	Site	Gleys	Site	Class 4
Water	71	Water	71	Water	71
Sandstone	6	Podzols	8	Class 3	0
Peat	0	Podzolic Com.	0	Class 4	28
Boulder Clay	20	Gleys	20	Class 5	1
Miscellaneous	1	Gleyic Com.	0	Class 6	0
		Peat	0	Class 7	0
		Miscellaneous	1	Miscellaneous	0

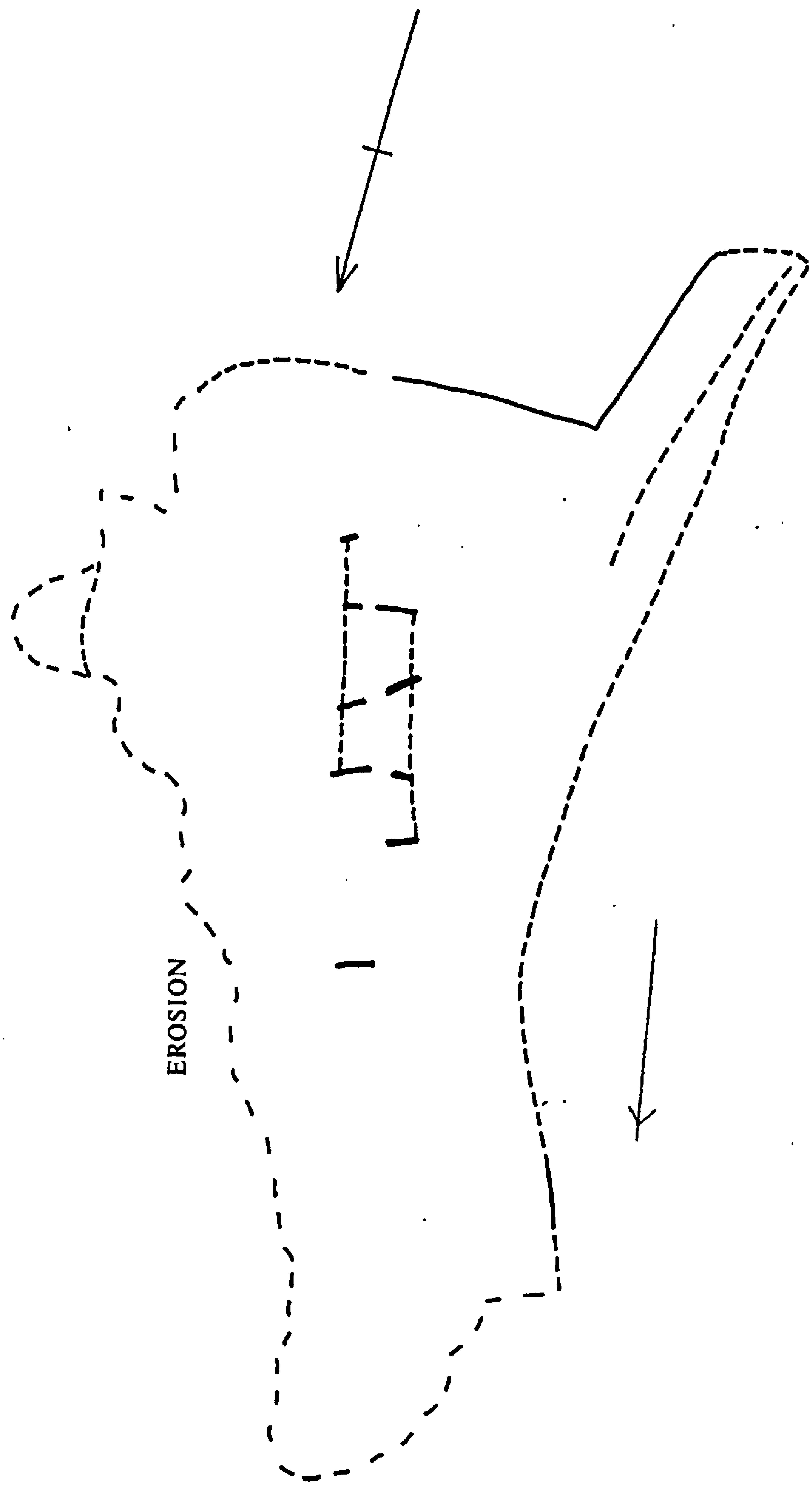
Visibility	Altitude	Topography
D 019-125 I 125-213 R 213-251 I 251-019	Site 5 High 15 Low 0	Coastal plain
	Coast	**Vegetation**
	Nature: Low rock Distance: 0	Improved pasture
	Approaches	**Intervisibility**
	Easy	ORK 33
	Drainage	
	Good	

POINT OF COTT ORK 41

On a promontory on the north-east coast of Westray, this unique monument can be approached across fields via the deserted farm-house of Cott. Some notion of the critical state of erosion by the sea reached by the site can be gathered from plate A.

The cairn is long, but neither its original length nor breadth can be ascertained exactly. Investigators of the Royal Commission removed turf from the south-east quadrant to reveal a horn-like projection which is part of the primary cairn structure. It must be surmised that the sea has removed other horns. Down the main axis of the cairn project at least nine cairn-fast stones, arranged in pairs, and suggesting a many-compartmented linear chamber. There is no sign of an entrance passage but the Commission tentatively mapped a passage entering from the south. The design of a stalled chamber of many compartments within a horned cairn is unusual.

*RCAMS 2: 356-7
CTS 1: 226



41 POINT OF COTT

POWDYKES	ORK 42

Map Reference		Ordnance Survey
HY 43424346		HY 44 SW 4
Island	**Parish**	**RCAMS Inventory**
Westray	Westray	1051
Category	**Landranger Sheet**	**Orkney Heritage Society**
Beta	5	-
Excavations	**Plans**	**Visited**
-	1957: Henshall	28/6/80 17/3/81 25/8/81

CAIRN		PASSAGE		CHAMBER	
Length	18.3	Length		Length	
Width	15.8	Width		Width	
Area	235	Area		Area	
Orientation	-	Orientation		Compartments	
Shape	Round			Cells	
				Orientation	
				Shape	

GEOLOGY		SOIL		LAND USE CAPABILITY	
Site	Sandstone	Site	Podzols	Site	Class 4
Water	0	Water	0	Water	0
Sandstone	79	Podzols	42	Class 3	9
Peat	0	Podzolic Com.	14	Class 4	48
Boulder Clay	0	Gleys	23	Class 5	21
Miscellaneous	21	Gleyic Com.	0	Class 6	22
		Peat	0	Class 7	0
		Miscellaneous	21	Miscellaneous	0

Visibility	Altitude	Topography
R 011-055 I 055-090 D 090-299 I 299-011	Site 46 High 150 Low 0	Terrace edge
	Coast Nature Low rock Distance 700	**Vegetation** Improved pasture
	Approaches Easy	**Intervisibility** ORK 17 ORK 29 ORK 35 ORK 53 ORK T5
	Drainage Good	

POWDYKES ORK 42

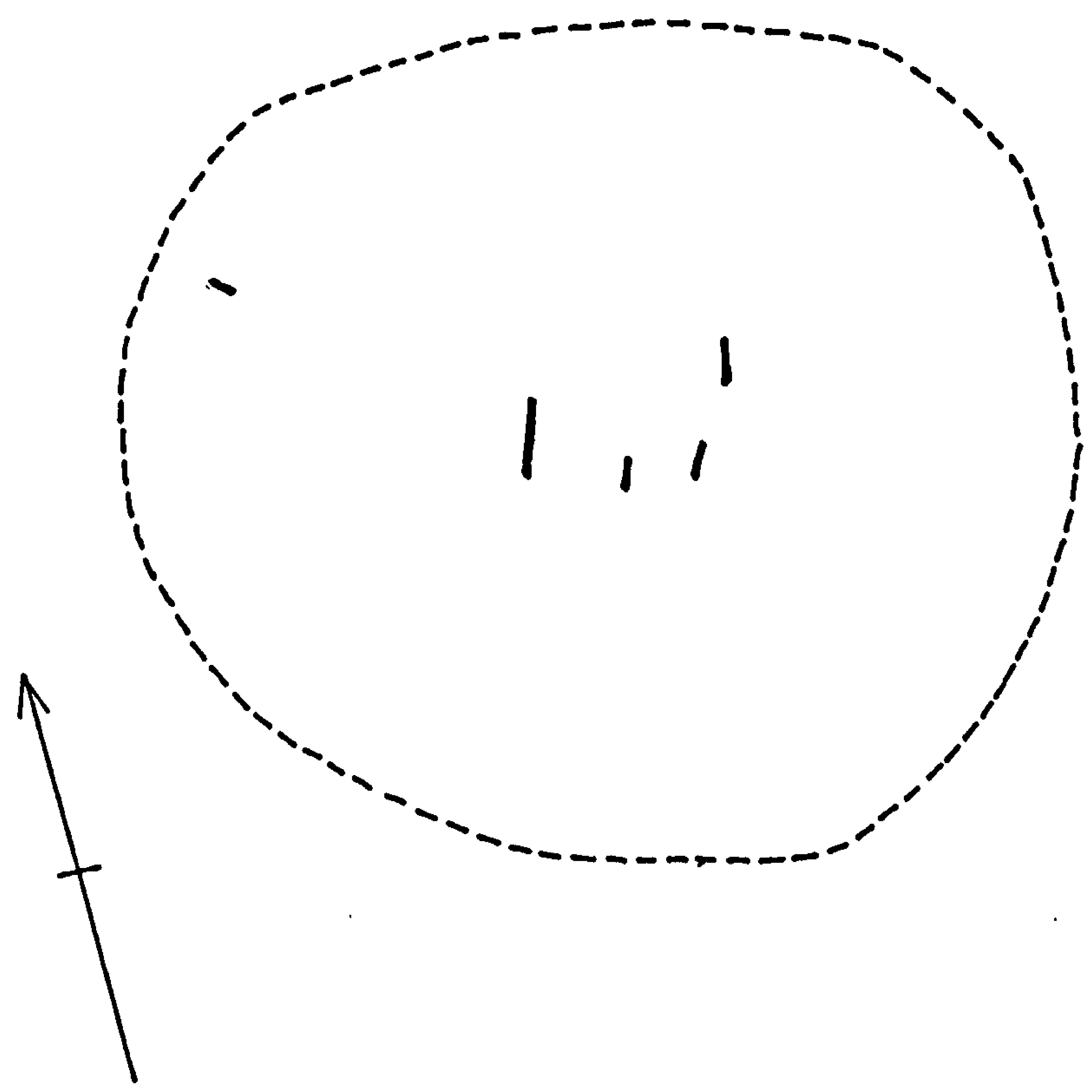
Also known as Howa Tower, the monument is in south-west Westray on the edge of a terrace two fields to the south of the farm-house of Powdykes.

An oval mound with its longer axis orientated north-west/south-east, the site has been much reduced by agriculture and its edges may have been more sharply defined by ploughing. The maximum height is now about 1.0 m. Towards the centre of the mound Henshall planned four upright stones, three of which are still visible. Stripping the turf would certainly reveal more stones. The four uprights are arranged to suggest a two or three compartment chamber with back-slab and an entrance in the south-east. One more cairn-fast stone is apparent just within the north-west edge of the cairn.

The site has extensive views of Eday, Rousay and the west coast of the Mainland.

RCAMS 2: 357

*CTS 1:226



42 POWDYKES

QUANTERNESS — ORK 43

Map Reference: HY 51771292

Ordnance Survey: HY 41 SW 4

Island: Mainland

Parish: Kirkwall and St.Ola

RCAMS Inventory: 411

Category: Alpha

Landranger Sheet: 6

Orkney Heritage Society: -

Excavations: 1972-4: Renfrew

Plans:
1805: Barry
1974: Renfrew

Visited:
19/6/80
18/8/80
17/5/81

CAIRN
- Length: 30.0
- Width: 30.0
- Area: 706
- Orientation: -
- Shape: Round

PASSAGE
- Length: 6.7
- Width: 0.7
- Area: 4.7
- Orientation: 100

CHAMBER
- Length: 10.5
- Width: 6.1
- Area: 37
- Compartments: 1
- Cells: 6
- Orientation: 016-196
- Shape: Complex

GEOLOGY

Site: Sandstone

Water	0
Sandstone	44
Peat	21
Boulder Clay	35
Miscellaneous	0

SOIL

Site: Podzols

Water	0
Podzols	64
Podzolic Com.	7
Gleys	15
Gleyic Com.	0
Peat	14
Miscellaneous	0

LAND USE CAPABILITY

Site: Class 3

Water	0
Class 3	49
Class 4	23
Class 5	20
Class 6	8
Class 7	0
Miscellaneous	0

Visibility:
D 024-087
R 087-260
I 260-024

Altitude:
- Site: 42
- High: 170
- Low: 3

Topography: Hillslope

Vegetation: Improved pasture

Coast:
- Nature: Low rock
- Distance: 1070

Intervisibility:
ORK 12
ORK 19

Approaches: Easy

Drainage: Good

QUANTERNESS ORK 43

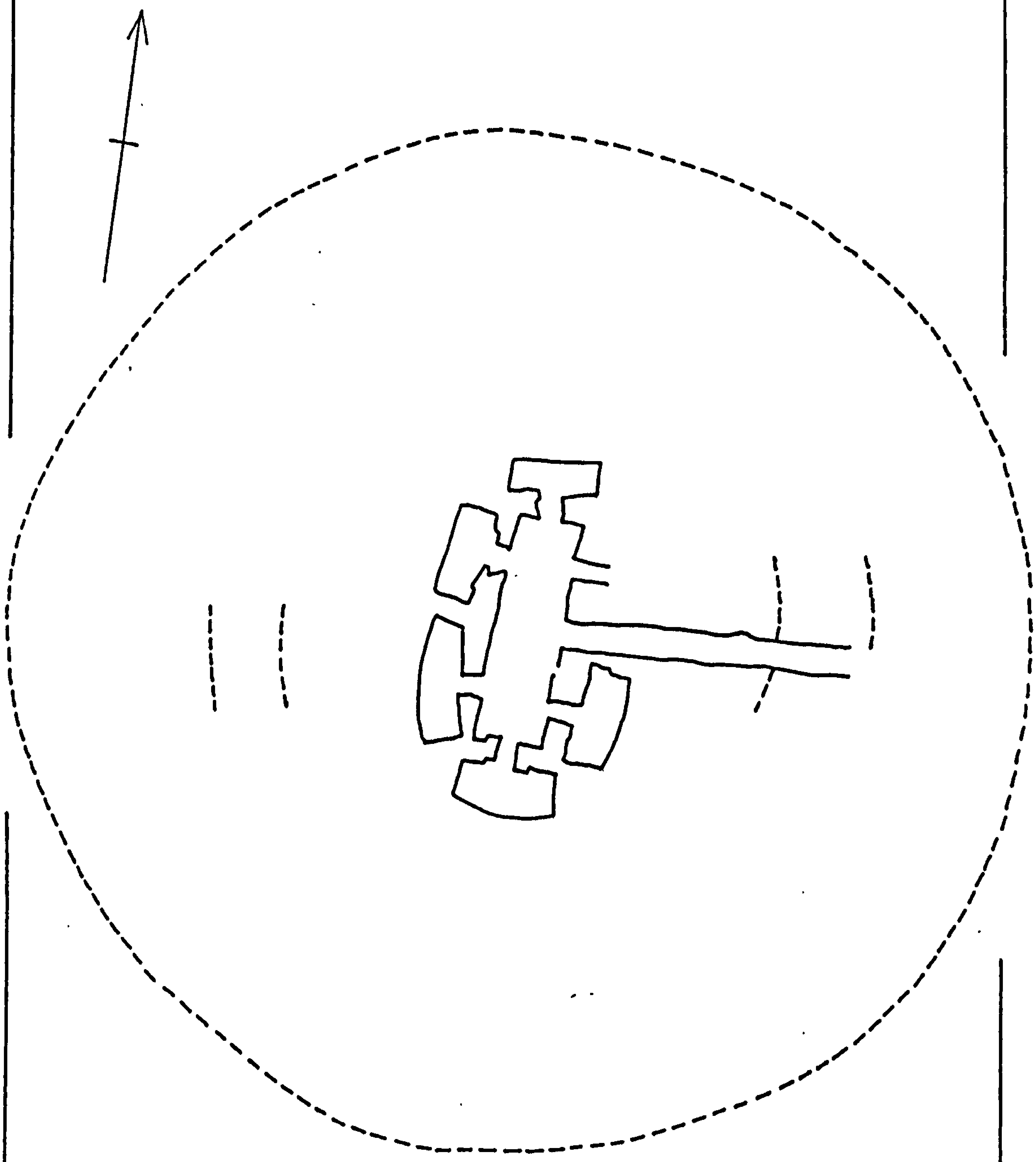
South of the Kirkwall-Finstown road, four km out of Kirkwall, the site is a prominent mound in a walled garden next to the farm-house of Quanterness. There is little to see now at the site but the recent excavation and associated research have added much to our knowledge of Neolithic Orkney.

The cairn itself is circular and may contain at least two internal walls encircling the central chamber. A long passage leads from the east into a chamber which is very similar to that of Quoyness on the island of Sanday. A rectangular central compartment is surrounded by six cells, connected to the central compartment by low passages. The cells are over 2.0 m high: the main compartment is at least 3.0 m high.

Undisturbed burial deposits found in Quanterness proved on examination to contain the remains of at least 157 humans, of all ages up to about 50, and of both sexes. In addition, pottery of Grooved Ware type and artefacts of bone and flint were recovered.

The outer end of the passage into Quanterness was disturbed by the construction of a round stone house of Iron Age date.

Barry (1978): 98-101
Arch 34 (1852): 123-4
Anderson (1886): 287-8
RCAMS 2: 159-160
CTS 1: 226-7
*Renfrew (1979)



43 QUANTERNESS

QUOYNESS	ORK 44

Map Reference HY 67663779		**Ordnance Survey** HY 63 NE 1
Island Sanday	**Parish** Lady	**RCAMS Inventory** 449
Category Alpha	**Landranger Sheet** 5	**Orkney Heritage Society** OR 308
Excavations 1867: Farrer and Petrie 1951: Childe	**Plans** 1951: Childe	**Visited** 8/8/80 5/8/81

CAIRN		PASSAGE		CHAMBER	
Length	20.4	Length	7.3	Length	8.0
Width	17.0	Width	0.6	Width	5.4
Area	289	Area	4.4	Area	22
Orientation	-	Orientation	118	Compartments	1
Shape	Round			Cells	6
				Orientation	025-205
				Shape	Complex

GEOLOGY		SOIL		LAND USE CAPABILITY	
Site	Sandstone	Site	Podzols	Site	Class 4
Water	74	Water	74	Water	74
Sandstone	26	Podzols	26	Class 3	0
Peat	0	Podzolic Com.	0	Class 4	26
Boulder Clay	0	Gleys	0	Class 5	0
Miscellaneous	0	Gleyic Com.	0	Class 6	0
		Peat	0	Class 7	0
		Miscellaneous	0	Miscellaneous	0

Visibility D 116-220 R 220-323 I 323-116	**Altitude** Site 5 High 13 Low 0	**Topography** Peninsula
		Vegetation
	Coast Nature Low rock Distance 30	**Intervisibility** ORK 14 ORK 50 ORK T21
	Approaches Easy	
	Drainage Good	

QUOYNESS ORK 44

The name "Egmond's Howe" does not refer to this guardianship site but to a neighbouring mound, perhaps also a chambered cairn but largely destroyed by the sea, to the south. Both are situated on the east side of the peninsula of Els Ness on the south coast of Sanday and can be reached by track across the Little Sea and past the farm-house of Elsness.

As displayed after excavation, the outward appearance of this monument is complex. The central cairn is surrounded by an irregular platform, not a common feature in Orkney. Within the body of the cairn there are at least three walls encircling the chamber. The tops of these walls are exposed, giving a stepped appearance to the structure, somewhat resembling that of Wideford Hill (ORK 54). There is some doubt whether all of these walls reach down to the original ground surface, suggesting that some may be features to aid in the construction of the cairn. A long passage leads from the seaward side into a chamber very similar to that of Quanterness (ORK 43). The central compartment is rectangular in shape and has corbelled walls reaching a height of 4.0 m. Six low passages lead into corbelled cells, irregular in shape but none larger than 2.0 m across.

A cist on the floor of the central compartment contained the fragmentary remains of 14 or 15 skeletons and more human bones were found in four of the cells. Artefacts include two curious carved stone objects.

The south end of Els Ness contains a complex of small mounds and other structures which have produced cramp and objects of prehistoric date.

NSA (1845): 15, 136

OH 6 August 1867

OH 24 March 1868

PSAS 7 (1868): 398-401

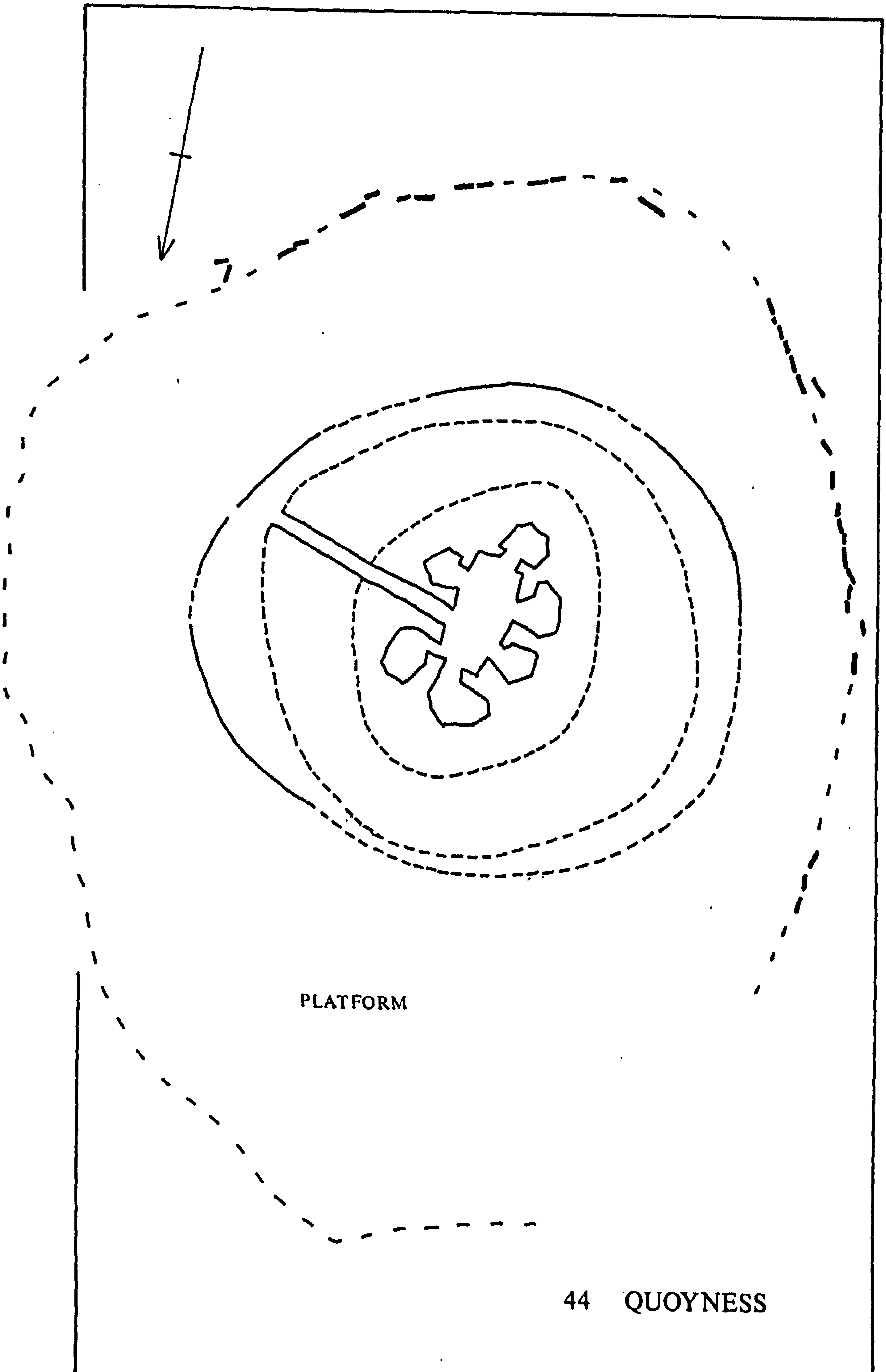
Antiq Ms 554

Anderson (1886): 283-7

RCAMS 2: 168-9

*PSAS 86 (1952): 121-39

CTS 1: 228-231



44 QUOYNESS

RING OF BOOKAN		ORK 45
Map Reference: HY 28341450		Ordnance Survey: HY 21 SE 7
Island: Mainland	Parish: Sandwick	RCAMS Inventory: 732
Category: Gamma	Landranger Sheet: 6	Orkney Heritage Society: -
Excavations: -	Plans: 1850s: Thomas 1928: Calder	Visited: 10/6/80 18/5/81

CAIRN		PASSAGE		CHAMBER	
	Length		Length		Length
	Width		Width		Width
	Area		Area		Area
	Orientation		Orientation		Compartments
	Shape				Cells
					Orientation
					Shape

GEOLOGY		SOIL		LAND USE CAPABILITY	
Site	Boulder clay	Site	Podzols	Site	Class 3
Water	39	Water	39	Water	39
Sandstone	18	Podzols	56	Class 3	57
Peat	0	Podzolic Com.	0	Class 4	3
Boulder Clay	42	Gleys	5	Class 5	1
Miscellaneous	1	Gleyic Com.	0	Class 6	0
		Peat	0	Class 7	0
		Miscellaneous	0	Miscellaneous	0

Visibility	Altitude	Topography
D 000-000	Site 25 High 26 Low 2	Ridge top
		Vegetation: Arable
	Coast: Nature Low rock; Distance 350	Intervisibility: ORK 4 ORK 51
	Approaches: Easy	
	Drainage: Good	

RING OF BOOKAN ORK 45

Between the lochs of Stenness and Harray, the Ring of Bookan is to be found in a cultivated field to the south-west of the farm of Bookan.

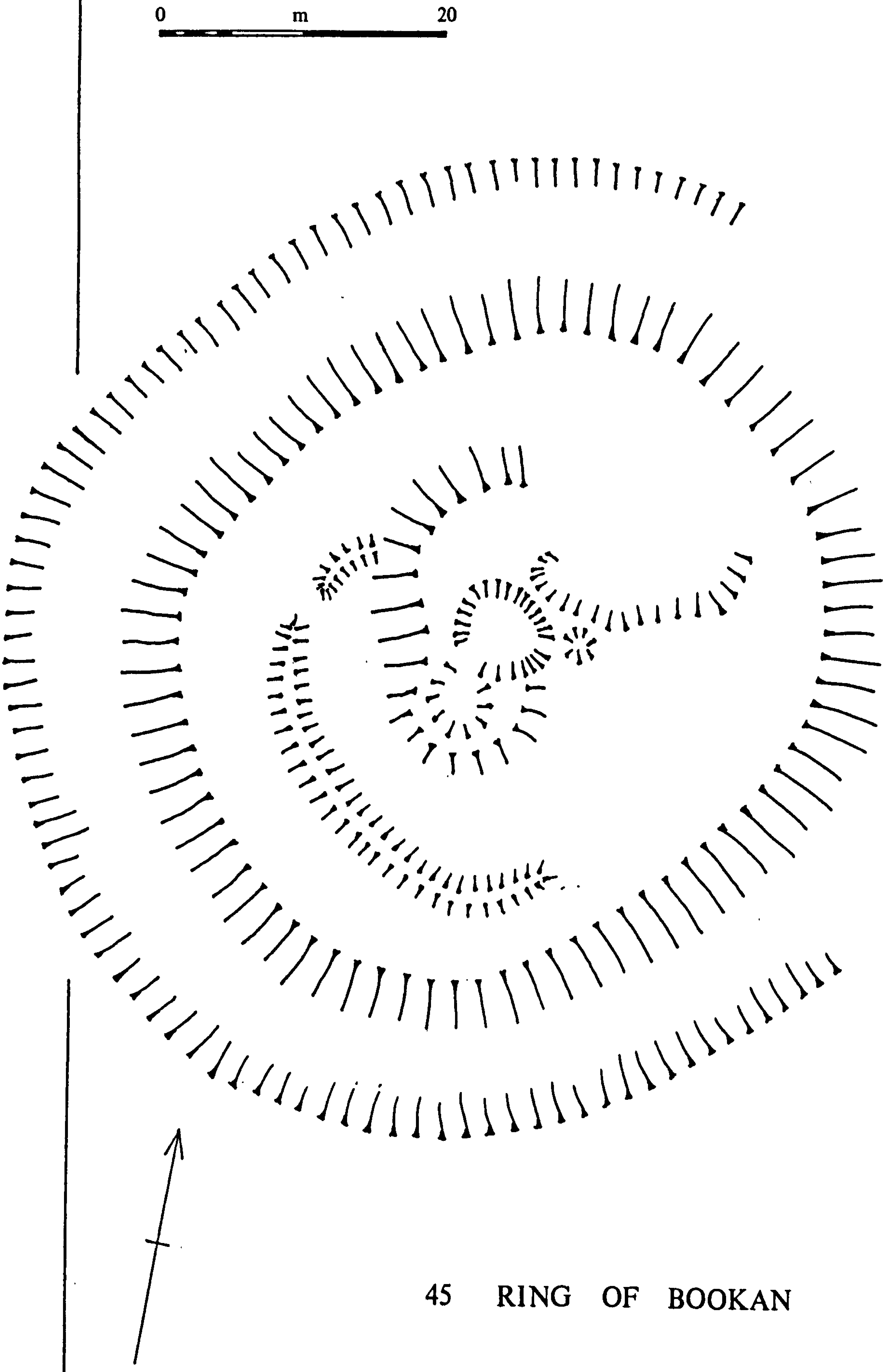
Plate O shows Thomas' original plan, made in the 1850s: less detail is visible at the site today. The monument consists of a circular ditch approaching 2.0 m deep and having an outer diameter of between 62 and 70 m. Within the ditch the ground is irregular and evidently contains much stone, but no pattern can be discerned. The ditch has been compared to that surrounding Maes Howe. The site has suffered much destruction and its attribution as a chambered cairn may never be proved satisfactorily.

Arch 34 (1852): 106

*RCAMS 2: 270

Piggott (1954): 243-4

CTS 1: 232



45 RING OF BOOKAN

ROSE NESS		ORK 46
Map Reference: ND 52629917		Ordnance Survey: ND 59 NW 1
Island: Mainland	Parish: Holm	RCAMS Inventory: 366
Category: Gamma	Landranger Sheet: 6,7	Orkney Heritage Society: -
Excavations: -	Plans: 1980: Fraser	Visited: 11/6/80

CAIRN		PASSAGE		CHAMBER	
Length	19.8	Length		Length	
Width	18.0	Width		Width	
Area	256	Area		Area	
Orientation	-	Orientation		Compartments	
Shape	Round			Cells	
				Orientation	
				Shape	

GEOLOGY		SOIL		LAND USE CAPABILITY	
Site	Sandstone	Site	Gleys	Site	Class 5
Water	66	Water	66	Water	66
Sandstone	14	Podzols	3	Class 3	0
Peat	0	Podzolic Com.	11	Class 4	17
Boulder Clay	20	Gleys	19	Class 5	14
Miscellaneous	0	Gleyic Com.	0	Class 6	3
		Peat	1	Class 7	0
		Miscellaneous	0	Miscellaneous	0

Visibility	Altitude	Topography
D 051-233 I 233-281 D 281-335 I 335-051	Site 20 High 20 Low 0	Coastal plain
	Coast: Nature Cliff; Distance 100	Vegetation: Unimproved pasture
	Approaches: Easy	Intervisibility: ORK 7
	Drainage: Good	

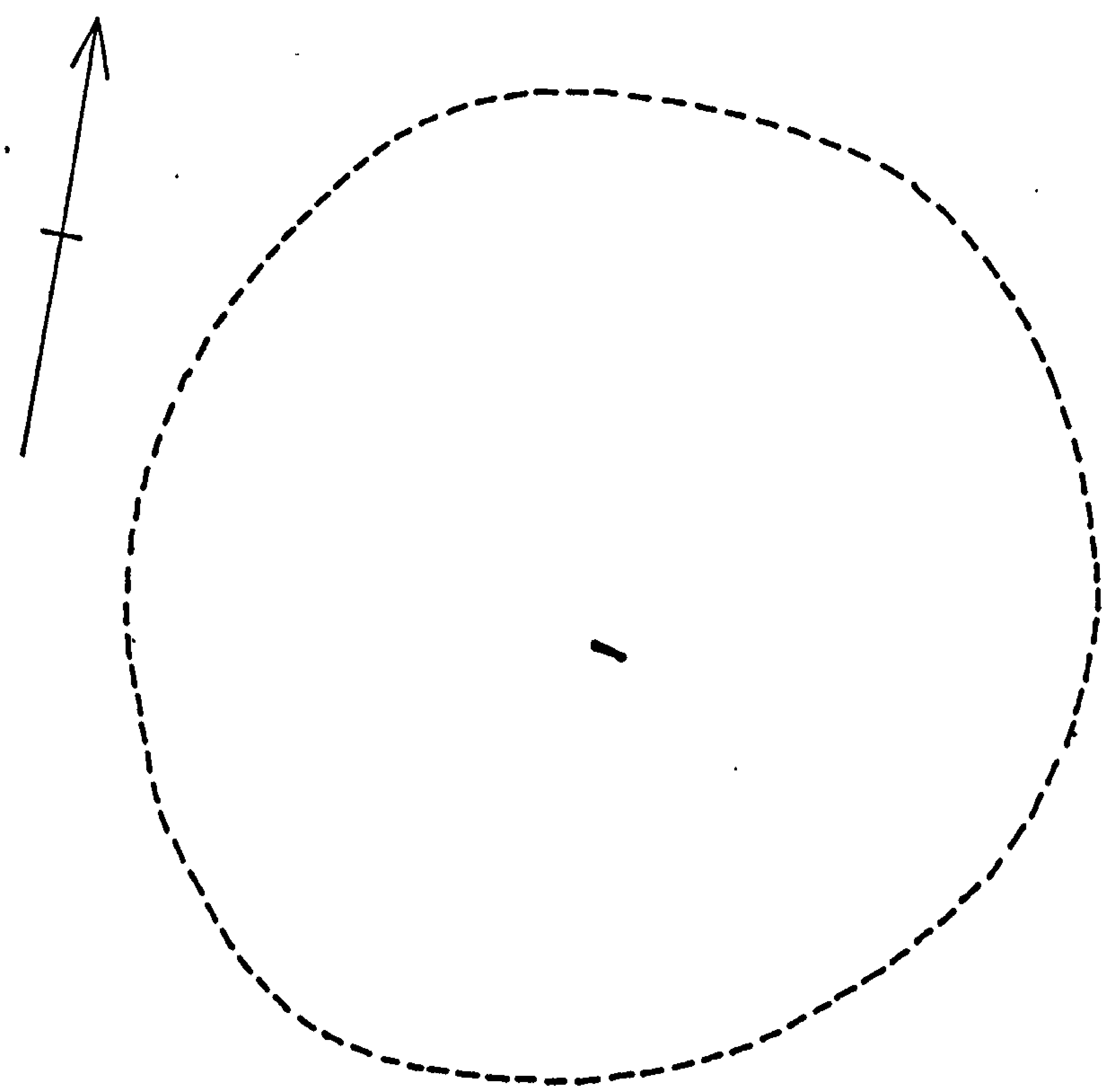
ROSE NESS ORK 46

Known locally as the North Cairn, this prominent mound is situated on the east coast of the promontory of Rose Ness in the extreme south-west Mainland. It is best approached across fields and rough ground from the farm of Roy.

The monument consists of a vegetation-covered circular mound with exposures showing cairn material of flat stones. In the centre of the mound is a hollow with a single upright stone protruding through. The mound stands about 2.3 m high and, as Henshall points out, the top of the single upright is over 2.1 m from ground level. The most likely explanation is that this stone is one orthostat of a chamber divided into compartments.

RCAMS 2: 106

*CTS 1: 252



46 ROSE NESS

SANDYHILL SMITHY		ORK 47
Map Reference: HY 56123299		Ordnance Survey: HY 53 SE 6
Island: Eday	Parish: Eday	RCAMS Inventory: 224
Category: Alpha	Landranger Sheet: 5,6	Orkney Heritage Society: -
Excavations: 1937: Calder	Plans: 1937: Calder	Visited: 24/6/80 29/5/81

CAIRN		PASSAGE		CHAMBER	
Length	8.1	Length	2.3	Length	3.4
Width	8.0	Width	0.5	Width	2.0
Area	52	Area	1.2	Area	6
Orientation	-	Orientation	110	Compartments	3
Shape	Round			Cells	0
				Orientation	114-294
				Shape	Simple

GEOLOGY		SOIL		LAND USE CAPABILITY	
Site	Sandstone	Site	Podzols	Site	Class 5
Water	14	Water	14	Water	14
Sandstone	43	Podzols	10	Class 3	11
Peat	27	Podzolic Com.	0	Class 4	0
Boulder Clay	7	Gleys	16	Class 5	32
Miscellaneous	7	Gleyic Com.	0	Class 6	43
		Peat	47	Class 7	0
		Miscellaneous	13	Miscellaneous	0

Visibility	Altitude / Coast / Approaches / Drainage	Topography / Vegetation / Intervisibility
I 003-041 R 041-093 D 093-171 I 171-260 R 260-348 D 348-003	Altitude: Site 32, High 75, Low 0 Coast: Nature Low rock, Distance 690 Approaches: Easy Drainage: Good	Topography: Hillslope Vegetation: Heathland Intervisibility: ORK 15, ORK 16, ORK 20, ORK 53, ORK 55, ORK T10

SANDYHILL SMITHY ORK 47

In central Eday, to the west of the main road, the site can be reached across rough ground from the new Church of Scotland.

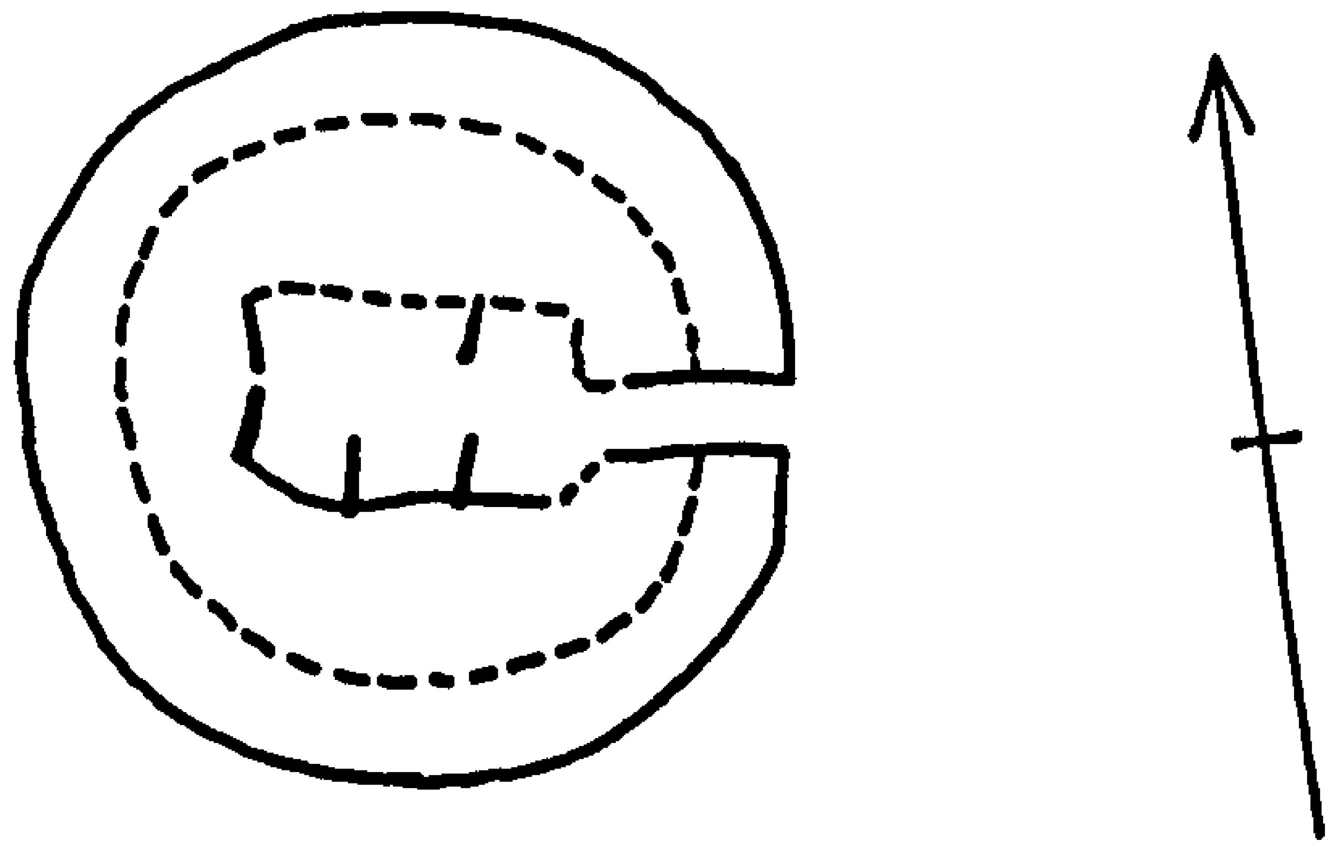
Excavated earlier this century, Sandyhill Smithy now appears as a low mound covered in heather through which protrudes a number of upright stones. The cairn is very small in comparison to many chambered cairns. An outer wall contained the cairn material and there is some evidence of an interior wall encircling the chamber. A passage enters from the south-east into a rectangular space divided into three compartments by two pairs of opposing upright stones. The inner-most compartment had two shelves about 0.3 m above the clay floor.

Artefacts of pottery, flint, and stone were found but no human remains were recovered.

*PSAS 72 (1938): 204-9, 214-16

RCAMS 2: 61-2

CTS 1: 232-3



47 SANDYHILL SMITHY

STONES OF VIA	ORK 48
Map Reference: HY 26001602	Ordnance Survey: HY 21 NE 3

Island: Mainland	Parish: Sandwick	RCAMS Inventory: 714
Category: Gamma	Landranger Sheet: 6	Orkney Heritage Society: -
Excavations: -	Plans: 1928: Calder 1955: Henshall	Visited: 10/6/80

CAIRN		PASSAGE		CHAMBER	
Length		Length		Length	
Width		Width		Width	
Area		Area		Area	
Orientation		Orientation		Compartments	
Shape				Cells	
				Orientation	
				Shape	

GEOLOGY		SOIL		LAND USE CAPABILITY	
Site	Boulder clay	Site	Podzols	Site	Class 4
Water	7	Water	7	Water	7
Sandstone	29	Podzols	74	Class 3	47
Peat	0	Podzolic Com.	0	Class 4	42
Boulder Clay	62	Gleys	18	Class 5	4
Miscellaneous	2	Gleyic Com.	0	Class 6	0
		Peat	0	Class 7	0
		Miscellaneous	1	Miscellaneous	0

Visibility: R 090-234 I 234-090	Altitude: Site 30, High 62, Low 15	Topography: Valley bottom
		Vegetation: Improved pasture
	Coast: Nature Low rock, Distance 800	Intervisibility: -
	Approaches: Easy	
	Drainage: Good	

STONES OF VIA ORK 48

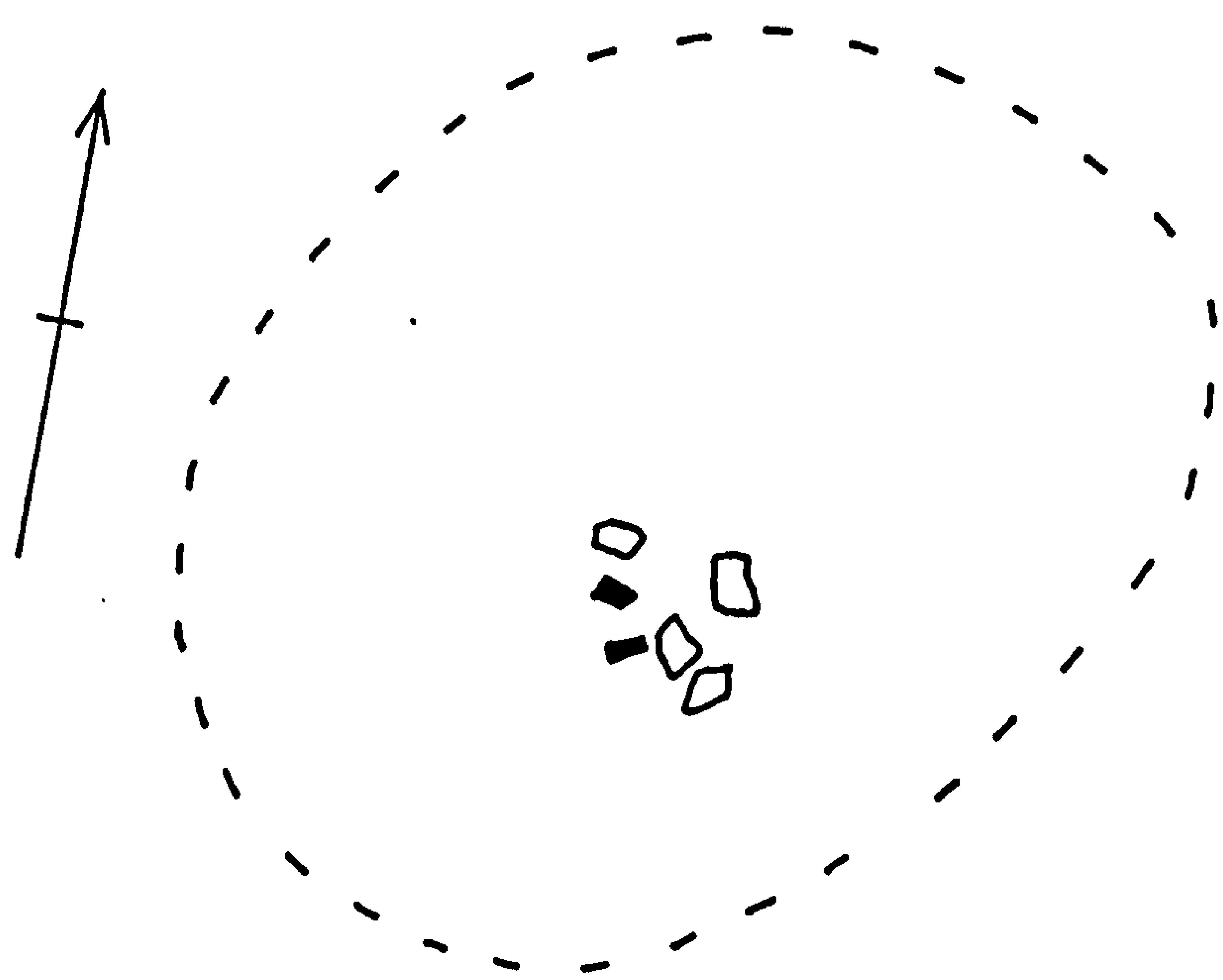
South-west of the Loch of Clumly in the Hestwall district of the West Mainland, the Stones of Via are in a field behind the house of Via.

Today there are no traces of a covering cairn and all that remains of a chamber is a setting of stones, none of them certainly in situ. Various reports from last century, including the Ordnance Survey map, suggest that the monument once consisted of at least seven large blocks of stone with uprights and a capstone, surrounded by an irregular circular enclosure.

The location of the site is not a usual one for a chambered cairn with the local topography giving a sense of oppressive enclosure, as shown by the visibility statistics.

Local tradition maintains that bodies or bones were taken from the Stones of Via and re-interred in a large amorphous mound, which is certainly artificial, located 30 m to the north of the house of Via.

NSA (1845): 15,53
Arch 34 (1852): 116
*RCAMS 2: 267
CTS 1: 234



48 STONES OF VIA

TAVERSOE TUICK

ORK 49

Map Reference	Ordnance Survey
HY 42572761	HY 42 NW 2

Island	Parish	RCAMS Inventory
Rousay	Rousay	570

Category	Landranger Sheet	Orkney Heritage Society
Alpha	5,6	-

Excavations	Plans	Visited
1898: Traill Burroughs 1937: Grant	1937: Wilson	4/6/80 6/6/80

CAIRN		PASSAGE Upper	PASSAGE Lower	CHAMBER Upper	CHAMBER Lower
Length	9.1	3.4	5.8	4.7	3.7
Width	9.0	0.5	0.6	1.8	1.8
Area	64	1.7	3.5	7	5
Orientation	-	349	162		
Shape	Round				
Compartments				3	4
Cells				1	0
Orientation				070-250	080-260
Shape				Complex	Simple

GEOLOGY

Site Sandstone

Water	24
Sandstone	60
Peat	11
Boulder Clay	5
Miscellaneous	0

SOIL

Site Podzolic Com.

Water	24
Podzols	43
Podzolic Com.	16
Gleys	4
Gleyic Com.	6
Peat	7
Miscellaneous	0

LAND USE CAPABILITY

Site Class 5

Water	24
Class 3	16
Class 4	15
Class 5	24
Class 6	21
Class 7	0
Miscellaneous	0

Visibility

D 114-297
R 297-324
I 324-114

Altitude

Site	65
High	195
Low	0

Topography Promontory end

Vegetation Improved pasture

Coast

Nature Low rock
Distance 440

Approaches Easy

Drainage Good

Intervisibility

ORK 11

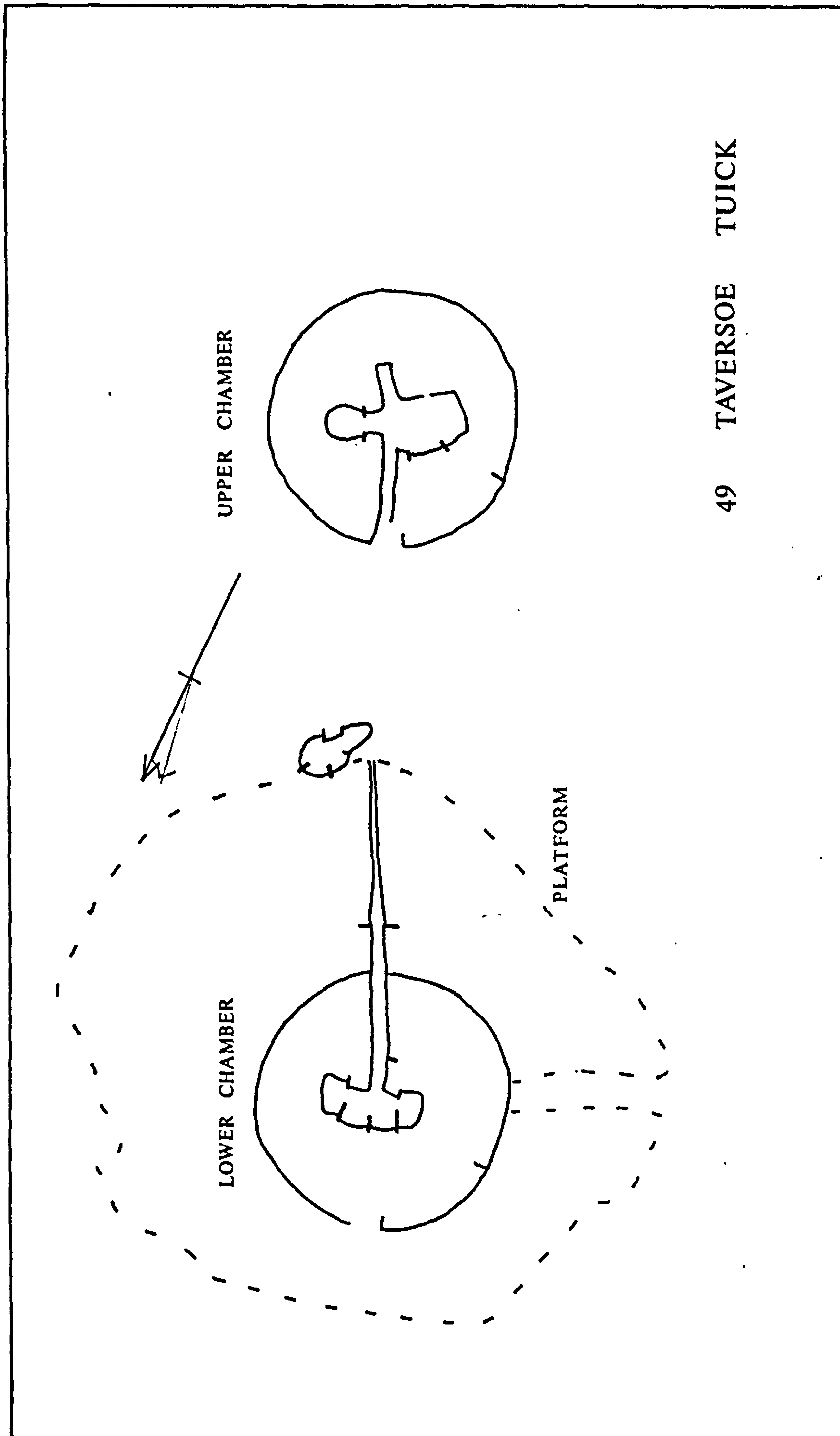
TAVERSOE TUICK ORK 49

In the south of Rousay, on a prominent mound to the west of Trumland House, this site was discovered during the construction of the shelter for a garden seat. It is now in the guardianship of the state and is sign-posted from the road.

Like Quoyness (ORK 44), Taversoe Tuick is surrounded by an irregular platform. The cairn is circular and it conceals an unusual interior. There are two chambers, one on top of the other, with two separate entrance passages. Originally there was no connection between the two but a ladder now allows access to the lower chamber. This chamber, entered in prehistoric times from the south by a long passage (part of it unroofed) has been dug into the ground. It consists of a rectangular space divided into five compartments by vertical slabs. The upper chamber, entered from the north, has a central compartment, divided into three by vertical slabs, and a small cell to the north. Outside the cairn itself, there is yet another chamber, a lintelled oval hollow which, like the lower chamber, is completely subterranean.

Although there was evidence of only five individuals interred in the various compartments, Taversoe Tuick did produce a large quantity of pottery and an assortment of flint and stone tools. Also found were a pendant and a number of beads.

PSAS 37 (1902): 73-82
PSAS 65 (1931): 86-91
*PSAS 73 (1939): 155-66
PSAS 76 (1942): 131-2
RCAMS 2: 206-9
CTS 1: 234-8
NMR HY 42



49 TAVERSOE TUICK

TRES NESS	ORK 50

Map Reference: HY 71103572		Ordnance Survey: HY 73 NW 3
Island: Sanday	Parish: Lady	RCAMS Inventory: 447
Category: Gamma	Landranger Sheet: 5	Orkney Heritage Society: OR 330
Excavations: -	Plans: 1957: Henshall; 1980: Fraser and Fraser	Visited: 7/8/80

CAIRN

Length	16.0
Width	16.0
Area	208
Orientation	-
Shape	Round

PASSAGE

Length	
Width	
Area	
Orientation	

CHAMBER

Length	
Width	
Area	
Compartments	
Cells	
Orientation	
Shape	

GEOLOGY

Site	Sandstone
Water	89
Sandstone	8
Peat	0
Boulder Clay	0
Miscellaneous	3

SOIL

Site	Podzols
Water	89
Podzols	8
Podzolic Com.	0
Gleys	0
Gleyic Com.	0
Peat	0
Miscellaneous	3

LAND USE CAPABILITY

Site	Class 4
Water	89
Class 3	0
Class 4	11
Class 5	0
Class 6	0
Class 7	0
Miscellaneous	0

Visibility

D 029-324
I 324-029

Altitude

Site	8
High	8
Low	0

Coast

Nature	Low rock
Distance	10

Approaches: Easy

Drainage: Good

Topography: Peninsula

Vegetation: Improved pasture

Intervisibility

ORK 14
ORK 20
ORK 38
ORK 44
ORK T21

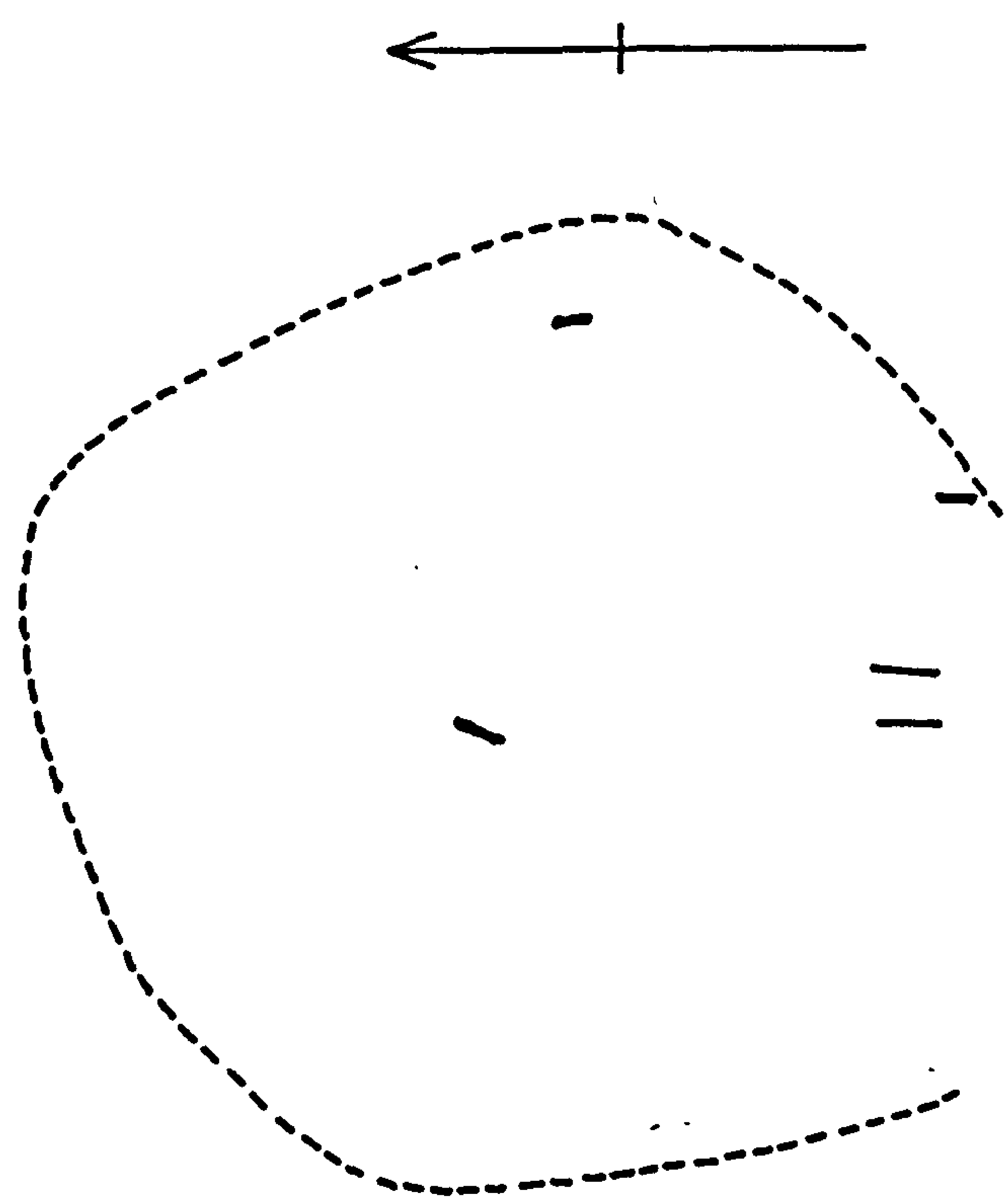
TRES NESS ORK 50

At the extreme tip of the peninsula of Tres Ness off the south coast of Sanday, this site can be approached by track across Cata Sand and past the farm-house of Tresness.

The mound has been truncated by the sea and in the exposed section cairn material can be seen for a distance of nearly 16 m. The apparent dimensions of the cairn are smaller than this would suggest. Two lines of walling can be seen in the south, forming a passage leading towards the centre of the cairn. Elsewhere within the cairn there are upright stones and short lengths of walling, but they form no discernible pattern. Henshall suggests that much of the internal structure remains intact, but the low height of the mound - at maximum 1.6 m - may be an indication that it has been disturbed.

RCAMS 2: 168

CTS 1: 239



50 TRES NESS

UNSTAN	ORK 51

Map Reference	Ordnance Survey
HY 28281172	HY 21 SE 5

Island	Parish	RCAMS Inventory
Mainland	Stenness	893

Category	Landranger Sheet	Orkney Heritage Society
Alpha	6	-

Excavations	Plans	Visited
1884: Clouston	1928: Ministry of Works	10/6/80 17/5/81

CAIRN

Length	13.7
Width	13.0
Area	151
Orientation	-
Shape	Round

PASSAGE

Length	5.9
Width	0.6
Area	3.5
Orientation	069

CHAMBER

Length	6.6
Width	3.4
Area	15
Compartments	5
Cells	1
Orientation	157-337
Shape	Complex

GEOLOGY

Site Sandstone

Water	66
Sandstone	8
Peat	0
Boulder Clay	26
Miscellaneous	0

SOIL

Site Gleys

Water	66
Podzols	3
Podzolic Com.	0
Gleys	31
Gleyic Com.	0
Peat	0
Miscellaneous	0

LAND USE. CAPABILITY

Site Class 3

Water	66
Class 3	32
Class 4	2
Class 5	0
Class 6	0
Class 7	0
Miscellaneous	0

Visibility

I 000-000

Altitude

Site	5
High	15
Low	2

Topography: Coastal plain

Vegetation: Improved pasture

Coast

Nature	Low rock
Distance	30

Intervisibility

ORK 4

ORK 36

ORK 45

Approaches: Easy

Drainage: Fair

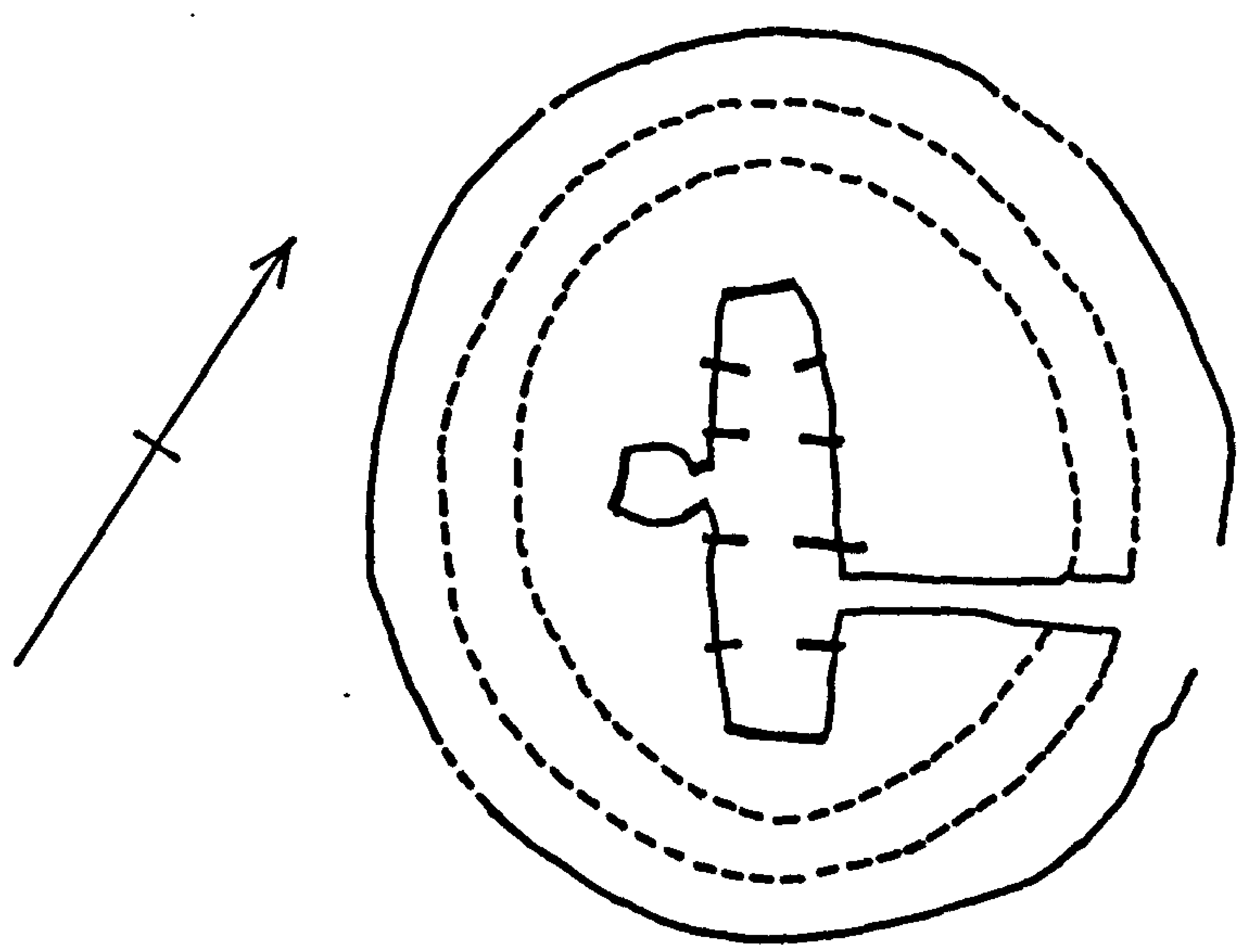
UNSTAN ORK 51

On the south shore of the Loch of Stenness in central Mainland, this guardianship site is sign-posted from the Stromness-Finstown road and is located next to the farm of Onstan. "Unstan" is an alternative spelling used by Clouston and propagated in the archaeological literature.

The cairn is roughly circular and contains two internal walls in addition to the original outer revetment: none of these are now visible. A passage leads from the west into a central rectangular chamber. This is divided into five compartments by pairs of projecting upright stones. The entrance passage enters the second of these compartments, while from the third there is a low passage leading to a single cell.

Unstan holds a unique place in the archaeology of Neolithic Scotland because of the pottery found there. The remains of about 30 bowls, mostly shallow, round-bottomed bowls with a pronounced neck forming a collar which is often decorated with incised lines, were recovered, as were tools of flint, stone and antler.

PSAS 19 (1885): 341-51
PSAS 63 (1929): 40-46
PSAS 76 (1942): 131-2
Jessen and Helbaek (1944): 18
PSAS 79 (1945): 167
*RCAMS 2: 315-17
CTS 1: 239-243



51 UNSTAN

VERE POINT	ORK 52

Map Reference	Ordnance Survey
HY 45835046	HY 45 SE 19

Island	Parish	RCAMS Inventory
Westray	Westray	1044
Category	**Landranger Sheet**	**Orkney Heritage Society**
Beta	5	-
Excavations	**Plans**	**Visited**
-	1981: Fraser and Bellamy	5/4/81 24/7/81

CAIRN		PASSAGE		CHAMBER	
Length	21.2	Length		Length	3.5
Width	19.7	Width		Width	3.0
Area	319	Area		Area	10
Orientation	-	Orientation	102	Compartments	2
Shape	Round			Cells	0
				Orientation	102-282
				Shape	Simple

GEOLOGY		SOIL		LAND USE CAPABILITY	
Site	Sandstone	Site	Podzols	Site	Class 4
Water	69	Water	69	Water	69
Sandstone	23	Podzols	26	Class 3	0
Peat	0	Podzolic Com.	0	Class 4	28
Boulder Clay	0	Gleys	0	Class 5	3
Miscellaneous	18	Gleyic Com.	0	Class 6	0
		Peat	0	Class 7	0
		Miscellaneous	5	Miscellaneous	0

Visibility	Altitude	Topography
D 021-161 I 161-245 R 245-293 I 293-021	Site 8 High 30 Low 0	Coastal plain
	Coast	**Vegetation**
	Nature: Low rock Distance: 90	Improved pasture
	Approaches	**Intervisibility**
	Easy	-
	Drainage	
	Fair	

VERE POINT ORK 52

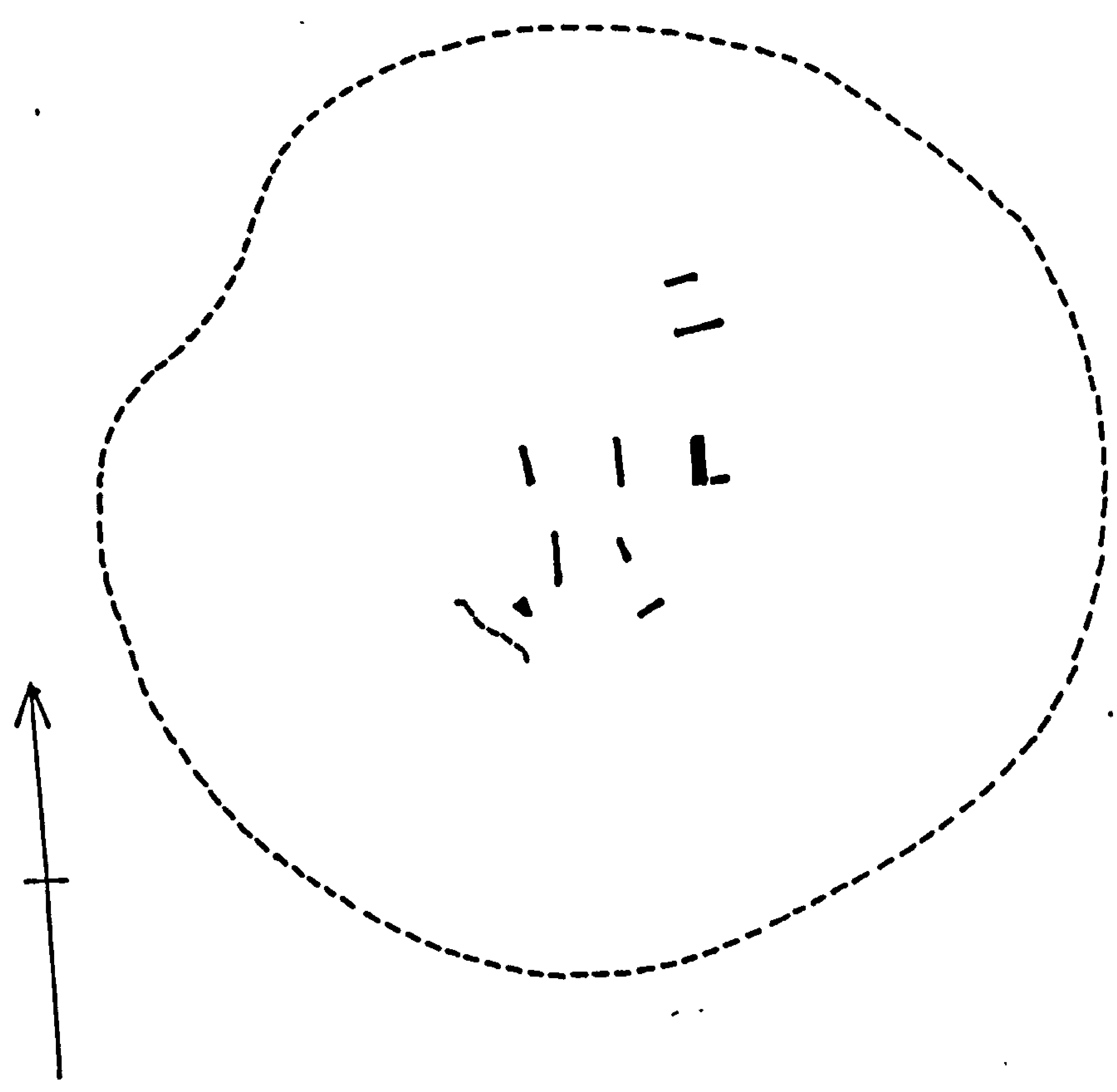
On the east coast in the Rackwick district of north-east Westray, this monument is located in the field in front of the farm-house of Vere.

The remains of a low mound, now a maximum of 1.0 m in height, are roughly circular. In a slight hollow in the centre can be seen at least ten cairn-fast upright stones. Five of these are arranged to form an oval chamber subdivided into two or three compartments by pairs of opposed orthostats. Next to the tallest stone, which stands to a height of 0.70 m, is a smaller stone at right angles, perhaps the first stone of a passage leading to the east. Around the central chamber there are other earth-fast stones and a short stretch of walling, all suggesting an internal wall around the chamber.

In the same field there are signs of a large circular enclosure: this may date from relatively modern times.

*RCAMS 2: 353

CTS 1: 243



52 VERE POINT

VINQUOY HILL	ORK 53

Map Reference HY 56013812		**Ordnance Survey** HY 53 NE 9
Island Eday	**Parish** Eday	**RCAMS Inventory** 216
Category Alpha	**Landranger Sheet** 5	**Orkney Heritage Society** -
Excavations 1857: Farrer and Hebden	**Plans** 1928: Calder	**Visited** 25/6/80 30/5/81

CAIRN		PASSAGE		CHAMBER	
Length	18.2	Length	4.0	Length	5.6
Width	16.0	Width	0.6	Width	4.6
Area	223	Area	2.4	Area	9
Orientation	-	Orientation	180	Compartments	1
Shape	Round			Cells	4
				Orientation	-
				Shape	Complex

GEOLOGY		SOIL		LAND USE CAPABILITY	
Site	Sandstone	Site	Podzols	Site	Class 6
Water	11	Water	11	Water	11
Sandstone	63	Podzols	48	Class 3	13
Peat	3	Podzolic Com.	0	Class 4	22
Boulder Clay	23	Gleys	37	Class 5	30
Miscellaneous	0	Gleyic Com.	0	Class 6	24
		Peat	4	Class 7	0
		Miscellaneous	0	Miscellaneous	0

Visibility
D 000-000

Altitude
Site 74
High 76
Low 0

Topography Hilltop

Vegetation Heathland

Coast
Nature Low rock
Distance 600

Approaches Easy

Drainage Good

Intervisibility

ORK 5	ORK 20
ORK 8	ORK 23
ORK 9	ORK 33
ORK 10	ORK 42
ORK 15	ORK 47
ORK 16	ORK 55
ORK 17	ORK T18

VINQUOY HILL ORK 53

Near the southern summit of Vinquoy Hill in northern Eday, this well-preserved monument can be reached by a track beginning on the Cusbay road to the new water store which shares the summit.

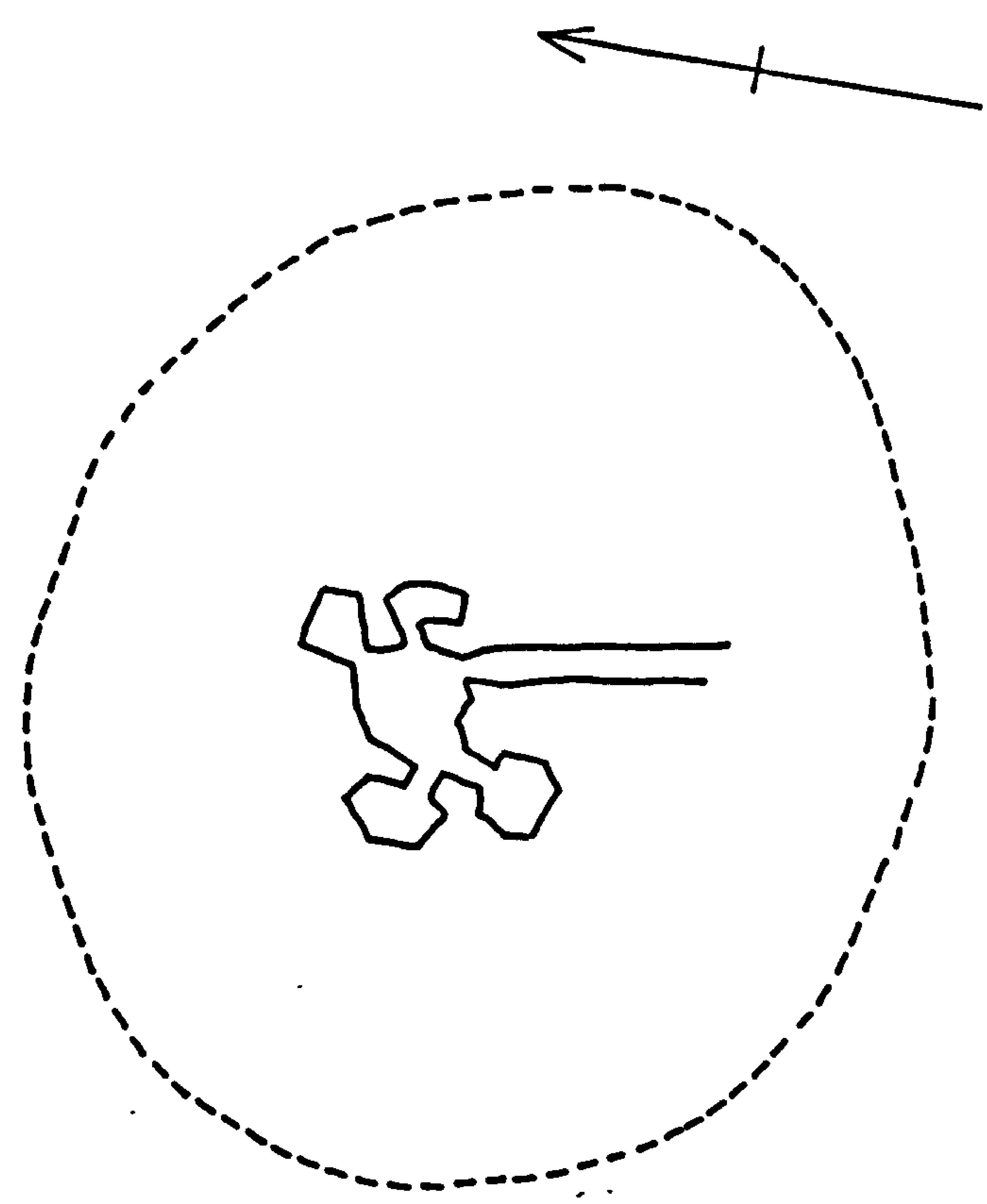
The cairn itself is almost circular and was once enclosed by a revetment wall. There are indications in the stone-work of the passage that the cairn contains a second encircling wall. The passage, only the inner section of which is roofed, enters into an irregular polygonal central compartment. This was originally over 3.0 m in height. Four low passages, each about 0.6 m high, lead into four corbelled cells with irregular ground plans but all roofed at a height of about 1.8 m. The two eastern-most cells appear to have been constructed as one but a stone partition has been inserted between them. It has been noted that the quality of the stone masonry at this site is inferior in comparison to that of other sites of clusters IV-VI. While this has been attributed to the use of stone of inferior quality, it is apparent in places that the skill and technique of the masons may also have been of a different standard.

Vinquoy Hill is at the centre of the north isles: there are extensive views in all directions and a large number of other chambered cairns can be seen (Figure 15.10).

Arch J. 20 (1863): 33-4

*RCAMS 2: 54-5

CTS 1: 244



53 VINQUOY HILL

WIDEFORD HILL	ORK 54

Map Reference	Ordnance Survey
HY 40901211	HY 41 SW 1

Island	Parish	RCAMS Inventory
Mainland	Kirkwall and St.Ola	410

Category	Landranger Sheet	Orkney Heritage Society
Alpha	6	-

Excavations	Plans	Visited
1849: Petrie 1935: Kilbride-Jones	1935: Ministry of Works	19/6/80 17/8/81

CAIRN		PASSAGE		CHAMBER	
Length	13.7	Length	5.3	Length	6.0
Width	12.6	Width	0.5	Width	3.4
Area	132	Area	2.5	Area	13
Orientation	-	Orientation	275	Compartments	1
Shape	Round			Cells	3
				Orientation	-
				Shape	Complex

GEOLOGY		SOIL		LAND USE CAPABILITY	
Site	Peat	Site	Podzols	Site	Class 5
Water	0	Water	0	Water	0
Sandstone	11	Podzols	44	Class 3	14
Peat	62	Podzolic Com.	0	Class 4	28
Boulder Clay	27	Gleys	29	Class 5	33
Miscellaneous	0	Gleyic Com.	0	Class 6	25
		Peat	27	Class 7	0
		Miscellaneous	0	Miscellaneous	0

Visibility	Altitude	Topography
R 025-217 D 217-025	Site 120 High 225 Low 10	Hillslope
		Vegetation Heathland
	Coast Nature Low rock Distance 1900	**Intervisibility** ORK 12
	Approaches Easy	
	Drainage Good	

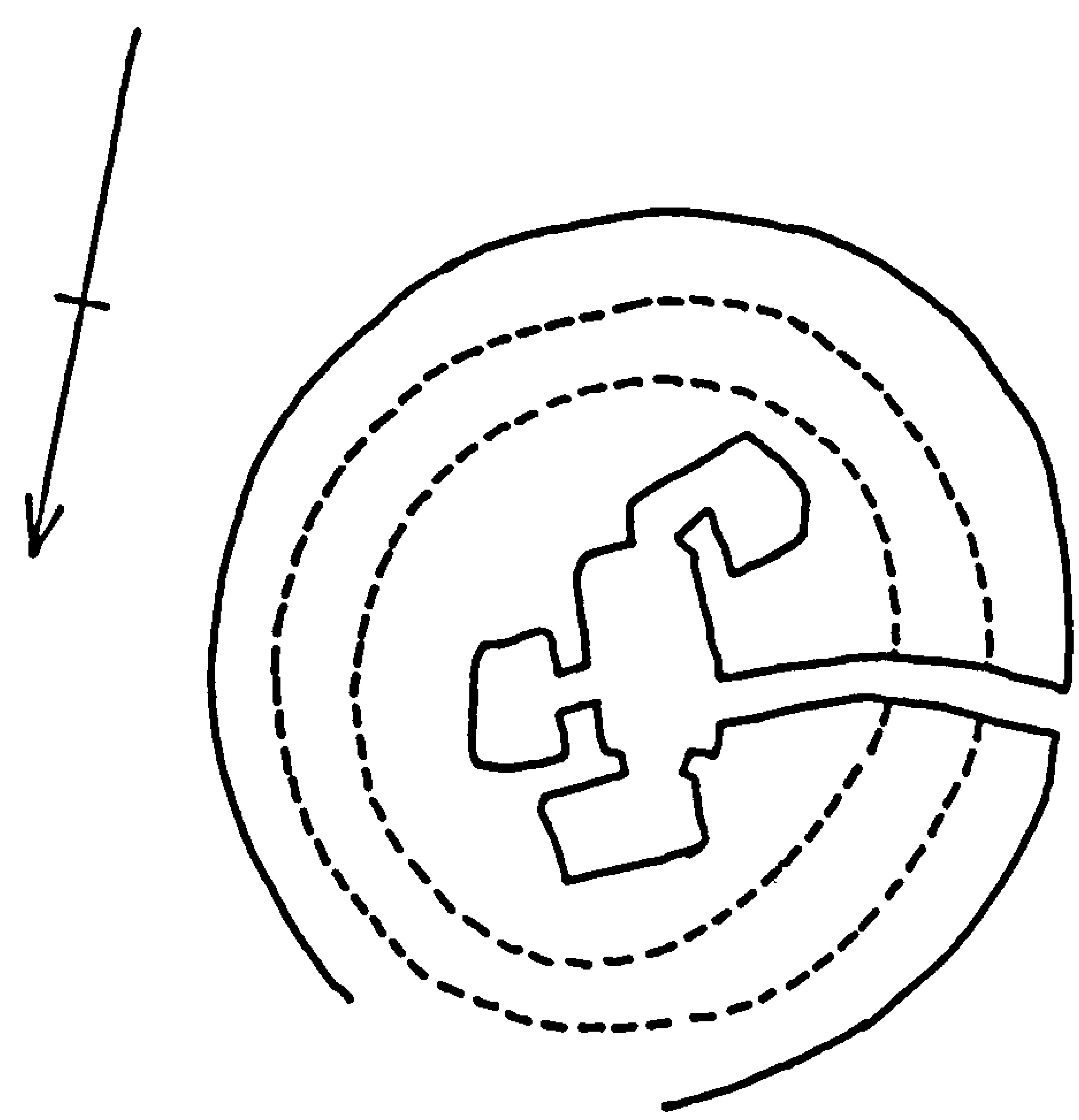
WIDEFORD HILL ORK 54

To the west of the summit of Wideford Hill in the central Mainland, this guardianship site must be approached by the long sign-posted footpath from the minor road between Kirkwall and Finstown to the south of the hill.

The cairn lies in an artificial hollow and is roughly circular. As displayed after the excavation, the tops of three concentric walls are visible, giving the profile of the cairn a stepped appearance. There is some doubt whether the two internal walls were intended to be visible at the time of building. A slightly crooked passage 5.3 m long leads from the west into the central compartment of a chamber which has three small side cells leading from it. The central compartment is 3.1 m by 1.4 m: the largest cell is 2.0 m long. All three cells have oversailing roofs reaching a height of about 2.1 m. Entry is now gained through a hatch in the roof of the central compartment which originally was higher than 2.5 m.

At the time of excavation the structure was found to be empty of human bones or objects of undoubted Neolithic age.

Arch 34 (1852): 124-7
TO 19 January 1856
POAS 5 (1927): 20-21
*RCAMS 2: 156-9
CTS 1: 245-6
APA 4 (1973): 75-96



54 WIDEFORD HILL

WITHEBEIR	ORK 55

Map Reference	HY 56753537
Ordnance Survey	HY 53 NE 12
Island	Eday
Parish	Eday
RCAMS Inventory	220
Category	Gamma
Landranger Sheet	5,6
Orkney Heritage Society	-
Excavations	1855: Farrer
Plans	1980: Fraser
Visited	24/6/80 29/5/81

CAIRN		PASSAGE		CHAMBER	
Length	16.6	Length		Length	
Width	14.0	Width		Width	
Area	172	Area		Area	
Orientation	-	Orientation		Compartments	
Shape	Round			Cells	
				Orientation	
				Shape	

GEOLOGY		SOIL		LAND USE CAPABILITY	
Site	Sandstone	Site	Podzols	Site	Class 6
Water	22	Water	22	Water	22
Sandstone	62	Podzols	35	Class 3	0
Peat	12	Podzolic Com.	0	Class 4	27
Boulder Clay	2	Gleys	21	Class 5	36
Miscellaneous	2	Gleyic Com.	0	Class 6	15
		Peat	9	Class 7	0
		Miscellaneous	13	Miscellaneous	0

Visibility

D 010-044
I 044-057
D 057-201
I 201-257
D 257-292
I 292-010

Altitude

Site	53
High	66
Low	0

Coast

Nature	Cliff
Distance	480

Approaches: Restricted

Drainage: Good

Topography: Hilltop

Vegetation: Heathland

Intervisibility

ORK 14, ORK 15, ORK 16, ORK 20, ORK 23, ORK 26, ORK 47, ORK 53, ORK T8, ORK T18

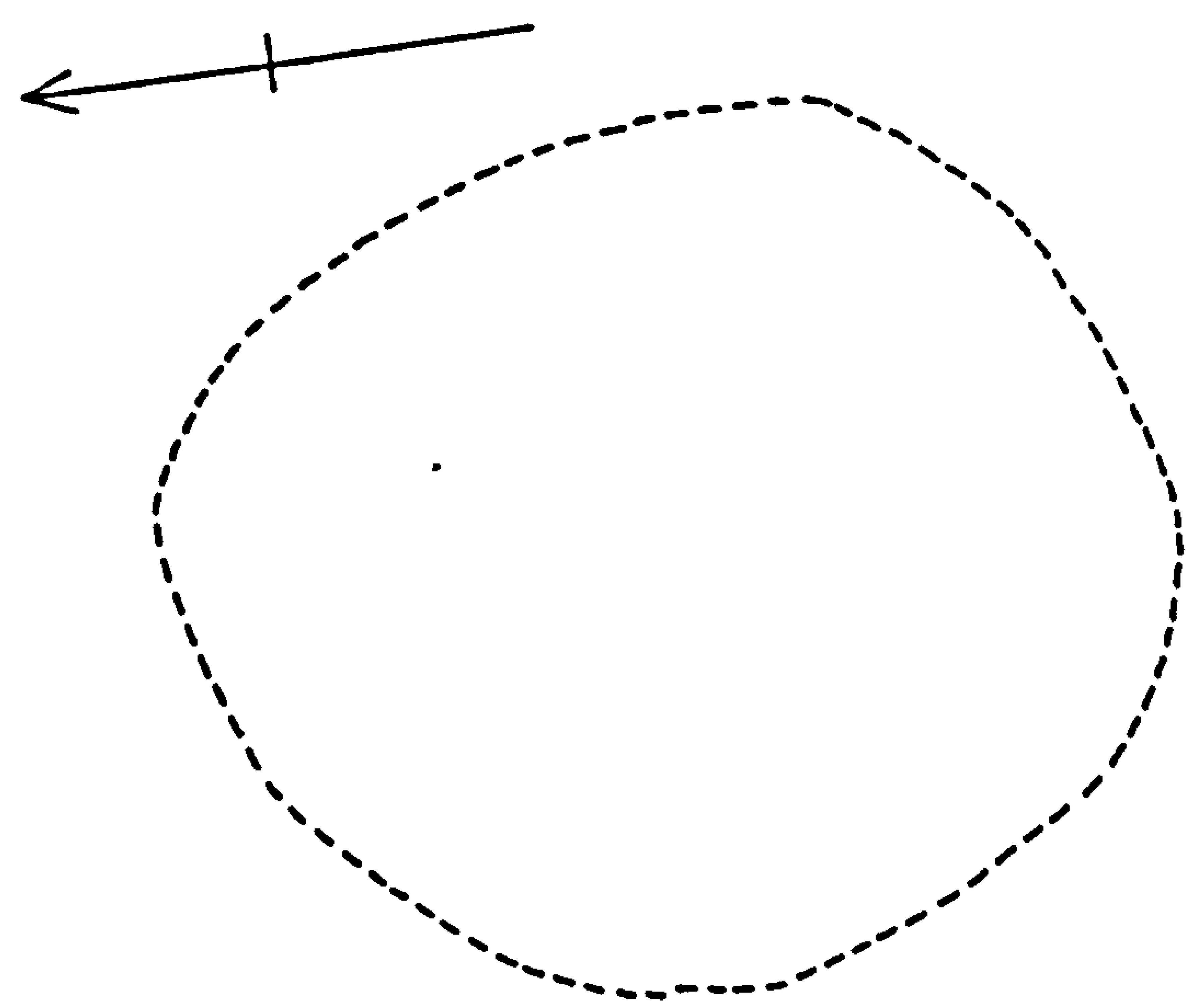
WITHEBEIR ORK 55

In the Whithebeir (sic) district in the east of central Eday, the site can be approached across rough ground to the east of the telephone exchange on the main road.

Although thick heather vegetation makes details difficult to see, the mound is roughly circular and is composed of stone. In the centre there is an irregular hollow in which several large slabs, not apparently earth-fast, are exposed. The cairn is thought to be chambered on the strength of a report by Farrer in 1855 who observed three compartments, and possibly a fourth, and who recovered deer bone and a human tooth.

The site commands extensive views over the north isles and like Vinquoy Hill (ORK 53), in a very similar position, it is possible to see a large number of other chambered cairns (Figure 15.10) from its elevated location.

PSAS 2 (1857): 179
*RCAMS 2: 60
CTS 1: 246



55 WITHEBEIR

QUOYS	ORK 56

Map Reference	Ordnance Survey
HY 37822507	HY 32 NE 25

Island	Parish	RCAMS Inventory
Mainland	Evie and Rendall	-
Category	**Landranger Sheet**	**Orkney Heritage Society**
Beta	6	-
Excavations	**Plans**	**Visited**
-	1967: Henshall	10/6/80 30/7/80 18/8/80 14/5/81

CAIRN

Length	18.0
Width	17.5
Area	255
Orientation	-
Shape	Round

PASSAGE

Length	
Width	
Area	
Orientation	

CHAMBER

Length	6.0
Width	3.0
Area	14
Compartments	3
Cells	0
Orientation	145-325
Shape	Simple

GEOLOGY

Site Boulder clay

Water	0
Sandstone	54
Peat	0
Boulder Clay	33
Miscellaneous	13

SOIL

Site Podzolic Com.

Water	0
Podzols	28
Podzolic Com.	21
Gleys	46
Gleyic Com.	0
Peat	0
Miscellaneous	5

LAND USE CAPABILITY

Site Class 4

Water	0
Class 3	0
Class 4	44
Class 5	36
Class 6	17
Class 7	3
Miscellaneous	0

Visibility

I 010-083
R 083-170
I 170-191
R 191-280
D 280-334
I 334-348
D 348-010

Altitude

Site	22
High	92
Low	4

Coast

Nature	Cliff
Distance	1180

Approaches Easy

Drainage Fair

Topography Valley bottom

Vegetation Unimproved pasture

Intervisibility

ORK 28
ORK 30
ORK 31
ORK 32
ORK 37
ORK 57
ORK T20

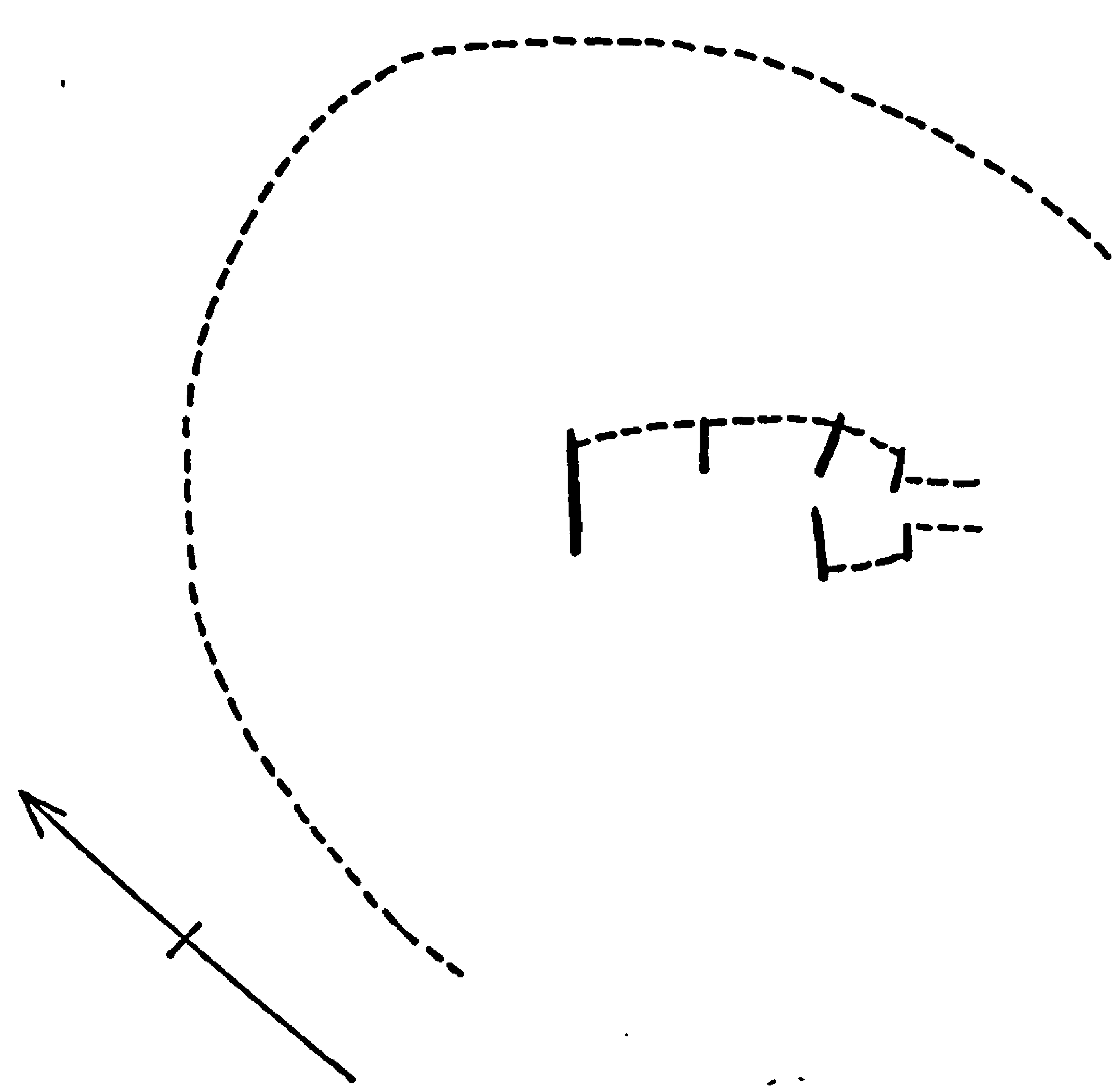
QUOYS ORK 56

To the north-east of the road in the Redland district of the West Mainland, this site is situated in rough grazing to the west of the track leading to the north-east opposite the new Evie school.

The cairn is now low, nowhere higher than 0.9 m, and its edge is indistinct under thick vegetation. Sufficient cairn material is exposed to confirm that it is mainly composed of stone. In the centre of the cairn are several upright stones, the tallest being 0.55 m but most just rising above the turf. They form the characteristic pattern of a chamber divided into three compartments by two pairs of opposed orthostats, with two portal stones and a single back-slab. The passage appears to have led towards the south-east.

This is one of three chambered cairns within 300 m of each other less than a kilometre south of the Sands of Evie where Grooved Ware finds may signify a contemporary settlement.

*CTS 2: 562



56 QUOYS

REDLAND NORTH	ORK 57

Map Reference: HY 38002501		Ordnance Survey: HY 32 NE 23
Island: Mainland	Parish: Evie and Rendall	RCAMS Inventory: -
Category: Beta	Landranger Sheet: 6	Orkney Heritage Society: -
Excavations: -	Plans: 1967: Henshall	Visited: 10/6/80 30/7/80 18/8/80 14/5/81

CAIRN		PASSAGE		CHAMBER	
Length		Length		Length	
Width		Width		Width	
Area		Area		Area	
Orientation		Orientation		Compartments	
Shape				Cells	
				Orientation	
				Shape	

GEOLOGY		SOIL		LAND USE CAPABILITY	
Site	Hummocky Moraine	Site	Podzolic com.	Site	Class 4
Water	0	Water	0	Water	0
Sandstone	56	Podzols	27	Class 3	39
Peat	0	Podzolic Com.	30	Class 4	32
Boulder Clay	30	Gleys	40	Class 5	25
Miscellaneous	12	Gleyic Com.	0	Class 6	4
		Peat	0	Class 7	0
		Miscellaneous	3	Miscellaneous	0

Visibility: I 005-068 R 068-176 I 176-207 R 207-286 I 286-330 D 330-349 I 349-358 D 358-005	Altitude: Site 26, High 90, Low 4	Topography: Valley bottom
		Vegetation: Unimproved pasture
	Coast: Nature Cliff, Distance 1070	Intervisibility: ORK 28 ORK 30 ORK 31 ORK 32 ORK 37 ORK 56 ORK T20
	Approaches: Easy	
	Drainage: Fair	

REDLAND NORTH ORK 57

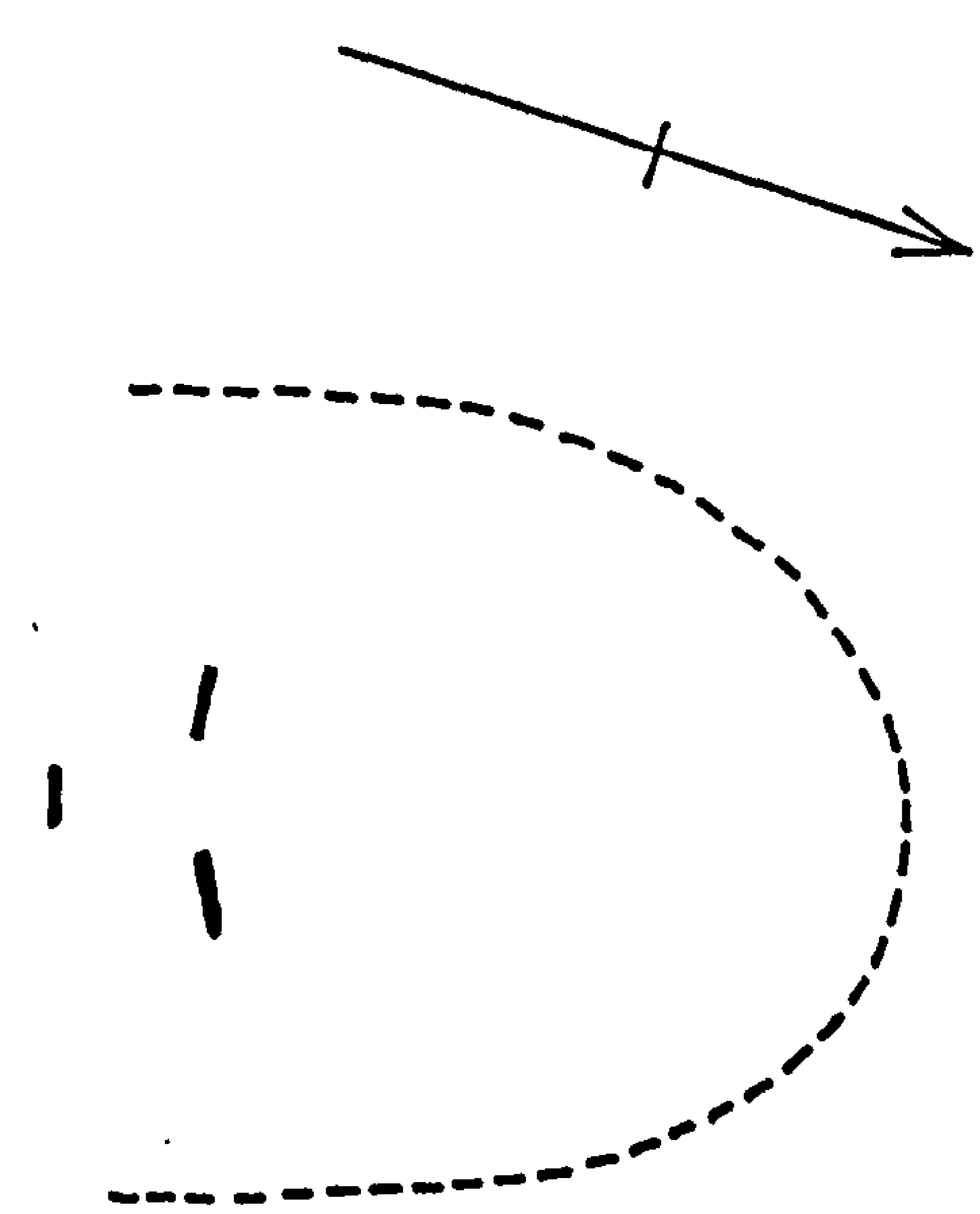
Originally known simply as "Redland", and once thought to be a standing stone, this site is in the district of the same name in the West Mainland, and is situated in rough grazing to the west of the track leading to the north-east opposite the new Evie school.

The cairn outline is indistinct due to the dense vegetation but can be traced with care for much of its circumference. It may be slightly oval with the long axis aligned north/south. In the centre there are three stones which are earth-fast, all parallel to each other. One possible interpretation is that they are the back-slab and a pair of opposed orthostats of a compartmented chamber, but this would mean the entrance passage would lead towards the north, an uncommon occurrence. Other stones are detectable beneath the turf but none which are easy to interpret. One of the upright stones is said to have been 6' (1.8 m) in height.

Within 200 m are the remains of two other chambered cairns. Quoys (ORK 56) and Redland South (ORK T20).

RCAMS 2: 81

*CTS 2: 563



57 REDLAND

VESTRA FIOLD			ORK T1
Map Reference HY 24082184			**Ordnance Survey** HY 22 SW 10
Island Mainland	**Parish** Sandwick		**RCAMS Inventory** 687
Category Gamma	**Landranger Sheet** 6		**Orkney Heritage Society** -
Excavations -	**Plans** 1980: Fraser		**Visited** 10/6/80 30/7/80

CAIRN		PASSAGE		CHAMBER	
Length	21.2	Length		Length	
Width	12.0	Width		Width	
Area	224	Area		Area	
Orientation	059-239	Orientation		Compartments	
Shape	Oval			Cells	
				Orientation	
				Shape	

GEOLOGY		SOIL		LAND USE CAPABILITY	
Site	Sandstone	Site	Podzol	Site	Class 5
Water	0	Water	0	Water	0
Sandstone	100	Podzols	10	Class 3	5
Peat	0	Podzolic Com.	0	Class 4	2
Boulder Clay	0	Gleys	0	Class 5	93
Miscellaneous	0	Gleyic Com.	87	Class 6	0
		Peat	0	Class 7	0
		Miscellaneous	3	Miscellaneous	0

Visibility	Altitude	Topography
I 071-214 D 214-304 R 304-071	Site 107 High 128 Low 35	Ridgetop
		Vegetation Improved pasture
	Coast Nature Cliff Distance 1160	**Intervisibility** -
	Approaches Easy	
	Drainage Good	

VESTRA FIOLD ORK T1

To the west of the road in the Sandwick district of the West Mainland, the site is best approached south across fields from a track near the summit of Vestra Fiold.

An oval mound, with its longer axis almost twice that of the other, the monument has indistinct edges which merge into the surrounding slopes. A single stone, earth-fast and upright, protrudes through the turf roughly in the centre of the mound. This stone is a maximum of 0.8 m high and is orientated north-west/south-east, almost perpendicular to the long axis of the mound, and is surrounded by a slight hollowing.

This is the closest putative chambered cairn to Skara Brae: the settlement in the Bay of Skaill three kilometres to the south is visible from the monument. Another unusual prehistoric site in close proximity to Vestra Fiold is a quarry for large flagstones on the southern slopes of the hill only a few hundred metres to the south-west.

RCAMS 2: 687


T1 VESTRA FIOLD

HOLY KIRK	ORK T2

Map Reference	Ordnance Survey
HY 24952163	HY 22 SW 16

Island	Parish	RCAMS Inventory
Mainland	Sandwick	735

Category	Landranger Sheet	Orkney Heritage Society
Gamma	6	-

Excavations	Plans	Visited
-	1980: Fraser and Morrison	10/6/80 30/7/80 31/7/80

CAIRN

Length	15.5
Width	14.0
Area	166
Orientation	-
Shape	Round

PASSAGE

Length	
Width	
Area	
Orientation	

CHAMBER

Length	
Width	
Area	
Compartments	
Cells	
Orientation	
Shape	

GEOLOGY

Site	Sandstone
Water	0
Sandstone	93
Peat	1
Boulder Clay	5
Miscellaneous	1

SOIL

Site	Gleyic com.
Water	0
Podzols	25
Podzolic Com.	0
Gleys	12
Gleyic Com.	57
Peat	0
Miscellaneous	6

LAND USE CAPABILITY

Site	Class 5
Water	0
Class 3	29
Class 4	8
Class 5	63
Class 6	0
Class 7	0
Miscellaneous	0

Visibility

D 057-227
R 227-057

Altitude

Site	92
High	128
Low	24

Topography: Hillslope

Vegetation: Unimproved pasture

Coast

Nature	Cliff
Distance	2220

Intervisibility: -

Approaches: Easy

Drainage: Good

TEXT CUT OFF IN ORIGINAL

HOLY KIRK ORK T2

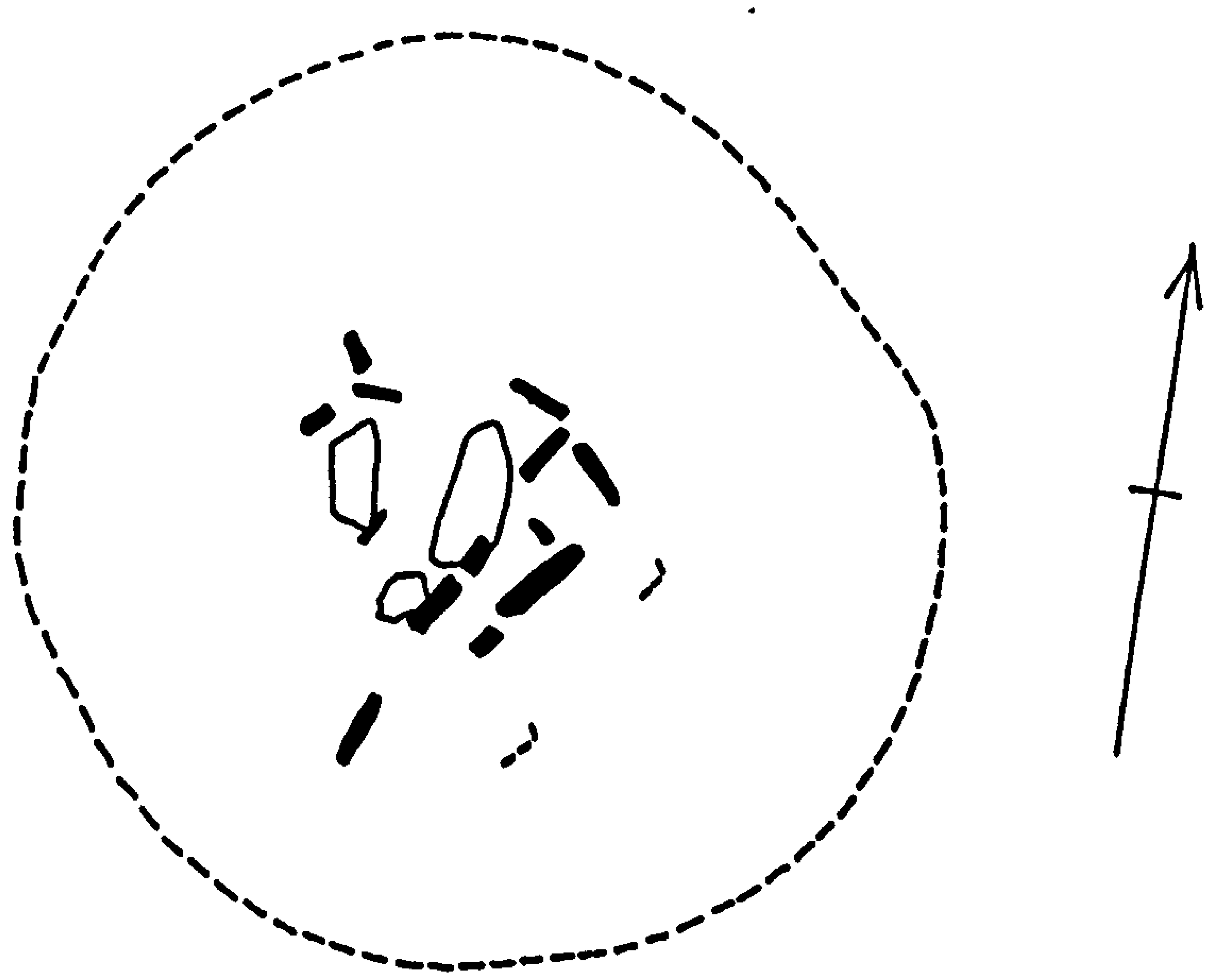
In the Sandwich district of the West Mainland the site can be reached across a field from a track leading to the deserted farmhouse north of Quoyloo.

The structure consists of several stones set within a low indeterminate mound. The mound is almost circular and has a maximum height of perhaps 0.3 m.

Fourteen stones are earthfast and upright. Of these, four, all in the north-west of the structure, are taller than 0.8 m. Most of the other earth-fast stones are longer than they are tall, the largest having maximum dimensions of 1.70 m by 0.38 m by 0.23 m high. Two very large stones lie among the others the larger being 2.50 m long by 0.95 m wide. In addition to the 16 visible stones, the edges of two more stones are apparent to the south-east of the main grouping.

Two patterns of stones suggestive of chambers may be discerned. The four tall stones appear to form the remains of one chamber orientated north-west/south-east with a possible entrance in the north-west. Seven other stones form a rectangular enclosure of low slabs, four forming one line, two more forming a line parallel to the first with one stone cutting off one end of the rectangle. This possible chamber is orientated approximately north-east/south-west and may have an entrance in the south-west. The two large stones which are not earth-fast may be interpreted as being former capstones, a suggestion corroborated by the NSA's account of one of these stones being supported by four of the others and by the name "Holy Kirk" from the resemblance of the latter five to an alter. This site is shown in Plate P.

NSA RCAMS 2:271



T2 HOLY KIRK

ONZIEBIST			ORK T3
Map Reference: HY 47422750		Ordnance Survey: HY 42 NE 4	
Island: Egilsay	Parish: Rousay	RCAMS Inventory: -	
Category: Gamma	Landranger Sheet: 5,6	Orkney Heritage Society: -	
Excavations: -	Plans: -	Visited: -	

CAIRN		PASSAGE		CHAMBER	
Length	20.0	Length		Length	
Width	17.0	Width		Width	
Area		Area		Area	
Orientation		Orientation		Compartments	
Shape				Cells	
				Orientation	
				Shape	

GEOLOGY		SOIL		LAND USE CAPABILITY	
Site	Sandstone	Site	Podzols	Site	Class 6
Water	55	Water	55	Water	55
Sandstone	43	Podzols	22	Class 3	7
Peat	0	Podzolic Com.	4	Class 4	21
Boulder Clay	0	Gleys	12	Class 5	9
Miscellaneous	2	Gleyic Com.	0	Class 6	3
		Peat	0	Class 7	0
		Miscellaneous	2	Miscellaneous	0

Visibility	Altitude	Topography
I 335-350 D 350-335	Site 15 High 30 Low 0	Hilltop
		Vegetation: Unimproved pasture
	Coast: Nature Beach; Distance 130	Intervisibility: ORK 1, ORK 2, ORK 26, ORK 27, ORK T19
	Approaches: Easy	
	Drainage: Good	

ONZIEBIST ORK T3

Since this site is unvisited, the Ordnance Survey record card, the only reference since its discovery in 1972, is quoted in its entirety:

> ".....a chambered cairn measuring 20.0 m north-south by 17.0 m and 1.8 m maximum height. Towards the north end a straight stretch of drystone walling is exposed 2.6 m long running north-south. From it to the west leads a lintelled passage 0.3 m wide and 1.0 m long into a corbelled oval cell, visible through a hole in its roof and measuring 1.5 m north-south by 1.0 m transversely. The top of the mound has been extensively dug into and little that is intelligible survives of the remainder of the chamber, though the cell appears to be part of the Maes Howe type chamber."

FARACLETT HEAD SOUTHWEST	ORK T4

Map Reference	Ordnance Survey
HY 44003272	HY 43 SW 9

Island	Parish	RCAMS Inventory
Rousay	Rousay	564

Category	Landranger Sheet	Orkney Heritage Society
Gamma	5,6	-

Excavations	Plans	Visited
-	1980: Fraser	7/6/80

CAIRN

Length	12.6
Width	12.0
Area	114
Orientation	-
Shape	Round

PASSAGE

Length	
Width	
Area	
Orientation	

CHAMBER

Length	
Width	
Area	
Compartments	
Cells	
Orientation	
Shape	

GEOLOGY

Site Sandstone

Water	13
Sandstone	82
Peat	0
Boulder Clay	5
Miscellaneous	0

SOIL

Site Podzolic com.

Water	13
Podzols	2
Podzolic Com.	72
Gleys	11
Gleyic Com.	0
Peat	2
Miscellaneous	0

LAND USE CAPABILITY

Site Class 6

Water	13
Class 3	3
Class 4	21
Class 5	28
Class 6	35
Class 7	0
Miscellaneous	0

Visibility

D 139-193
I 193-309
R 309-139

Altitude

Site	75
High	106
Low	0

Topography: Terrace edge

Vegetation: Heathland

Coast

Nature	Cliff
Distance	550

Intervisibility: ORK 1

Approaches: Easy

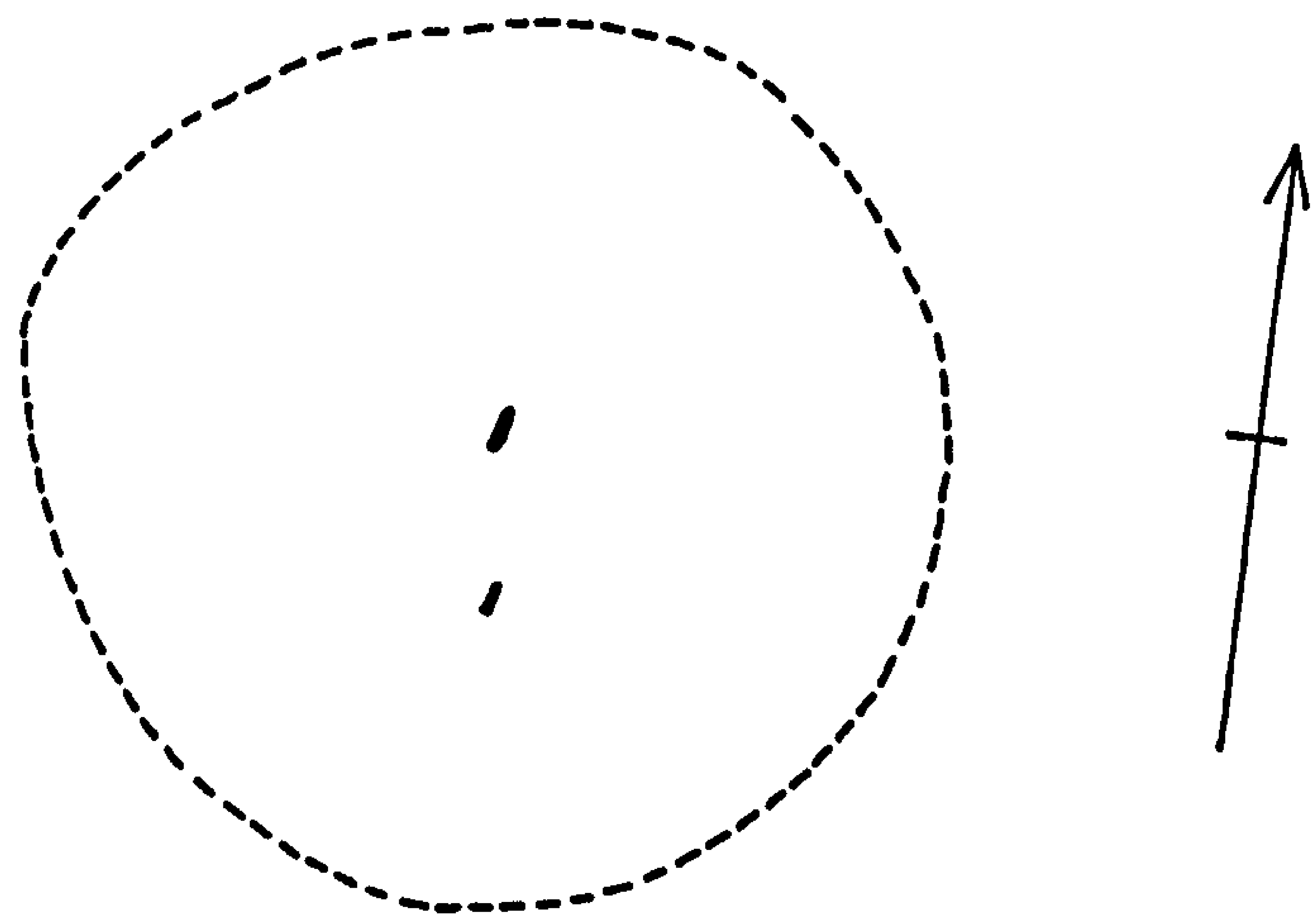
Drainage: Good

FARACLETT HEAD SOUTH-WEST ORK T4

On the southern slopes of the hill of Faraclett Head, in north-east Rousay, the site can be reached across fields and rough ground to the north of Bigland farm-house.

This is the west cairn of a pair of cairns about 12 m apart. It consists of a well-defined pile of stones and slabs, roughly circular with a maximum height of 1.0 m. The surface of the cairn is strewn with many irregular flat slabs of stone with several over 0.6 m in length and one 1.15 m long. Towards the centre of the cairn, and in a slight irregular hollow, are two cairn-fast upright stones. They are both orientated north-east/south-west but are not in line with each other. The distance between them is about 1.8 m. The RCAMS in 1935 noted "a margin of coursed stones" in the west of the cairn: this is not now visible.

RCAMS 2: 204.



T4 FARACLETT HEAD SOUTH-WEST

FITTY HILL	ORK T5

Map Reference	Ordnance Survey
HY 43324452	HY 44 SW 8

Island	Parish	RCAMS Inventory
Westray	Westray	-
Category	**Landranger Sheet**	**Orkney Heritage Society**
Gamma	5	-
Excavations	**Plans**	**Visited**
-	1970: Ordnance Survey 1980: Fraser	28/6/80 15/3/81

CAIRN		PASSAGE		CHAMBER	
Length	16.6	Length		Length	
Width	16.0	Width		Width	
Area	206	Area		Area	
Orientation	-	Orientation		Compartments	
Shape	Round			Cells	
				Orientation	
				Shape	

GEOLOGY		SOIL		LAND USE CAPABILITY	
Site	Sandstone	Site	Podzolic com.	Site	Class 6
Water	0	Water	0	Water	0
Sandstone	90	Podzols	11	Class 3	11
Peat	0	Podzolic Com.	53	Class 4	44
Boulder Clay	0	Gleys	36	Class 5	1
Miscellaneous	10	Gleyic Com.	0	Class 6	44
		Peat	0	Class 7	0
		Miscellaneous	0	Miscellaneous	0

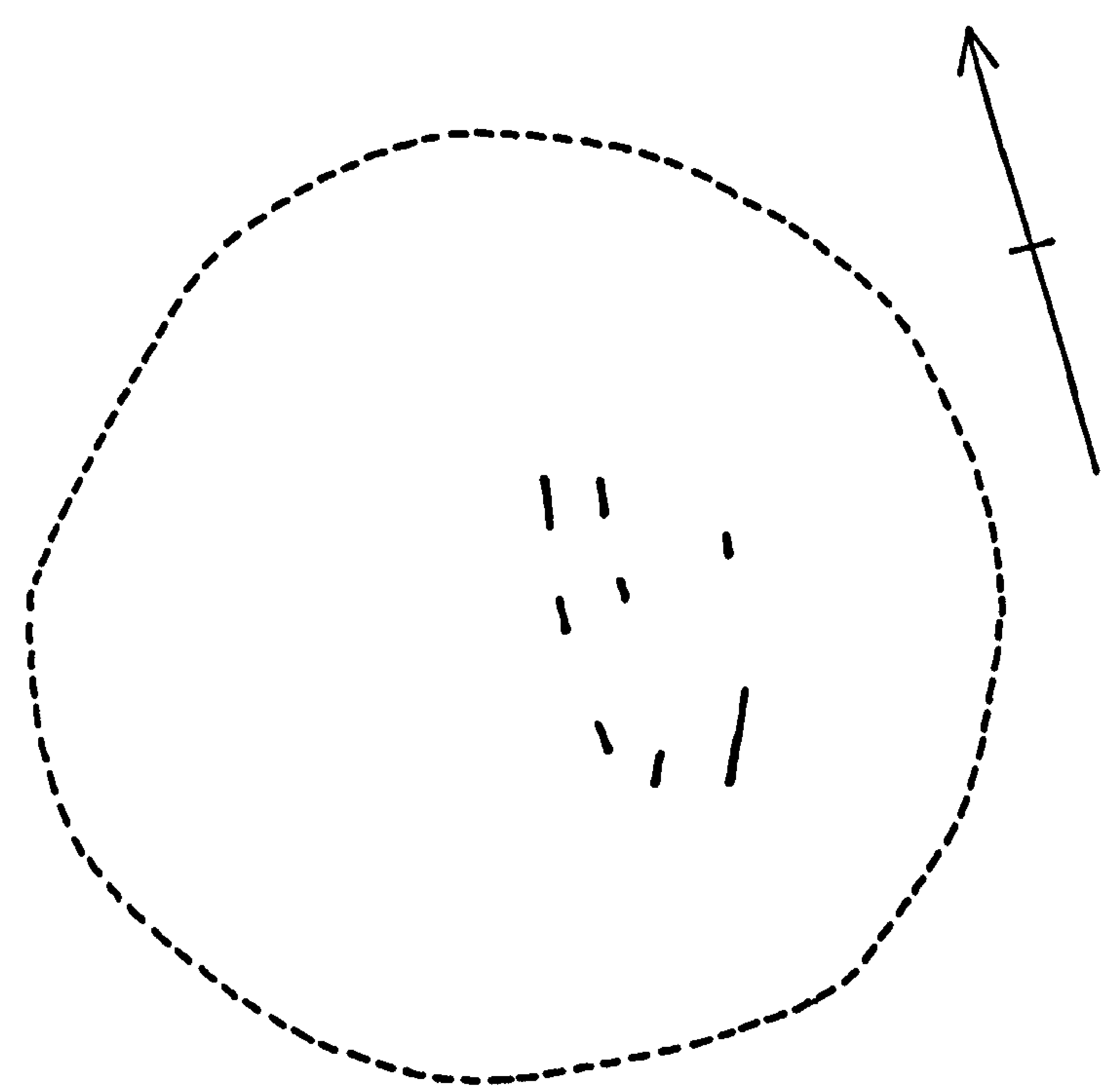
Visibility	Altitude	Topography
I 018-093 D 093-268 R 268-018	Site 60 High 169 Low 15	Terrace edge
		Vegetation
		Unimproved pasture
	Coast	**Intervisibility**
	Nature: Low rock Distance: 1100	ORK 17 ORK 29 ORK 35 ORK 42
	Approaches: Easy	
	Drainage: Good	

FITTY HILL ORK T5

On the south-east slopes of Fitty Hill, the highest point of Westray, this monument can be reached across fields north of Powdykes farm-house.

The cairn is an amorphous and indeterminate mound of stones which may have been originally circular. At its maximum height, it is perhaps 0.9 m above the surrounding ground. Within the mound there are seven earth-fast upright stones. Five of these are to the east of the centre of the mound and arranged in two parallel lines. Two more are towards the eastern edge, one of them standing 0.9 m tall and showing signs (concrete on its top edge) of having been used in modern times. The Ordnance Survey note that this was part of a container for sheep fodder and suggest that the stone is not an original feature.

Around the site there are several quarry pits, now overgrown, which are certainly not modern.



T5 FITTY HILL

CASTLE BLOODY	ORK T6

Map Reference	HY 52121492
Ordnance Survey	HY 51 SW 2
Island	Shapinsay
Parish	Shapinsay
RCAMS Inventory	797
Category	Beta
Landranger Sheet	6
Orkney Heritage Society	-
Excavations	-
Plans	1972: Ordnance Survey 1980: Fraser 1981: Henshall and Davidson
Visited	21/6/80 24/5/81

CAIRN		PASSAGE		CHAMBER	
Length	15.8	Length		Length	
Width	14.7	Width		Width	
Area	179	Area		Area	
Orientation	-	Orientation		Compartments	
Shape	Round			Cells	
				Orientation	
				Shape	

GEOLOGY		SOIL		LAND USE CAPABILITY	
Site	Sandstone	Site	Podzols	Site	Class 6
Water	52	Water	52	Water	52
Sandstone	27	Podzols	29	Class 3	0
Peat	0	Podzolic Com.	0	Class 4	9
Boulder Clay	18	Gleys	19	Class 5	6
Miscellaneous	0	Gleyic Com.	0	Class 6	33
		Peat	0	Class 7	0
		Miscellaneous	1	Miscellaneous	0

Visibility	D 016-291 I 291-327 D 327-344 I 344-016
Altitude	Site 40 High 40 Low 0
Topography	Hilltop
Vegetation	Heathland
Coast	Nature Cliff Distance 320
Approaches	Easy
Drainage	Good
Intervisibility	ORK 18 ORK 19 ORK 26

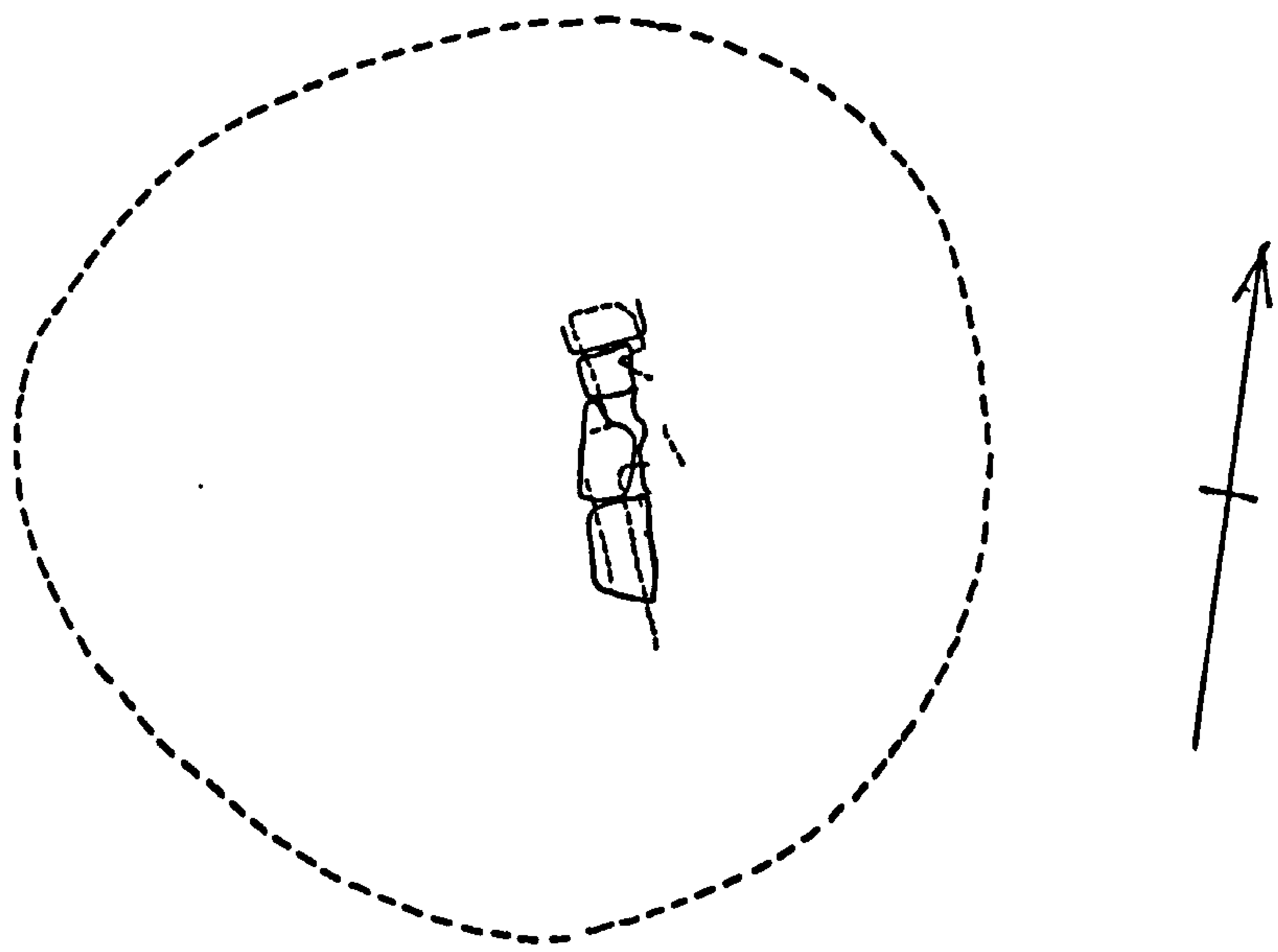
CASTLE BLOODY ORK T6

This enigmatic site is located on the highest point of south-east Shapinsay and can be approached across rough ground from the Mor Stein or across fields from Purtaquoy.

The mound is circular and stands to a height of about 1.4 m. It is heather-covered but there are sufficient exposures to confirm that it is largely composed of stone. To the east of the centre of the mound modern exploration has revealed a stone-constructed compartmnet or series of compartments. At least five large capstones rest on walls whose depth is unknown due to debris infill. The walling is dry-stone of small slabs, few exceeding 0.5 m in length and has at least five courses in places. The chamber appears to consist of a passage about 0.6 m wide leading from the south into a central compartment with, perhaps, recesses or subsidiary compartments leading to east and west. In the north there is another compartment separated by a partition of partially destroyed walling which can still be entered with difficulty.

This is either a chambered cairn or a later souterrain: a parallel argument continues about a similar site in Caithness (Mercer, 1981: Mon 648). It is included here because of the mound, the orientation of the chamber, the design of the chamber, and the singular location of the monument.

RCAMS 2: 277-8



T6 CASTLE BLOODY

HACKSNESS	ORK T7

Map Reference	Ordnance Survey
HY 52121492	HY 51 SW 5

Island	Parish	RCAMS Inventory
Shapinsay	Shapinsay	797

Category	Landranger Sheet	Orkney Heritage Society
Beta	6	-

Excavations	Plans	Visited
-	1972: Ordnance Survey 1980: Fraser	21/6/80 24/5/81

CAIRN		PASSAGE		CHAMBER	
Length		Length		Length	4.9
Width		Width		Width	3.4
Area		Area		Area	9
Orientation		Orientation		Compartments	3
Shape				Cells	0
				Orientation	059-239
				Shape	Simple

GEOLOGY		SOIL		LAND USE CAPABILITY	
Site	Sandstone	Site	Podzols	Site	Class 4
Water	78	Water	78	Water	78
Sandstone	17	Podzols	4	Class 3	0
Peat	0	Podzolic Com.	0	Class 4	19
Boulder Clay	2	Gleys	17	Class 5	3
Miscellaneous	3	Gleyic Com.	0	Class 6	0
		Peat	0	Class 7	0
		Miscellaneous	1	Miscellaneous	0

Visibility	Altitude	Topography
R 049-136 D 136-314 I 314-049	Site 5 High 30 Low 0	Coastal plain
	Coast Nature: Low rock Distance: 10	**Vegetation** Improved pasture
	Approaches Easy	**Intervisibility** ORK 18 ORK 19
	Drainage Good	

HACKSNESS ORK T7

On the west shore of the promontory of Haco's Ness, in south-east Shapinsay, the site can be reached across fields from Sandgarth.

The monument has been much disturbed by the construction of an animal-fold which overlies it, and the cairn stones have been re-used in those walls. In places it is possible to trace the outer edge of a mound, but not enough remains to suggest the original cairn shape. At least seven upright stones are cairn-fast, with three being incorporated in the modern walling. Six of these stones are arranged to suggest an oval chamber divided into three compartments by pairs of opposed orthostats with a massive back-slab. The seventh stone may be part of a passage leading to the north-east. In the north of the mound is a short stretch of walling, perhaps part of an internal wall of the cairn.

RCAMS 2: 279

T7 HACKSNESS

CARRICK HOUSE	ORK T8

Map Reference		Ordnance Survey
HY 56363880		HY 53 NE 16
Island	**Parish**	**RCAMS Inventory**
Eday	Eday	242
Category	**Landranger Sheet**	**Orkney Heritage Society**
HY 53 NE 16	5	-
Excavations	**Plans**	**Visited**
-	1980: Fraser	25/6/80

CAIRN		PASSAGE		CHAMBER	
Length	8.6	Length		Length	
Width	7.9	Width		Width	
Area	52	Area		Area	
Orientation	-	Orientation		Compartments	
Shape	Round			Cells	
				Orientation	
				Shape	

GEOLOGY		SOIL		LAND USE CAPABILITY	
Site	Eday	Site	Gleys	Site	Class 5
Water	23	Water	23	Water	23
Sandstone	48	Podzols	42	Class 3	13
Peat	10	Podzolic Com.	0	Class 4	10
Boulder Clay	19	Gleys	21	Class 5	19
Miscellaneous	0	Gleyic Com.	0	Class 6	35
		Peat	14	Class 7	0
		Miscellaneous	0	Miscellaneous	0

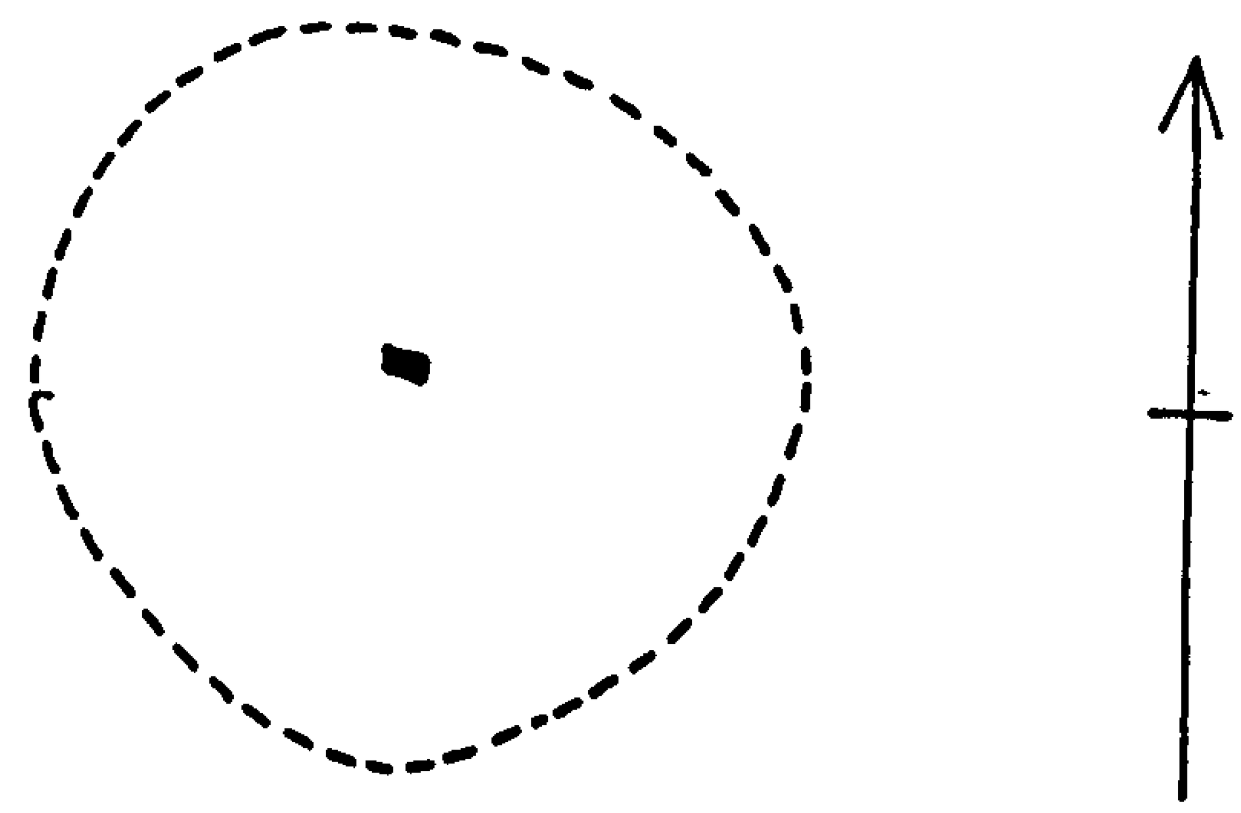
Visibility	Altitude	Topography
D 006-011	Site 50	Hillslope
I 011-041	High 76	**Vegetation**
D 041-068	Low 0	Unimproved pasture
I 068-096	**Coast**	**Intervisibility**
D 096-151	Nature: Low rock	ORK 8
I 151-167	Distance: 210	ORK 9
D 167-187	**Approaches**	ORK 10
I 187-197	Easy	ORK 53
R 197-006	**Drainage**: Good	

CARRICK HOUSE ORK T8

This site is located in an aesthetically satisfying position on the eastern slopes of Vinquoy Hill in north Eday, and overlooking Calf Sound and the Calf of Eday. It can be approached across grazing land from Carrick House.

It consists of a roughly circular patch of vegetated disturbed ground, with many large stones showing through the turf. The average height of the mound is about 0.3 m and it is hollowed towards the centre. Almost exactly in the centre there is a single massive upright stone which is earth-fast and about 0.6 m tall.

RCAMS 2: 64



T8 CARRICK HOUSE

HOLM OF PAPA WESTRAY CENTRE	ORK T9

Map Reference	Ordnance Survey
HY 50705186	HY 55 SW 3

Island	Parish	RCAMS Inventory
Holm of Papa Westray	Papa Westray	546

Category	Landranger Sheet	Orkney Heritage Society
Gamma	5	-

Excavations	Plans	Visited
-	1980: Fraser and Aitchison	5/7/80

CAIRN		PASSAGE		CHAMBER	
Length	14.1	Length		Length	
Width	11.7	Width		Width	
Area	119	Area		Area	
Orientation	-	Orientation		Compartments	
Shape	Round			Cells	
				Orientation	
				Shape	

GEOLOGY		SOIL		LAND USE CAPABILITY	
Site	Sandstone	Site	Gleys	Site	Class 5
Water	89	Water	89	Water	89
Sandstone	11	Podzols	0	Class 3	0
Peat	0	Podzolic Com.	0	Class 4	0
Boulder Clay	0	Gleys	11	Class 5	11
Miscellaneous	0	Gleyic Com.	0	Class 6	0
		Peat	0	Class 7	0
		Miscellaneous	0	Miscellaneous	0

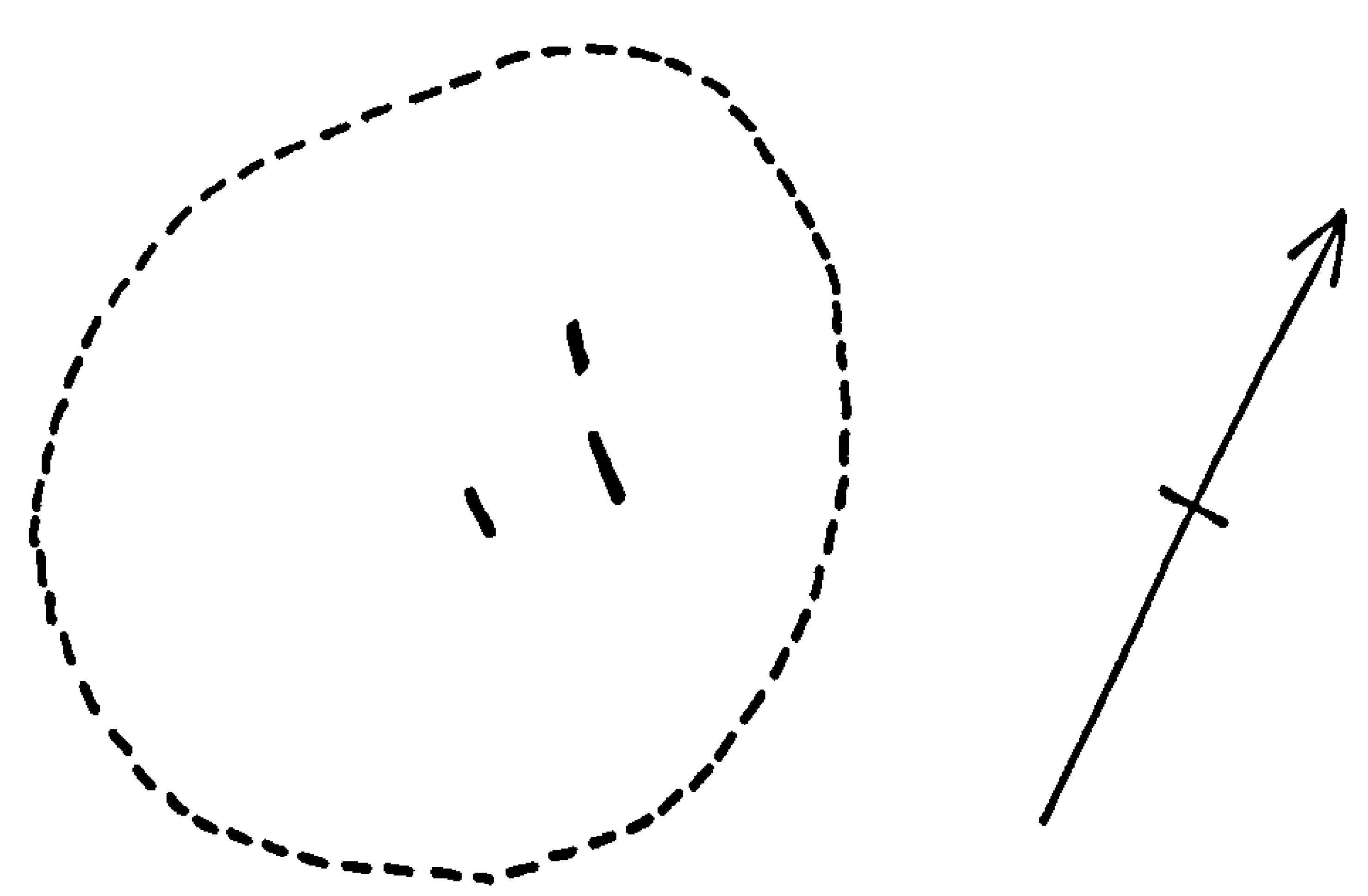
Visibility	Altitude	Topography
R 001-169 D 169-212 I 212-001	Site 10 High 15 Low 0	Small island
	Coast: Nature Low rock; Distance 80	Vegetation: Unimproved pasture
	Approaches: Easy	Intervisibility: ORK 21, ORK 22
	Drainage: Good	

HOLM OF PAPA WESTRAY CENTRE ORK T9

The Holm of Papa Westray, a small island to the east of Papa Westray, can be reached by small boat from that island or from Westray. The site is midway between the other two chambered cairns on the island, Holm of Papa Westray North (ORK 21) and South (ORK 22).

A low, roughly circular mound of stones, covered in vegetation, is nowhere more than 0.4 m high. Close to the centre, are three earth-fast slabs which may be the back-slab and a pair of opposed divisional stones of a compartmented chamber. In addition to these stones there are at least six more earth-fast stones but they form no appreciable pattern.

RCAMS 2: 190



T9 HOLM OF PAPA WESTRAY CENTRE

KELSBIR		ORK T10
Map Reference: HY 61762487		Ordnance Survey: HY 62 SW 8
Island: Stronsay	Parish: Stronsay	RCAMS Inventory: -
Category: Beta	Landranger Sheet: 5	Orkney Heritage Society: -
Excavations: -	Plans: 1970: Ordnance Survey; 1971: Henshall	Visited: 14/6/80

CAIRN		PASSAGE		CHAMBER	
Length	24.0	Length		Length	
Width	11.4	Width		Width	
Area	235	Area		Area	
Orientation	142-322	Orientation		Compartments	
Shape	Rectangle			Cells	
				Orientation	
				Shape	

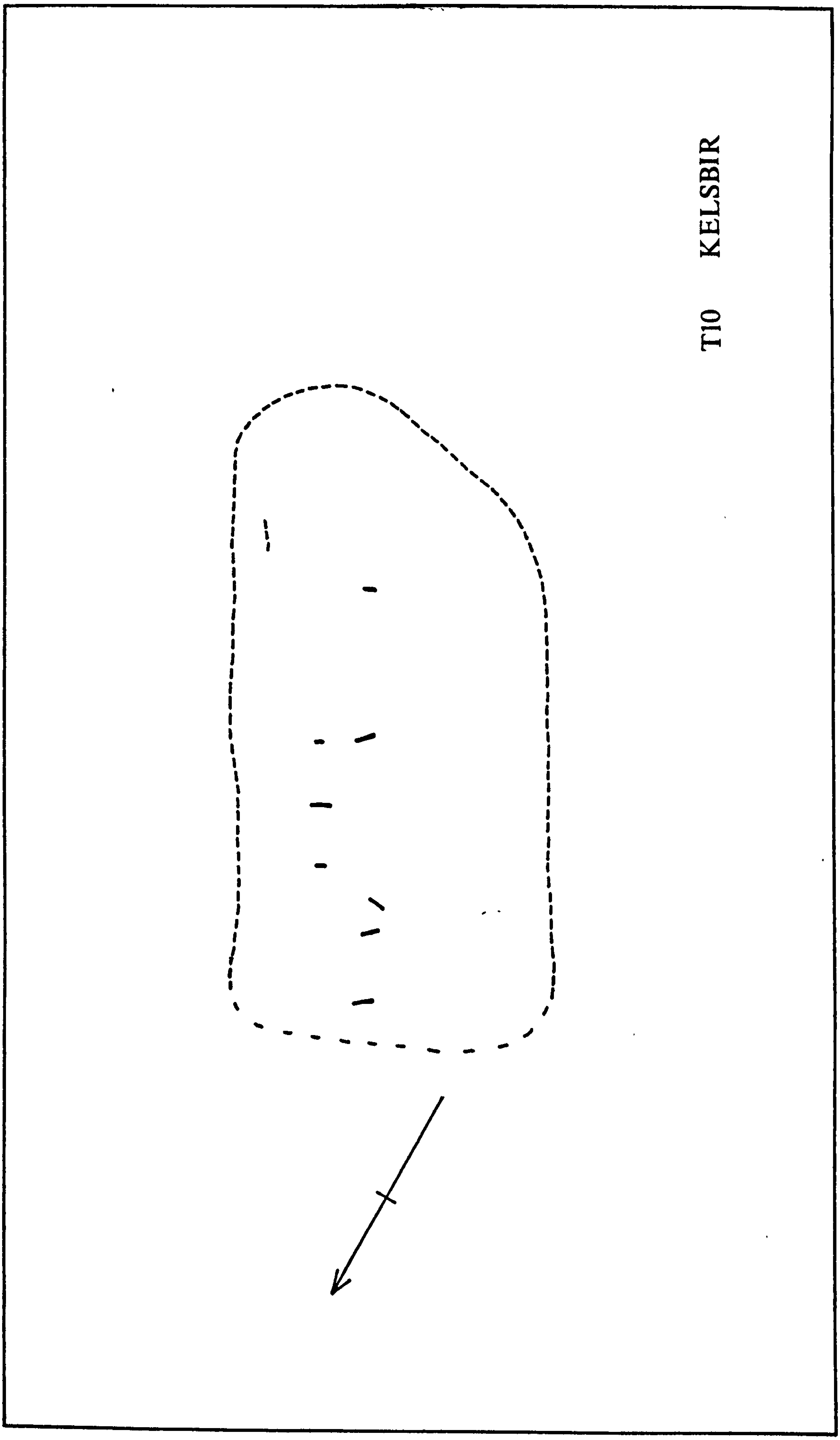
GEOLOGY		SOIL		LAND USE CAPABILITY	
Site	Boulder clay	Site	Gleys	Site	Class 3
Water	69	Water	69	Water	69
Sandstone	2	Podzols	0	Class 3	19
Peat	0	Podzolic Com.	0	Class 4	11
Boulder Clay	23	Gleys	29	Class 5	1
Miscellaneous	6	Gleyic Com.	0	Class 6	0
		Peat	0	Class 7	0
		Miscellaneous	2	Miscellaneous	0

Visibility	Altitude	Topography
I 004-077 R 077-138 I 138-221 D 221-004	Site 5 High 18 Low 0	Coastal plain
	Coast: Nature Low rock; Distance 0	Vegetation: Improved pasture
	Approaches: Easy	Intervisibility: ORK 20, ORK 47
	Drainage: Good	

KELSBIR ORK T10

On the north-west shore of the Rothiesholm peninsula in south-west Stronsay, the site can be reached by a track from the farm of Rothiesholm, known as the Bu.

The cairn is a turf-covered stony mound, 1.8 m in maximum height and orientated north-west/south-east. The north-west extremity of the rectangular mound has been truncated by the sea and cairn material shows in exposures on the shore. Down the long axis of the cairn, in a slight hollow suggesting the collapse of a chamber, are the tops of at least nine upright stones, certainly cairn-fast, and, if earth-fast then at least 1.5 m tall. They are arranged in two lines, each stone perpendicular to the long axis of the mound, in a pattern characteristic of the divisional orthostats of a many-compartmented chamber. The number of compartments is certainly more than six but the irregular spacing of the visible orthostats does not allow more certainty than this.


T10 KELSBIR

WART OF KIRBISTER	ORK T11

Map Reference	Ordnance Survey
HY 68282385	HY 62 SE 8

Island	Parish	RCAMS Inventory
Stronsay	Stronsay	965

Category	Landranger Sheet	Orkney Heritage Society
Gamma	5	-

Excavations	Plans	Visited
-	-	14/6/80

CAIRN		PASSAGE		CHAMBER	
Length		Length		Length	
Width		Width		Width	
Area		Area		Area	
Orientation		Orientation		Compartments	
Shape				Cells	
				Orientation	
				Shape	

GEOLOGY		SOIL		LAND USE CAPABILITY	
Site	Sandstone	Site	Podzols	Site	Class 3
Water	25	Water	25	Water	25
Sandstone	13	Podzols	5	Class 3	36
Peat	0	Podzolic Com.	0	Class 4	32
Boulder Clay	62	Gleys	70	Class 5	7
Miscellaneous	0	Gleyic Com.	0	Class 6	0
		Peat	0	Class 7	0
		Miscellaneous	0	Miscellaneous	0

Visibility
D 040-136
I 136-240
R 240-329
I 329-040

Altitude
Site 36
High 42
Low 0

Coast
Nature Low rock
Distance 260

Approaches Easy

Drainage Good

Topography Hillslope

Vegetation Arable

Intervisibility -

WART OF KIRBISTER ORK T11

On the east-facing slopes of the high ground in southern Stronsay, this site is now only visible as a large mound of indeterminate shape in a cultivated field to the east of Kirbister farm-house.

The Royal Commission report the following discovery: "....about the year 1925, the wheel of a reaping-machine struck against a block of stone, the removal of which revealed a large carefully built chamber. One of the workers prodded with a crowbar to ascertain its depth, when the tool slipped from his grasp and fell inside, unfortunately smashing a clay vessel on the floor. This man, who entered the chamber, has described it as being of rectangular form and about 6 ft (1.8 m) high with its major axis approximately north and south. Passages open off it to east and west, but these he did not explore. The structure was subsequently covered over".

Part of the clay vessel was deposited in Kirkwall Museum. A perforated stone hammer has been found in the same field.

RCAMS 2: 331-32

LAMB NESS		ORK T12
Map Reference: HY 68902125		Ordnance Survey: HY 62 SE 16
Island: Stronsay	Parish: Stronsay	RCAMS Inventory: 984
Category: Beta	Landranger Sheet: 5	Orkney Heritage Society: OR 159
Excavations: -	Plans: 1980: Fraser	Visited: 14/6/80

CAIRN		PASSAGE		CHAMBER	
Length	12.9	Length		Length	
Width	11.5	Width		Width	
Area	115	Area		Area	
Orientation	-	Orientation		Compartments	
Shape	Round			Cells	
				Orientation	
				Shape	

GEOLOGY		SOIL		LAND USE CAPABILITY	
Site	Sandstone	Site	Gleys	Site	Class 5
Water	79	Water	79	Water	79
Sandstone	3	Podzols	0	Class 3	7
Peat	0	Podzolic Com.	0	Class 4	2
Boulder Clay	18	Gleys	21	Class 5	12
Miscellaneous	0	Gleyic Com.	0	Class 6	0
		Peat	0	Class 7	0
		Miscellaneous	0	Miscellaneous	0

Visibility	Altitude	Topography
R 026-165 D 165-284 I 284-026	Site 5 High 23 Low 0	Coastal plain
		Vegetation: Unimproved pasture
	Coast: Nature Low rock; Distance 20	Intervisibility: -
	Approaches: Easy	
	Drainage: Good	

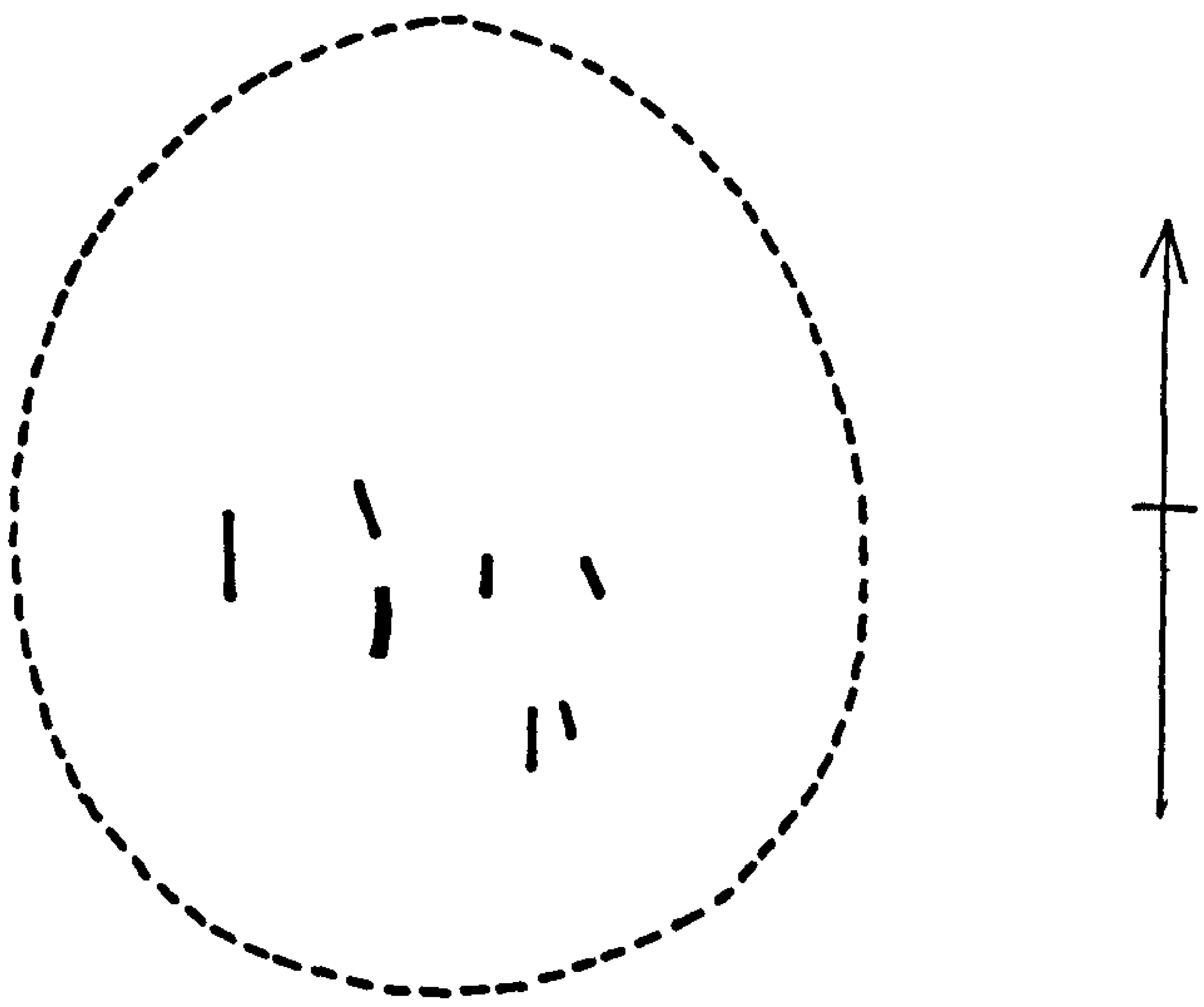
LAMB NESS ORK T12

Located on the east side of the promontory of Lamb Ness in south-east Stronsay, this site may be approached by track around the Bay of Houseby.

A slight circular prominence covered in vegetation is all that remains of the cairn. It stands less than 0.3 m high. Within the circle there are seven cairn-fast slabs, none of which are taller than 0.2 m. Five of these are suggestive of a chamber divided into two or three compartments by pairs of opposed orthostats with a single back-slab. The other two do not conform to this suggestion.

This is the smaller, and east-most, of two similar denuded cairns lying just 13 m apart. Two upright stones are visible in the second cairn. The well-preserved broch of Lamb Head is just 200 m to the north.

RCAMS 2:334



T12 LAMB NESS

CANTICK	ORK T13

Map Reference		Ordnance Survey
ND 34038904		ND 38 NW 5
Island	**Parish**	**RCAMS Inventory**
Hoy (South Walls)	Walls and Flotta	1012
Category	**Landranger Sheet**	**Orkney Heritage Society**
Gamma	7	-
Excavations	**Plans**	**Visited**
-	1980: Fraser and Fraser	13/8/80

CAIRN		PASSAGE		CHAMBER	
Length	13.0	Length		Length	
Width	12.6	Width		Width	
Area	129	Area		Area	
Orientation	-	Orientation		Compartments	
Shape	Round			Cells	
				Orientation	
				Shape	

GEOLOGY		SOIL		LAND USE CAPABILITY	
Site	Sandstone	Site	Gleys	Site	Class 4
Water	65	Water	65	Water	65
Sandstone	25	Podzols	10	Class 3	0
Peat	0	Podzolic Com.	0	Class 4	33
Boulder Clay	7	Gleys	25	Class 5	2
Miscellaneous	3	Gleyic Com.	0	Class 6	0
		Peat	0	Class 7	0
		Miscellaneous	0	Miscellaneous	0

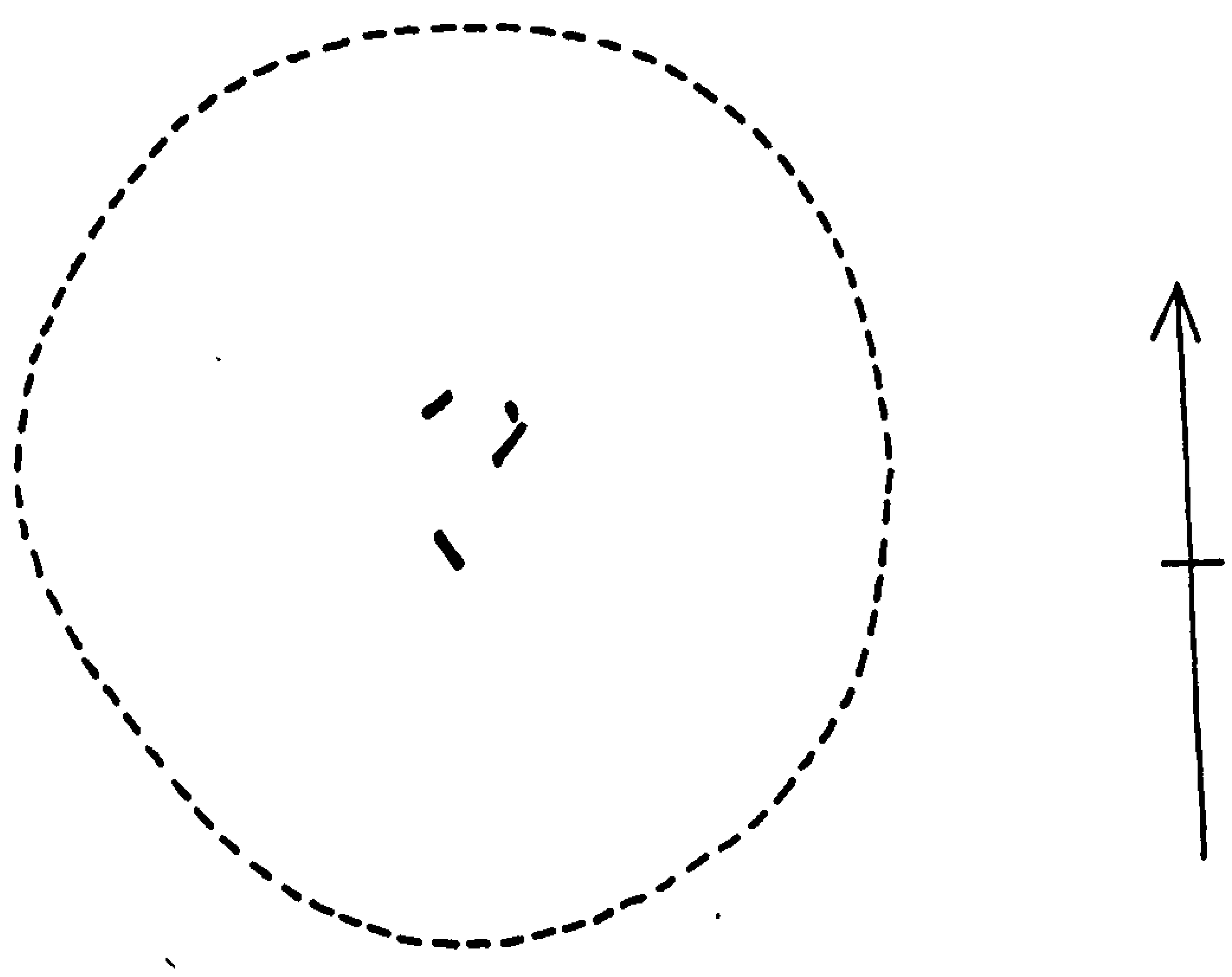
Visibility	Altitude	Topography
R 053-107 D 107-274 I 274-053	Site 11 High 13 Low 0	Hillslope
	Coast Nature Cliff Distance 30	**Vegetation** Improved pasture
	Approaches Easy	**Intervisibility** -
	Drainage Good	

CANTICK ORK T13

On the south side of the peninsula of Cantick Head in the south-east of South Walls, the site can be approached across a field to the south of the farm-house of Cantick.

The monument now consists of a circular grassy mound with a maximum height of 1.2 m. Near the centre of the mound there is a hollow in which can be seen the tops of at least four earth-fast slabs. The pattern formed by them suggests the polygonal or rectangular enclosure of a chamber or a large cist.

RCAMS 2: 340



T13 CANTICK

SWONA	ORK T14

Map Reference	Ordnance Survey
ND 38438370	ND 38 SE 2

Island	Parish	RCAMS Inventory
Swona	South Ronaldsay	-

Category	Landranger Sheet	Orkney Heritage Society
Beta	7	-

Excavations	Plans	Visited
-	1981: Henshall and Davidson	20/5/81

CAIRN		PASSAGE		CHAMBER	
Length	17.2	Length		Length	7.3
Width	10.5	Width		Width	3.4
Area	123	Area		Area	19
Orientation	090-270	Orientation		Compartments	3
Shape	Round			Cells	0
				Orientation	085-265
				Shape	

GEOLOGY		SOIL		LAND USE CAPABILITY	
Site	Sandstone	Site	Gleys	Site	Class 6
Water	80	Water	80	Water	80
Sandstone	16	Podzols	0	Class 3	0
Peat	0	Podzolic Com.	0	Class 4	9
Boulder Clay	4	Gleys	20	Class 5	0
Miscellaneous	0	Gleyic Com.	0	Class 6	11
		Peat	0	Class 7	0
		Miscellaneous	0	Miscellaneous	0

Visibility	Altitude	Topography
I 019-074 D 074-279 I 279-309 D 309-019	Site 5 High 30 Low 0	Coastal plain
	Coast Nature: Low rock Distance: 0	**Vegetation** Unimproved pasture
	Approaches Easy	**Intervisibility** -
	Drainage Good	

SWONA ORK T14

This recently noted monument is located on the southern shore of Swona, a deserted island which may be reached by small boat from South Ronaldsay.

The cairn has been truncated on the south and west by the sea but it may have been rectangular or oval in shape. Very little remains of the original cairn material. Within the cairn there are a number of tall upright stones, some with gabled tops. The tallest of these is 1.45 m high and there are six over 0.90 m. Six stones are arranged in three pairs of opposed orthostats and these together with more stone to the west are strongly suggestive of an oval chamber divided into three or more compartments. The chamber is orientated east/west but it is impossible to say whether the entrance was to east or west. There are several other slabs which appear to be earth-fast and a number of large slabs lying on the turf.

T14 SWONA

NEV HILL	ORK T15

Map Reference: ND 42848921		Ordnance Survey: ND 48 NW 10
Island: South Ronaldsay	Parish: South Ronaldsay	RCAMS Inventory: 827
Category: Alpha	Landranger Sheet: 7	Orkney Heritage Society: -
Excavations: 1970: Watson	Plans: 1973: Ordnance Survey 1980: Fraser and Fraser	Visited: 11/6/80 5/8/80 16/8/80 22/5/81

CAIRN		PASSAGE		CHAMBER	
Length	13.9	Length		Length	6.0
Width	13.7	Width		Width	4.2
Area	142	Area		Area	21
Orientation	-	Orientation		Compartments	3
Shape	Round			Cells	0
				Orientation	174-354
				Shape	Simple

GEOLOGY		SOIL		LAND USE CAPABILITY	
Site	Rousay	Site	Podzols	Site	Class 4
Water	43	Water	43	Water	43
Sandstone	36	Podzols	40	Class 3	14
Peat	0	Podzolic Com.	0	Class 4	36
Boulder Clay	20	Gleys	17	Class 5	7
Miscellaneous	1	Gleyic Com.	0	Class 6	0
		Peat	0	Class 7	0
		Miscellaneous	0	Miscellaneous	0

Visibility: I 075-199 D 199-320 I 320-351 R 351-075	Altitude: Site 30 High 42 Low 0	Topography: Hillslope
	Coast: Nature Cliff Distance 70	Vegetation: Improved pasture
	Approaches: Easy	Intervisibility: -
	Drainage: Good	

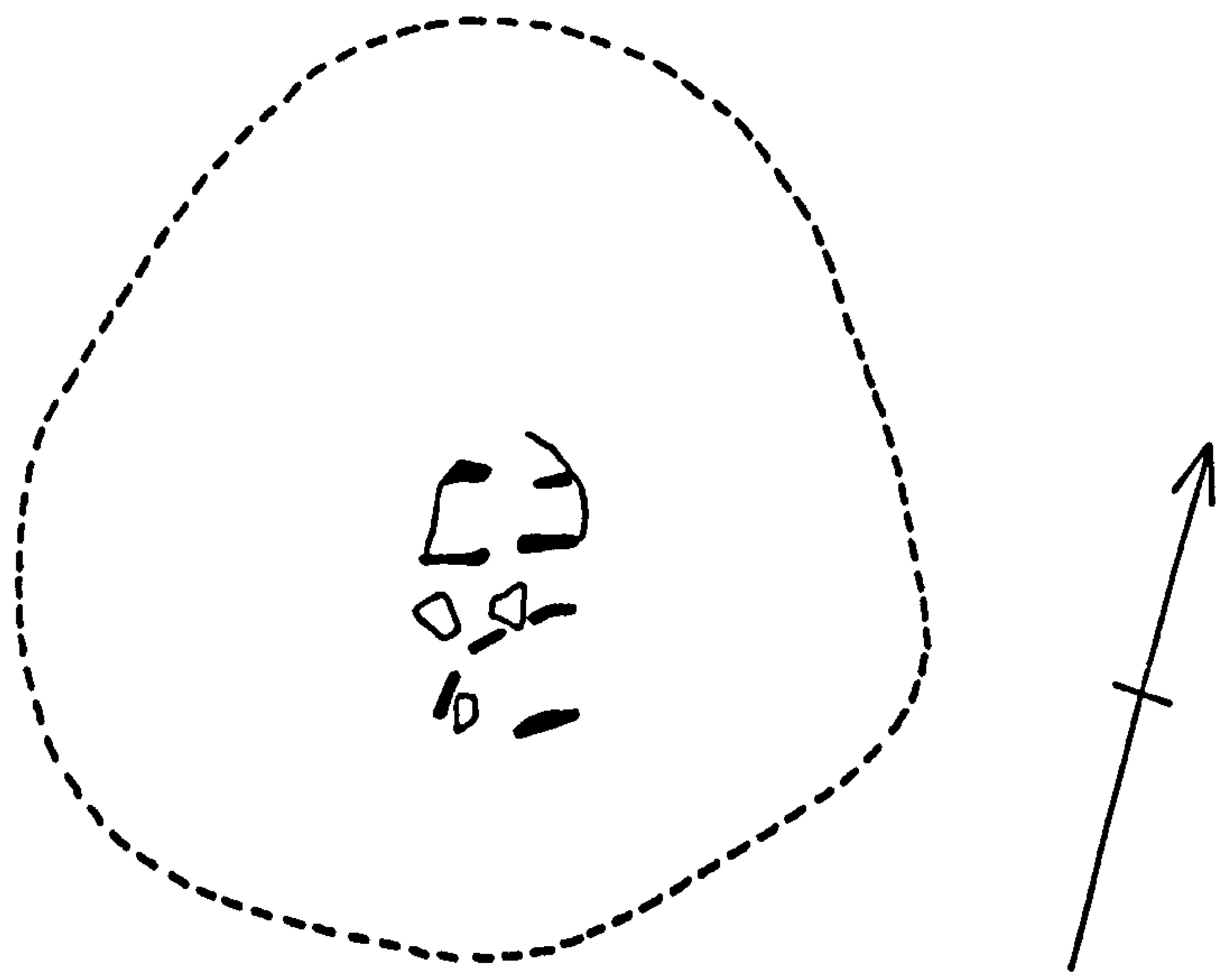
NEV HILL ORK T15

On the promontory of Nev Hill west of Sand Wick on the west coast of South Ronaldsay, this chambered cairn is located in a field 250 m to the south-east of the farm-house of Somerset.

The monument was subject to an excavation in 1970 and many details of the interior can still be seen. Within a circular mound there is an oval chamber divided into three compartments by pairs of opposed orthostats, the tallest of which stands 1.10 m above the chamber floor. The floor level of the rearmost compartment is 0.15 m higher than that of the central compartment although this may be a result of incomplete excavation. Dry-stone walling linking the orthostats is visible in the west of the central compartment, where it is five courses and 0.40 m high, and in an arc encompassing the east of the central compartment and much of the rearmost compartment. This latter walling survives ten courses and 0.73 m high. The southern half of the chamber and the entrance passage have not been completely excavated but the most likely suggestion is that the passage left the chamber heading in a direction east of south between two opposed orthostats. There are several large slabs lying in the vicinity of the chamber which may be part of the original roof.

The Ordnance Survey report that no finds were made during the excavation.

RCAMS 2: 287-8



T15 NEV HILL

HESTA HEAD	ORK T16

Map Reference ND 46298788		**Ordnance Survey** ND 48 NE 12
Island South Ronaldsay	**Parish** South Ronaldsay	**RCAMS Inventory** -
Category Beta	**Landranger Sheet** 7	**Orkney Heritage Society** -
Excavations -	**Plans** 1973: Ordnance Survey 1980: Fraser 1981: Henshall and Davidson	**Visited** 16/8/80 20/5/81

CAIRN

Length	20.3
Width	20.0
Area	333
Orientation	-
Shape	Round

PASSAGE

Length	
Width	
Area	
Orientation	

CHAMBER

Length	5.2
Width	3.1
Area	14
Compartments	3
Cells	0
Orientation	065-255
Shape	Simple

GEOLOGY

Site Sandstone

Water	51
Sandstone	34
Peat	0
Boulder Clay	15
Miscellaneous	0

SOIL

Site Gleys

Water	51
Podzols	3
Podzolic Com.	0
Gleys	46
Gleyic Com.	0
Peat	0
Miscellaneous	0

LAND USE CAPABILITY

Site Class 4

Water	51
Class 3	11
Class 4	24
Class 5	14
Class 6	0
Class 7	0
Miscellaneous	0

Visibility

D 109-171
I 171-208
D 208-248
I 248-339
R 339-109

Altitude

Site	60
High	113
Low	0

Coast

Nature	Cliff
Distance	120

Approaches Easy

Drainage Good

Topography Coastal plain

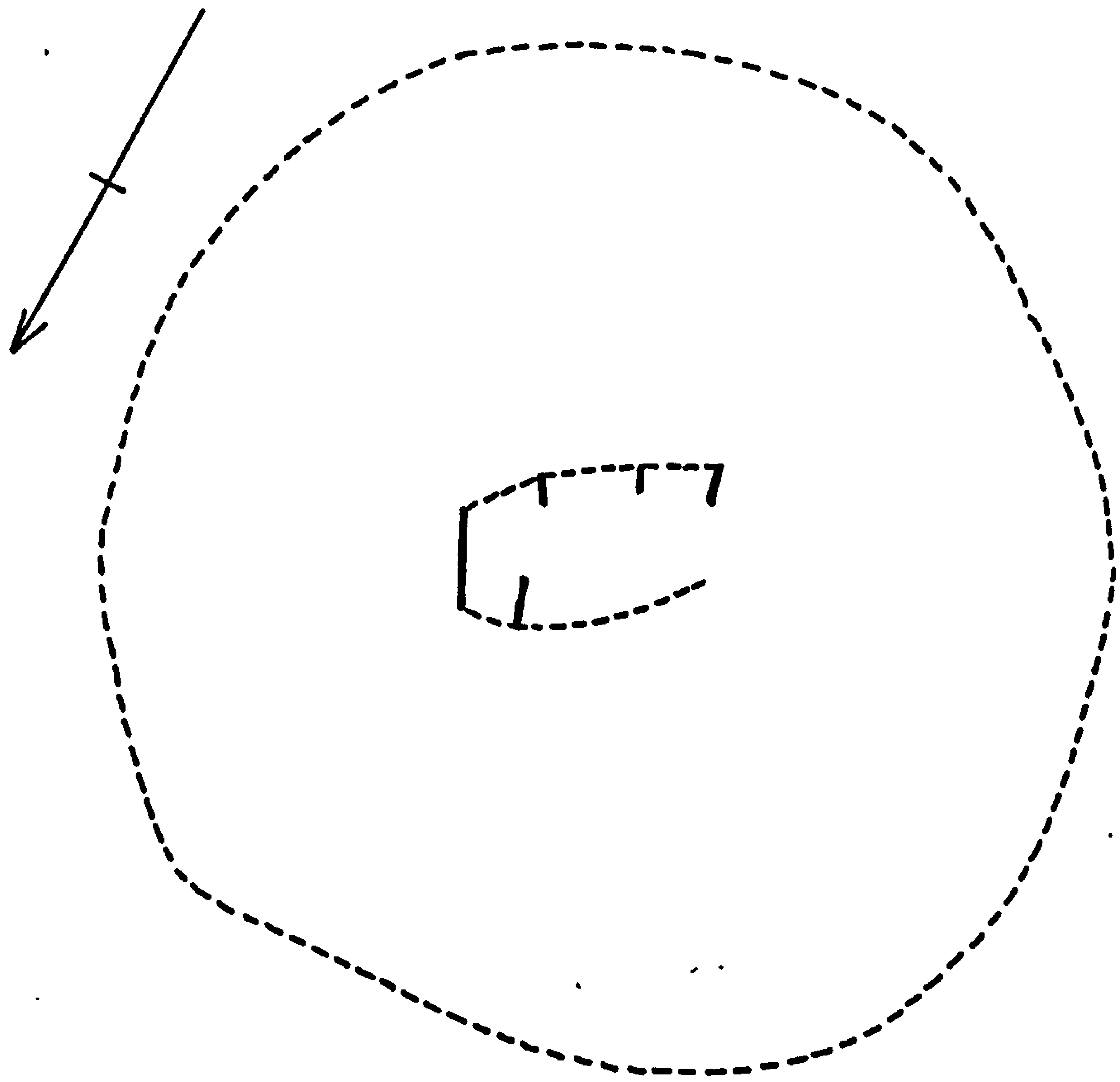
Vegetation Improved pasture

Intervisibility -

HESTA HEAD ORK T16

Near the east coast of central South Ronaldsay this site can be approached across fields from the bay of Wind Wick one kilometre to the south-east.

The mound is circular and now about 1.0 m high. The field has been ploughed recently which may have reduced the height. In the centre of the mound, the Ordnance Survey noted six upright stones in 1973 - only four of these are now visible. They are arranged to suggest an oval chamber divided into three compartments by pairs of opposed orthostats with a single massive back-slab. None of the upright stones are taller than 0.3 m. The position of the back-slab suggests an entrance passage leading to the south-west.



T16 HESTA HEAD

THE WART, HOXA HILL	ORK T17

Map Reference	Ordnance Survey
ND 43339357	ND 49 SW 4

Island	Parish	RCAMS Inventory
South Ronaldsay	South Ronaldsay	824
Category	**Landranger Sheet**	**Orkney Heritage Society**
Gamma	7	-
Excavations	**Plans**	**Visited**
1869 or 1871: Gray and Petrie	1973: Ordnance Survey 1980: Fraser	2/8/80

CAIRN

Length	9.8
Width	9.5
Area	76
Orientation	-
Shape	Round

PASSAGE

Length	
Width	
Area	
Orientation	

CHAMBER

Length	
Width	
Area	
Compartments	
Cells	
Orientation	
Shape	

GEOLOGY

Site Sandstone

Water	15
Sandstone	12
Peat	0
Boulder Clay	72
Miscellaneous	1

SOIL

Site Podzols

Water	15
Podzols	68
Podzolic Com.	0
Gleys	14
Gleyic Com.	0
Peat	0
Miscellaneous	3

LAND USE CAPABILITY

Site Class 4

Water	15
Class 3	8
Class 4	75
Class 5	0
Class 6	2
Class 7	0
Miscellaneous	0

Visibility

I 051-241
D 241-051

Altitude

Site	61
High	61
Low	0

Topography Hilltop

Vegetation Improved pasture

Coast

Nature Low rock
Distance 430

Intervisibility -

Approaches Easy

Drainage Good

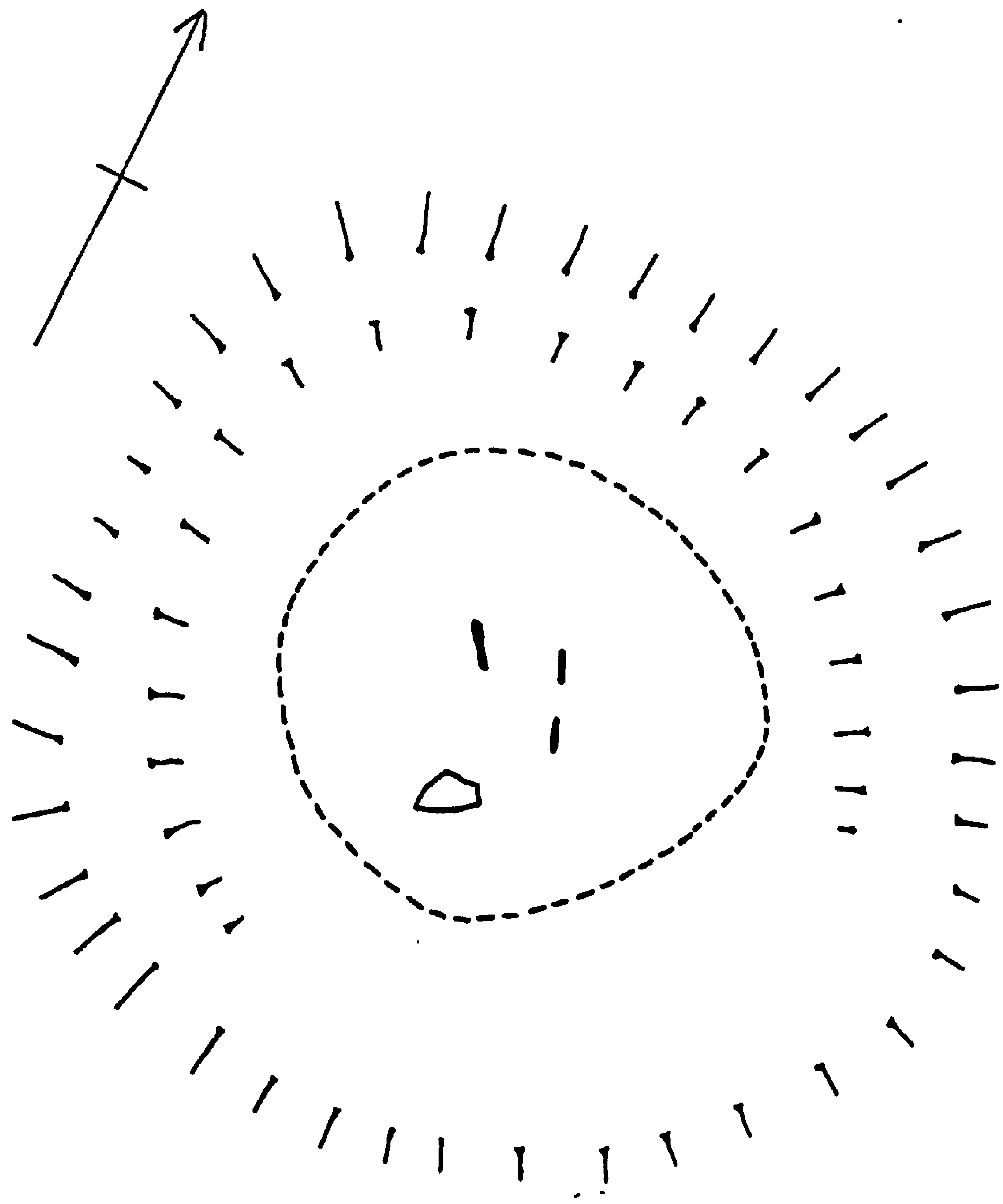
THE WART, HOXA HILL ORK T17

The site is located on the summit of Hoxa Hill, in the north-west of South Ronaldsay and can be approached up a farm track and across fields from the farm of Ronaldsvoe.

The cairn has been composed of large stones, with many of them more rounded than is common in Orcadian cairns, suggesting a glacial origin. It has been much disturbed by Petrie's excavation. Around the centre there is a feature with two possible interpretations. The first is that a central cairn about 10 m in diameter is surrounded by a low platform. The second, and more likely interpretation judging by the surviving form of the monument, is that a central cairn was surrounded by a ditch and outer upcast bank, the whole monument having the design of a bowl barrow.

Only four stones of the central chamber remain in situ, suggesting a chamber divided into two or more compartments by pairs of opposed orthostats. This is supported by Petrie's notes recording a roughly built chamber divided into several compartments by upright stone slabs. He also records the finding of human bones mixed with charcoal.

RCAMS 2: 287



T17 THE WART, HOXA HILL

RETHIE TAING	ORK T18

Map Reference	Ordnance Survey
HY 65114424	-

Island	Parish	RCAMS Inventory
Sanday	Cross and Burness	-
Category	**Landranger Sheet**	**Orkney Heritage Society**
Gamma	5	OR 140
Excavations	**Plans**	**Visited**
-	1980: Fraser and Fraser	8/8/81 4/8/81

CAIRN		PASSAGE		CHAMBER	
Length	40.0	Length		Length	
Width	17.5	Width		Width	
Area	517	Area		Area	
Orientation	020-200	Orientation		Compartments	
Shape	Oval			Cells	
				Orientation	
				Shape	

GEOLOGY		SOIL		LAND USE CAPABILITY	
Site	Sandstone	Site	Podzols	Site	Class 4
Water	69	Water	69	Water	69
Sandstone	30	Podzols	31	Class 3	0
Peat	0	Podzolic Com.	0	Class 4	31
Boulder Clay	0	Gleys	0	Class 5	0
Miscellaneous	1	Gleyic Com.	0	Class 6	0
		Peat	0	Class 7	0
		Miscellaneous	0	Miscellaneous	0

Visibility

I 009-041
D 041-068
I 068-199
D 199-009

Altitude

Site	5
High	14
Low	0

Coast

Nature	Low rock
Distance	0

Approaches: Easy

Drainage: Good

Topography: Coastal plain

Vegetation: Improved pasture

Intervisibility

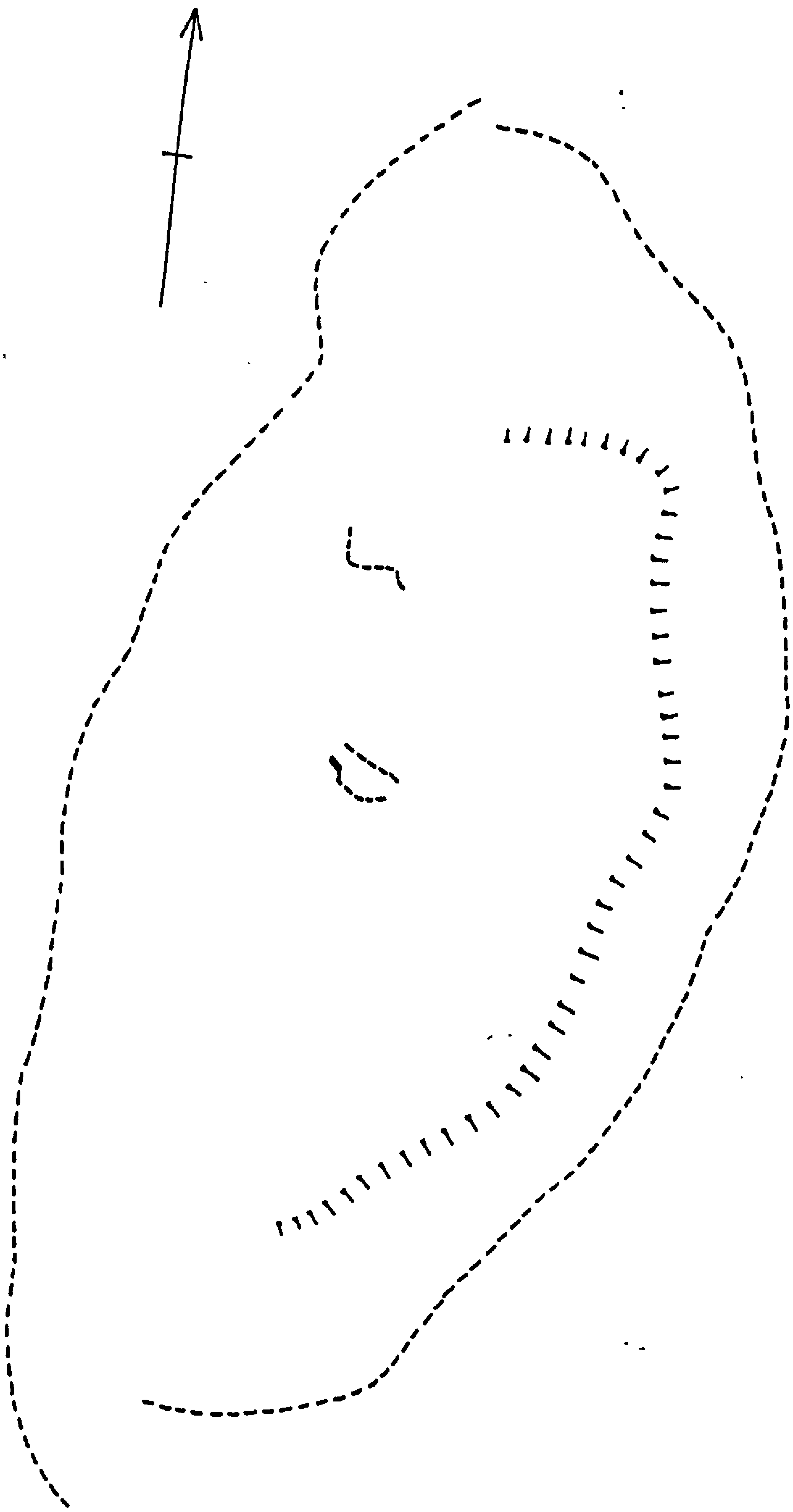
ORK 21
ORK 22
ORK 53
ORK 55

RETHIE TAING ORK T18

At the point of the headland called Rethie Taing, on the west coast of the Burness peninsula in north Sanday, this site can best be approached past the farm-house of Airon and south along the coast outside the high shore-dyke.

The mound, certainly truncated by the sea, was probably oval in shape with the long axis running parallel to the shore. It is much overgrown and the cairn material may be mixed with the large stones from a more recent storm beach. Two sections of walling survive: one of these may be part of an entrance passage entering from the middle of the long side of the oval closer to the sea. There are no signs of earth-fast orthostats: this is either a domestic structure or a cairn with a chamber constructed of dry-stone walling.

Lamb (1980): 11



T18 RETHIE TAING

FARACLETT HEAD NORTH-EAST	ORK T19

Map Reference		Ordnance Survey
HY 44053282		-
Island	**Parish**	**RCAMS Inventory**
Rousay	Rousay	-
Category	**Landranger Sheet**	**Orkney Heritage Society**
Gamma	5,6	-
Excavations	**Plans**	**Visited**
-	1980: Fraser	7/6/80

CAIRN		PASSAGE		CHAMBER	
	Length		Length		Length
	Width		Width		Width
	Area		Area		Area
	Orientation		Orientation		Compartments
	Shape				Cells
					Orientation
					Shape

GEOLOGY		SOIL		LAND USE CAPABILITY	
Site	Sandstone	Site	Podzolic Com.	Site	Class 6
Water	13	Water	13	Water	13
Sandstone	82	Podzols	0	Class 3	2
Peat	0	Podzolic Com.	73	Class 4	23
Boulder Clay	5	Gleys	12	Class 5	26
Miscellaneous	0	Gleyic Com.	0	Class 6	36
		Peat	2	Class 7	0
		Miscellaneous	0	Miscellaneous	0

Visibility	Altitude	Topography
D 101-200 I 200-295 R 295-101	Site 86 High 106 Low 0	Terrace edge
		Vegetation Heathland
	Coast Nature Cliff Distance 580	**Intervisibility** ORK T3
	Approaches Easy	
	Drainage Good	

FARACLETT HEAD NORTH-EAST ORK T19

On the southern slopes of the hill of Faraclett Head, in north-east Rousay, the site can be reached across fields and rough ground to the north of Bigland farm-house. It is two terraces above and about 80 m to the north-east of Faraclett Head South-West (ORK T4).

There are no visible signs of a cairn associated with the structure. It is prominent because of nine earth-fast stones forming two parallel lines about 1.3 m apart although (since some of the stones are not upright) this distance is variable. Five stones are visible in the northern line, with the two eastern ones having tilted. There are four in the southern line with the two western ones tilted. One of the stones in this line is orientated at right angles to all the others. The west-most stone is the tallest in the entire group being 0.6 m high. Together the nine stones suggest a rectangular chamber with two or more divisions, and an entrance from either the east or west.

T19 FARACLETT HEAD NORTH-EAST

REDLAND SOUTH	ORK T20

Map Reference		Ordnance Survey
HY 37992486		-
Island	**Parish**	**RCAMS Inventory**
Mainland	Evie and Rendall	-
Category	**Landranger Sheet**	**Orkney Heritage Society**
Beta	6	-
Excavations	**Plans**	**Visited**
-	1980: Fraser and Morrison 1981: Henshall and Davidson	10/6/80 14/5/81 19/6/80 30/7/80 18/8/80

CAIRN		PASSAGE		CHAMBER	
Length	27.4	Length		Length	20.0
Width	11.7	Width		Width	2.8
Area	249	Area		Area	52
Orientation	058-238	Orientation		Compartments	10
Shape	Oval			Cells	0
				Orientation	058-238
				Shape	Simple

GEOLOGY		SOIL		LAND USE CAPABILITY	
Site	Hummocky Moraine	Site	Podzolic Com.	Site	Class 4
Water	0	Water	0	Water	0
Sandstone	61	Podzols	28	Class 3	34
Peat	0	Podzolic Com	29	Class 4	35
Boulder Clay	26	Gleys	39	Class 5	25
Miscellaneous	13	Gleyic Com.	0	Class 6	6
		Peat	0	Class 7	0
		Miscellaneous	3	Miscellaneous	0

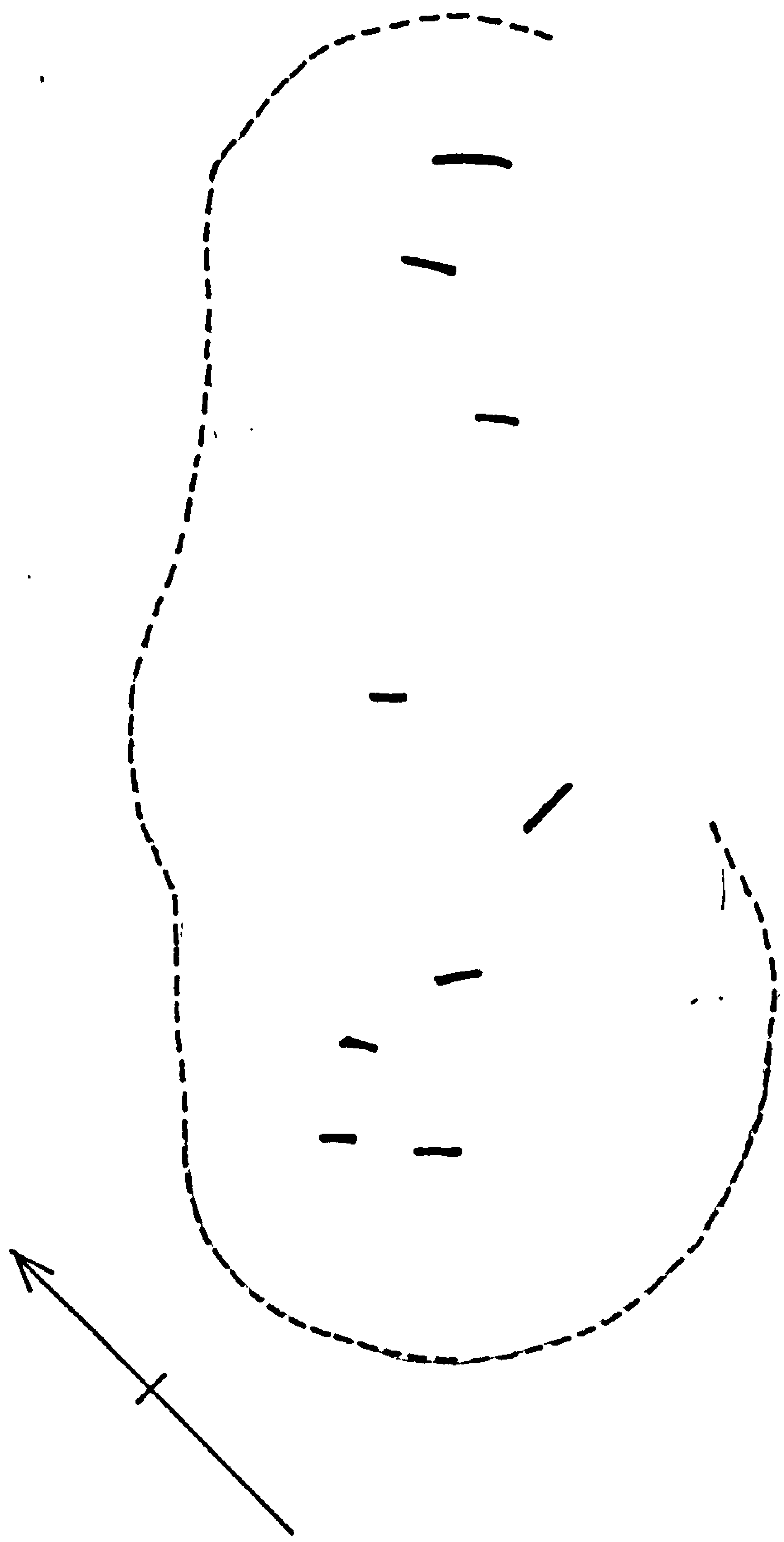
Visibility	Altitude	Topography
R 054-170 I 170-216 R 216-299 I 299-335 D 335-347 I 347-054	Site 30 High 95 Low 5	Valley bottom
		Vegetation Unimproved pasture
	Coast Nature: Cliff Distance: 1200	**Intervisibility** ORK 28 ORK 30 ORK 31 ORK 32 ORK 37 ORK 56 ORK 57
	Approaches Easy	
	Drainage Good	

REDLAND SOUTH ORK T20

To the north-east of the main road in the Redland district of the West Mainland, this site is situated in rough grazing to the immediate east of the track leading to the north-east opposite the new Evie school. It is in close proximity to Quoys (ORK 56) and Redland North (ORK 57).

At the junction of two fields, there is an area of disturbed ground of large stones underneath the turf, roughly oval-shaped with the long axis orientated north-east/south-west. The boundary of the area is indeterminate, especially at the north-east end. In the south-west, the mound is truncated by a fence and ditch bordering the track. A hollow running the length of the mound is apparent. A ridge paralleling the outer edge of the mound on the north-west side of this hollow is more pronounced than the corresponding ridge on the south-east side. The disturbed ground rises to a maximum of 1.2 m above the surrounding land.

Within the mound, several earth-fast stones protrude through the turf, and there are indications that probing would reveal the locations of more such stones. Of the eight stones visible, all but one are orientated perpendicularly to the main axis of the cairn. The tallest stone, 0.48 m high, and another form a pair suggestive of opposing orthostats in a compartmented chamber, and the other six stones and slabs are placed so as to support this interpretation. There were at least ten compartments, but there is no indication of a passage.



T20 REDLAND SOUTH

CUTTER'S TOOER	ORK T21

Map Reference	Ordnance Survey
HY 67252847	HY 62 NE 2

Island	Parish	RCAMS Inventory
Stronsay	Stronsay	-

Category	Landranger Sheet	Orkney Heritage Society
Gamma	5	-

Excavations	Plans	Visited
-	1980: Fraser	13/6/80

CAIRN		PASSAGE		CHAMBER	
Length	21.0	Length		Length	
Width	20.5	Width		Width	
Area	334	Area		Area	
Orientation	-	Orientation		Compartments	
Shape	Round			Cells	
				Orientation	
				Shape	

GEOLOGY		SOIL		LAND USE CAPABILITY	
Site	Sandstone	Site	Podzols	Site	Class 3
Water	84	Water	84	Water	84
Sandstone	16	Podzols	12	Class 3	11
Peat	0	Podzolic Com.	0	Class 4	4
Boulder Clay	0	Gleys	3	Class 5	0
Miscellaneous	0	Gleyic Com.	0	Class 6	1
		Peat	0	Class 7	0
		Miscellaneous	1	Miscellaneous	0

Visibility
I 159-315
D 315-159

Altitude

Site	5
High	11
Low	0

Topography
Coastal plain

Vegetation
Unimproved pasture

Coast

Nature	Low rock
Distance	80

Approaches
Easy

Drainage
Good

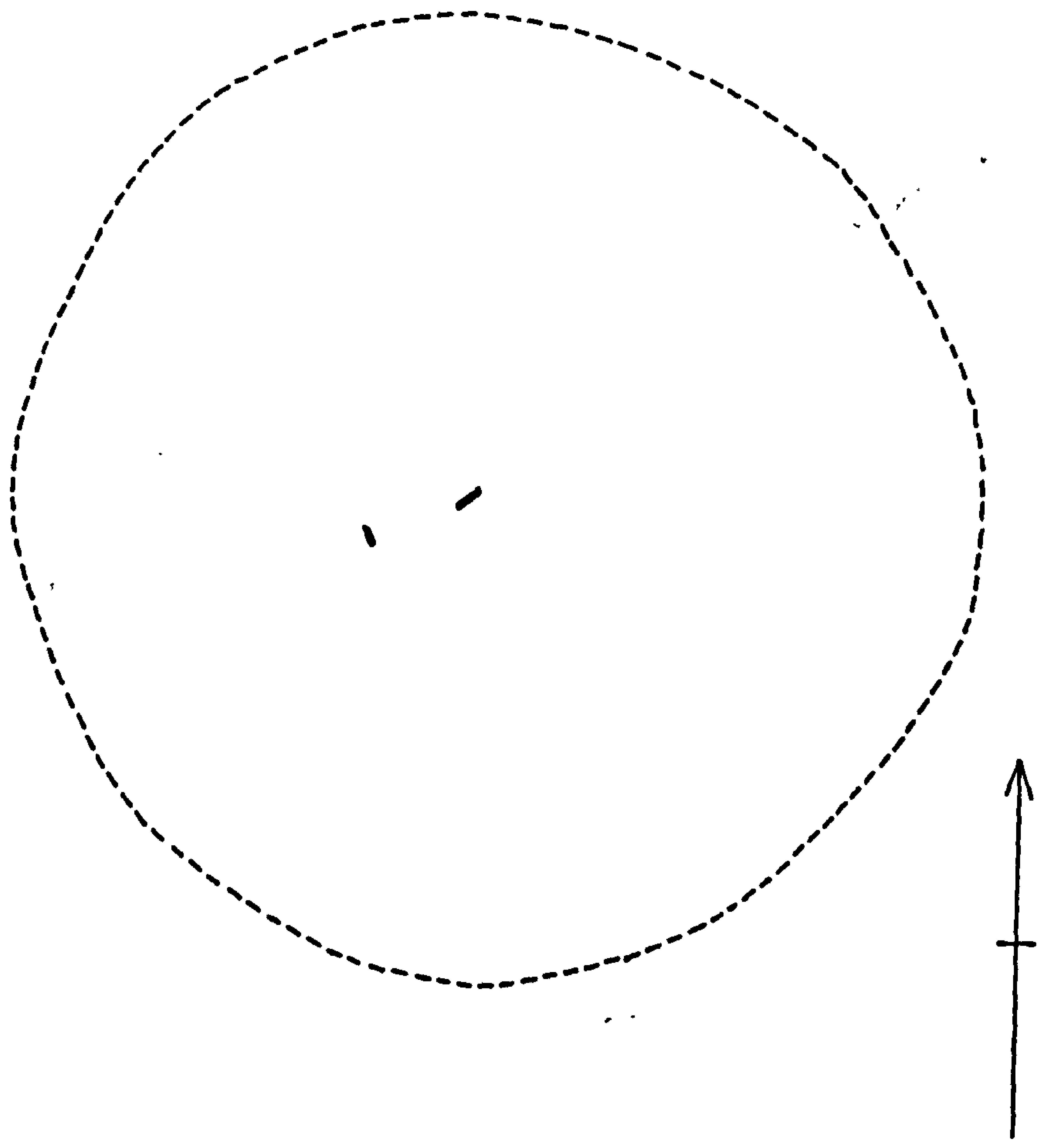
Intervisibility
ORK 14
ORK 20
ORK 38
ORK 44
ORK 50

CUTTER'S TOOER ORK T21

Situated in the centre of the headland of Grice Ness, in north-west Stronsay, Cutter's Tooer may be approached along the shore to the east of Whitehall village.

The cairn is large and circular. It is built of stone but has been much disturbed and now resembles a disc, with a pronounced edge and a central mound of irregular shape, giving rise to the Ordnance Survey's appellation of "bell cairn". The outer disc, perhaps the remains of an encircling platform, is nowhere more than 0.3 m high while the central mound reaches to about 1.0 m. There are no earth-fast stones which rise above the cairn material but recent activity by grazing cattle has revealed the tops of two cairn-fast slabs. They are situated towards the centre of the mound and at right angles to each other. A cavity 0.3 m deep is exposed beside one. If both stones belong to the same enclosed space, then that space is at least 2.6 m long.

POAS 5 (1927): 62
RCAMS 2: 330



T21 CUTTER'S TOOER

APPENDIX B

A LIST OF UNCERTAIN SITES

APPENDIX B

A LIST OF UNCERTAIN SITES

EXPLANATION

This appendix contains a list of sites visited during field-work in the summers of 1980 and 1981 which were not included in the analysis of chambered cairns. Selected from various sources of being worthy of visiting, they were rejected after examination for two groups of reasons. Volume 1: 82 more fully explains the distinction between category Delta sites (rejected for lack of positive evidence) and category Epsilon sites (rejected because of positive evidence that they belong to another class of archaeological monument).

These sites are listed here with two aims: firstly, to compile a gazeteer of sites (the category Delta sites) which may be admitted to the class of chambered cairns in the future; and secondly, to compile a list (the category Epsilon sites) which may be placed low on the list of priorities of future field-workers interested in chambered cairns.

Each entry in the list includes a name and island; a National Grid map reference; an Ordnance Survey index card reference; a Royal Commission Inventory number; a brief description of reasons for rejection; and details of any documentation recorded during the course of this survey and now deposited with the National Monuments Record in Edinburgh.

CATEGORY DELTA

1. AUGMUND HOWE — HY 67653754
   Sanday — HY 63 NE 3
   Inv 450

   A severely eroded large mound of carefully-laid stones.

2. BRODGAR FARM — HY 30301280
   Mainland — HY 31 SW 20
   Inv 878

   A ruined cairn or mound between Brogar and Stenness said to have produced an incised stone sinker and an ornamental stone ball.

3. CALF OF EDAY CENTRE — HY 58063885
   Calf of Eday — HY 53 NE 20
   Inv 248

   A small stony mound with a ruined structure including upright stones and dry stone walling.

4. DOOMY HILL — HY 557345
   Eday — HY 53 SE 4

   At least 13 stone slabs protruding through the vegetation in no identifiable pattern. Photographs in NMR.

5. FARACLETT HEAD THREE — c.HY 439328
   Rousay

   A small oval cairn with two earth-fast stones. Photographs in NMR.

6. GREENHOWE — ND 48799404
   South Ronaldsay — ND 49 SE 5
   Inv 825

   A mound, now completely ploughed away, from which four or five upright slabs were removed in c.1970.

7. HOWANA GRUNA — HY 33642632
   Mainland — HY 32 NW 9
   Inv. 275

   A large stony cairn in a conspicuous position. No structures are visible.

8. HOWE HARPER — HY 34551437
   Mainland — HY 31 SW 9
   Inv 333

   A conspicuous and well-formed large mound surrounded by a ditch. No internal structure is apparent.

9. KILI HOLM ONE HY 47573259
Kili Holm HY 43 SE 4A
A stony mound with a number of slabs protruding through the turf presenting no identifiable pattern. Plan and photographs in NMR.

10. KILI HOLM TWO HY 47633265
Kili Holm HY 43 SE 4B
A stony mound with a number of slabs protruding through the turf, both within and outwith the mound edge, but none forming a recognisable pattern. Plan and photographs in NMR.

11. KIRKHOUSE ND 47249084
South Ronaldsay ND 49 SE 16
A much-disturbed and vegetation-covered mound of indeterminate shape with a single upright stone.

12. KNOWE OF QUIAN BRUSSTI HY 25672249
Mainland HY 22 SE 53
Inv 748
Nothing is now visible of this site. It is reported to have consisted of a mound containing four circular cells connected by passages, neither cells nor passages conforming to those found in chambered cairns.

13. PICKAQUOY (ORK 40) HY 44061116
Mainland HY 41 SW 13
Inv 419
Recorded by the Royal Commission and by Renfrew (1979) as a burnt mound, but by Henshall (1963) as a chambered cairn, this is an amorphous mound with traces of burnt stone and reports of two stone structures.

14. RESTING HILL HY 56123684
Eday HY 53 NE 17
Inv 243
A stony mound with a historical report of an interior accessible through an entrance passage.

15. SKETHAQUOY HY 41734850
Westray HY 44 NW 25
Inv 1041/1075
A circular artificial mound of stone with two upright slabs near its centre.

16. STANDING STONES HOTEL — HY 30241165
Mainland — HY 31 SW 24
Inv 894
A large mound, the size suggesting to the Commission that it is chambered.

17. STEBB HILL — HY 66262332
Stronsay — HY 62 SE 10
Inv 967
A much ruined and now indeterminate mound with a historical report of a single corbelled chamber.

18. SWONA ONE — ND 39248511
Swona — ND 38 NE 2
A low indeterminate mound with several slabs protruding through the turf. Photographs in NMR.

19. SWONA TWO — ND 39388495
Swona — ND 38 SE 1
A low indeterminate mound with several slabs protruding through the turf.

20. SWONA THREE — ND 38278381
Swona — ND 38 SE 3A
A low indeterminate mound with several slabs protruding through the turf.

21. TOFT'S NESS — HY 76104683
Sanday — HY 74 NE 1
Inv 474
One of three large mounds containing indeterminate structures, part of an extensive complex of banks and mounds.

22. TRENABIE — HY 44325103
Westray — HY 45 SW 1
Inv 1038
Variously reported as "Brough", "Tumulus", "Standing Stone", and chambered cairn, this is the ruined remains of a stony mound with several protruding slabs.

23. WARD HOLM — HY 59570148
Ward Holm — HY 50 SE 4
Inv 668
A large cairn of stones in a conspicuous position.

24. WARD OF HOUSEBY — HY 67022115
Stronsay — HY 62 SE 12
Inv 969

A large grass-covered circular mound with midden material showing in an exposed section. The interior is said to contain a long low angled passage with branches on either side.

25. WHALE HEAD — HY 76264383
Sanday — HY 74 SE 9
Inv 477

A large rounded mound said to contain a chamber.

CATEGORY EPSILON

1. CLODDYHALL — ND 43498958
   South Ronaldsay — ND 48 NW 3
   Inv 823
   An amorphous area of disturbed ground adjacent to a standing stone. A cist is said to have been found in the area.

2. DWARFIE STONE (ORK 13) — HY 24300043
   Hoy — HY 20 SW 8
   Inv 385
   This site, with an extensive literature beginning in the seventeenth century, consists of a large rock with a rock-cut chamber which has been said to resemble the chambers of Neolithic tombs. It is unique in Scotland.

3. HANDEST — HY 30232074
   Mainland — HY 32 SW 6
   Inv 31
   A mound with an extensive stone structure consisting of a series of circular beehive cells. Finds included pottery, stone objects, and a cup-marked stone.

4. HESTA HEAD — ND 46548800
   South Ronaldsay — ND 48 NE 2
   Inv 826
   A circular area containing many stones, some of them earth-fast, including a circle of stones suggesting the kerb of a cairn.

5. HOLM OF FARA — HY 52723843
   Holm of Fara — HY 53 NW 4
   An extensive area of disturbed ground with many protruding slabs and wall-faces, suggesting two circular, or one figure-of-eight shaped, domestic settlements. Photographs in NMR.

6. HUNDA — ND 43409616
   Hunda — ND 49 NW 1
   Inv 863
   A circular ring-mound with internal features of stone, this site has the characteristics of a broch.

7. KNOWE OF BUCKQUOY — HY 24482820
Mainland — HY 22 NW 11
Inv 25

Once reported to be a long stalled cairn, this site has now been fully excavated to reveal farmsteads of Pictish and Viking age.

8. KNOWE OF MIDGARTH — HY 39812361
Mainland — HY 32 SE 6
Inv 272

A mound with two passages leading into a complex of corbelled chambers. Finds would suggest a later prehistoric domestic settlement.

9. KYELITTLE — ND 48519531
Burray — ND 49 NE 8

A grass-covered circular mound showing some of the features of a broch.

10. MUCKLE SKERRY NORTH-WEST — ND 46157835
Muckle Skerry — ND 47 NE 8A

A low stony mound with many slabs protruding through the vegetation, suggesting a later prehistoric domestic structure. Plan and photographs in NMR.

11. MUCKLE SKERRY SOUTH-EAST — ND 46287807
Muckle Skerry — ND 47 NE 10

A low stony figure-of-eight shaped mound with many protruding slabs and some visible walling, suggesting a later prehistoric domestic structure. Plan and photographs in NMR.

12. ORAM'S FANCY — HY 64502718
Stronsay — HY 62 NW 1
Inv 951

A long mound or mounds in which a number of cists and a quantity of funerary pottery have been found.

13. ROSSEL HOWE — HY 24842016
Mainland — HY 22 SW 5
Inv 773

A completely destroyed mound said to have contained a cist with human remains.

14. WESTNESS — HY 38402898
Rousay — HY 32 NE 16
Inv 581

An earth-and-stone mound containing an irregular sub-oval chamber of stone with a rectangular compartment and two recesses.

APPENDIX C

A LIST OF STANDING STONES

Site Number	Ordnance Survey Ref.	Island	Number of Stones	Map Reference	Name
1	ND 38 NW 2	Hoy	1	ND 30368938	
2	ND 38 NW 12	Hoy	1	ND 32568867	Heylack
3	ND 39 SE 1	Switha	1	ND 36279090	
4	ND 39 SE 2	Switha	1	ND 36449095	
5	ND 48 NW 1	South Ronaldsay	1	ND 43538957	
6	ND 48 NE 1	South Ronaldsay	1	ND 46558900	
7	ND 48 SW 6	South Ronaldsay	1	ND 44008428	Ladykirk Stone
8	ND 49 SE 3	South Ronaldsay	1	ND 46919140	
9	HY 20 NW 2	Mainland	1	HY 23140987	
10	HY 20 NW 4	Mainland	2	HY 23060927	
11	HY 20 NE 4	Mainland	1	HY 29350739	
12	HY 20 SW 3	Hoy	1	HY 24340220	
13	HY 21 NE 22	Mainland	1+	HY 264 154	
14	HY 21 SE 13	Mainland	3	HY 29631331	Comet Stone
15	HY 21 SE 25	Mainland	2	HY 271 116	
16	HY 22 NE 3	Mainland	1	HY 25322629	Wheebin
17	HY 22 NE 10	Mainland	1	HY 28052520	
18	HY 22 SW 6	Mainland	1	HY 24802161	
19	HY 22 SE 48	Mainland	1+	HY 25542442	
20	HY 30 SW 11	Mainland	1	HY 33470450	
21	HY 31 NW 6	Mainland	1	HY 32621620	
22	HY 31 NW 10	Mainland	1	HY 31941567	

Site Number	Ordnance Survey Ref.	Island	Number of Stones	Map Reference	Name
23	HY 31 SW 10	Mainland	2	HY 30341283	
24	HY 31 SW 11	Mainland	2	HY 30551264	Watch Stone
25	HY 31 SW 12	Mainland	1	HY 31271217	Barnhouse Stone
26	HY 31 SW 38	Mainland	1	HY 30241016	
27	HY 31 SW 40	Mainland	1	HY 30 12	Stone of Odin
28	HY 31 SW 41	Mainland	1	HY 30351136	Kethesgo Stone
29	HY 42 NW 7	Rousay	1	HY 40412750	Long Stone
30	HY 42 NW 28	Rousay	1	HY 418 289	
31	HY 43 SW 1	Rousay	1	HY 44713271	Yatenes Stone
32	HY 44 NW 5	Westray	1	HY 44454717	
33	HY 44 NW 8	Westray	1	HY 43 48	
34	HY 45 SE 24	Papa Westray	3	HY 49 50	
35	HY 50 SW 6	Mainland	1	HY 54130239	
36	HY 51 NW 1	Shapinsay	1	HY 52381686	Mor Stein
37	HY 52 NE 1	Eday	1	HY 56152923	
38	HY 53 NE 5	Eday	1	HY 56103775	
39	HY 53 NE 6	Eday	1	HY 56463717	Stone of Setter
40	HY 53 SE 2	Eday	1	HY 55663297	
41	HY 61 NE 4	Auskerry	1	HY 67241642	
42	HY 61 NE 5	Auskerry	1	HY 67081629	
43	HY 61 NE 7	Auskerry	1	HY 67691616	
44	HY 75 SE 6	North Ronaldsay	1	HY 75224292	

APPENDIX D

ON MEASUREMENT

APPENDIX D

ON MEASUREMENT

1. ACCURACY OF MEASUREMENT

There are many different levels of accuracy possible in the measurement of the linear data which plays such a major part in this thesis. In all cases, there is a fine dividing line between under-accuracy, where the full potential of the data is not realised, and over-accuracy, where spurious credibility may be given to measurements which are in reality not so assured.

Throughout, standard conventions have been used to indicate the level of accuracy at which measurements were recorded. These rely on the number of significant figures shown. Thus a measurement of 8 m has been taken to the nearest metre; a measurement of 8.7 m has been taken to the nearest decimetre; and a measurement of 8.76 m has been taken to the nearest centimetre. It is thus possible to deduce from any given measurement the accuracy with which it was measured from the field, map, or plan.

2. CONVENTIONS IN HISTOGRAMS

Many of the illustrations in Volume 2 are histograms: bar-charts with heights proportional to the quantities they represent. Each bar is associated with a class of measurements commonly indicated by labelling of the horizontal axis at the intersections of bars. The convention adopted throughout

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is that the class is inclusive of the lower measurement, but exclusive of the higher measurement. Thus an axis labelled .... 4, 5, 6.... is divided in classes .... (4.0 - 4.9), (5.0 - 5.9)....

3. MEASUREMENT OF AREA

Monkhouse and Wilkinson (1971: 73-80)mention seven different methods of measuring areas. Each of these was considered and experiments were done on the type of material which was to be measured. In all cases, accuracy of measurement is dependent on the scale at which the measurement is made. The method finally chosen was the best compromise between fine measurement at the available scales, and the effort expended in making that measurement.

The method used throughout this thesis is simple to operate and requires no special equipment. It is a variant of the dot planimeter and works by overlaying the area or areas to be measured with a regular grid of dots spaced so that each dot is at the centre of an imaginary square of known area. The number of dots which fall within the area to be measured is then counted and taken as an approximation of the true area. The fineness of measurement is dependent on the density of the dot grid but experiments with grids of varying density showed that a coarse grid, in many cases, gave results which could not be distinguished (taking into account the ultimate purpose of the measurements) from grids of closely spaced dots.

Two types of areal measurement were made: of chambered cairns and of parts of chambered cairns; and of the land of Orkney and of parts of the land of Orkney. For the first type, a grid of dots one metre apart at a scale of 1:50, 1:100, 1:200, or 1:360 (according to the various scales of the plans from which measurements were taken) was used. For the second type, a grid of dots one kilometre apart at a scale of 1:50000 or 1:63360 was used. For convenience, the kilometre squares of the National Grid were employed and measurements taken directly from the published Ordnance Survey, Soil Survey, and Geological Survey maps.

APPENDIX E

DESCRIPTION OF INEXACT CLASSES

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DESCRIPTION OF INEXACT CLASSES

More often than not, the classes of objects encountered in archaeological research do not have explicit criteria of membership. For example, the class of "Grooved Ware pottery" clearly includes certain pots from Quanterness and Links of Noltland and clearly excludes the food-vessel from Knowe of Yarso. However, as is apparent from Chapter 8, there are many pieces of pottery which have an ambiguous status with respect to Grooved Ware. Such imprecisely defined terms (the phrase having no derogatory connotations) play an important part in human thinking, and, in this case, can lead to a greater understanding of twentieth century archaeologists and of third millennium Orcadians. In the real world of human decisions it is rare that any action has an unambiguous outcome: there are many shades of gray, but never pure black or white.

The concept of fuzziness, as first introduced by Zadeh (1965), is an attempt to deal with such problems where a source of imprecision is the lack of precisely defined criteria for membership of a particular class. Beyond a brief discussion by Orton (1980: 220-22), the concept has not yet been explicitly applied to archaeology despite a superficial compatibility between the two.

The measurement of inexact classes, used throughout Chapter 12, is a preliminary attempt to apply the theory of fuzzy sets to the data-base of archaeology. It is best explained in terms of a specific example.

Knowe of Craie (ORK 27) is located at the head of the Suso valley in north-east Rousay. The Soil Survey map shows that the soil immediately underlying the cairn is a Bilbster series podzol. Thus, in a conventional analysis of the location of chambered cairns according to soil type Knowe of Craie would be assigned to the class of cairns located on podzols. Expressed in a table, Knowe of Craie is 100% located on podzolic soils:

Podzols	100
Podzolic complexes	0
Gleys	0
Gleyic complexes	0
Peat	0
Miscellaneous	0

However, if the soil map is examined more closely, it is soon apparent that this table is an inadequate representation of the soils around Knowe of Craie. The boundary of the Bilbster podzol (as mapped) is less than a hundred metres distant to the north and to the west. Within a kilometre of Knowe of Craie there are extensive areas of peat and large areas of seven other soil series. Indeed, the patch of Bilbster podzol is not a major constituent of the pedological make-up of the Suso valley. Naturally, the purpose of the analysis must be kept in focus but since the aim of examining soil distributions in Chapter 12 is to discuss the chambered cairns of Orkney in their environmental setting, it is therefore realistic to consider the Knowe of Craie as being at the centre of a circle of radius one kilometre (the distance being chosen by experimental knowledge of the Orcadian landscape and being consistently adhered to for all 76 cairns) and to measure the area of each soil type within that circle. The table given above is transformed into a very different table:

Podzols	15
Podzolic complexes	21
Gleys	15
Gleyic complexes	10
Peat	39
Miscellaneous	0

This measurement by inexact classes may be conceptualised by considering the location of the Knowe of Craie as having a "podzol-ness" of 15%, a "peat-ness" of 39%, and so on, rather than the previous formulation which gave the location a "podzol-ness" of 100% and ignored its true complexity. Thus the act of locating the chambered cairn, which may have partly depended on the imprecise recognition by human beings of the nature of soils in the Suso valley (the Soil Survey map being another such imprecise recognition), is more closely approached through measurement by inexact classes.

Such a procedure has been carried out for geology, soil, and land use capability. The results for each of the 76 chambered cairns are tabulated in items 17, 18 and 19 of Appendix A.

APPENDIX F

THE CUTPOINT INDEX

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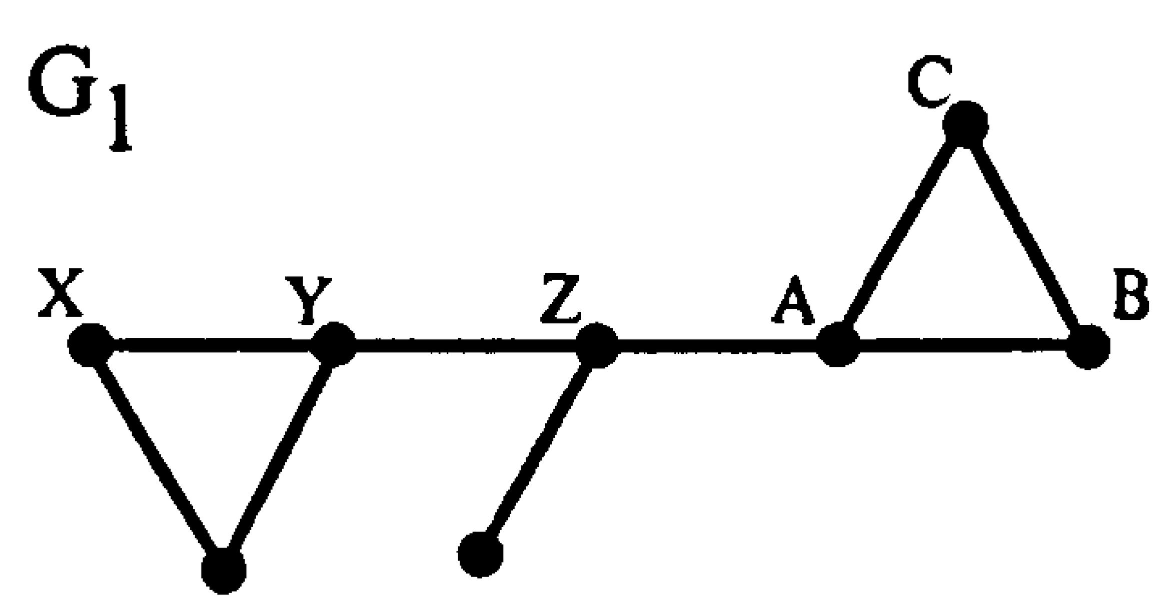
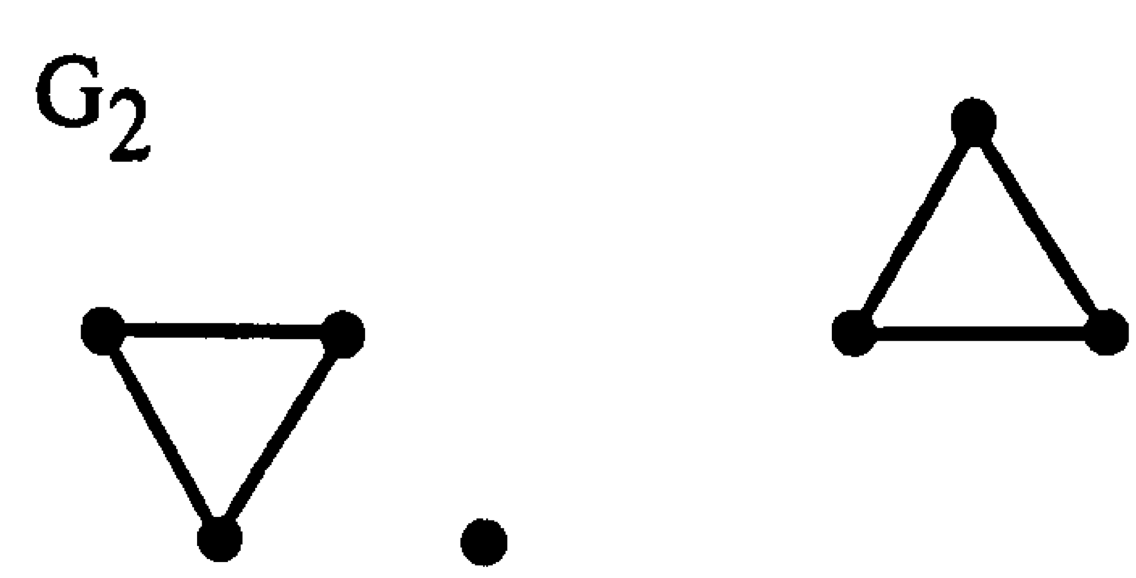
THE CUTPOINT INDEX

(This appendix is a shortened, and slightly adapted, version of Fraser (1980a)).

The mathematical theory of graphs, and its applied counterpart, network analysis, have many applications in geography and other disciplines. For instance, the beta index and the connectivity index are both measures of the degree to which the nodes of a network are directly connected to each other while the nodality of a point is a measure of its accessibility (Hammond and McCullagh, 1974). None of these indices is able to account for the part played by each point of a network in connecting together the network. That is, there is no measure of the degree of disruption to a network caused by the removal, in turn, of each of its constituent points. Here the concept of the 'cutpoint', as defined in elementary graph theory, is used to construct an index which adequately fulfils this task.





Only a few intuitive definitions in graph theory are needed here. (Those interested in more rigorous definitions are referred to Harary, 1969). A graph G is a structure composed of points which are joined by lines. G_1 is an example of a graph containing eight points and nine lines. A subgraph of G is a graph with all its points and lines contained in G. The triangle of lines containing points a, b, and c is a subgraph of G_1. A path is a sequence of lines beginning at one point and ending at another in which no point is visited more than once and no line is used more than once. One of the paths from point x to point z contains two lines and passes through point y. A graph is connected if there is a path between every pair of points. A graph consisting of a single point is also defined as connected. G_1 is connected while G_2 is not connected. A subgraph which is maximally connected is termed a component. Graph G_2 consists of three components - two triangles and a single point. A cutpoint of a graph is a point whose removal creates additional components which do not feature in the original graph. The cutpoint index of a point is the number of these components. A point which is not a cutpoint is defined as having a cutpoint index of one. A point which has no lines connecting it to other points is defined as having a cutpoint index of zero. Point z is a cutpoint of G_1 which transforms G_1 into G_2. The cutpoint index of z is therefore three. The cutpoint indices of points x and y in G_1 are respectively one and two.

It has been found easy to calculate, by hand, cutpoint indices for every point in graphs which contain up to about fifty points and one hundred lines. For graphs of higher order, an algorithm exists, in the form of a Fortran subroutine named SPANFO (Nijenhuis and Wilf, 1975: 102) for calculating the number of connected components of a graph. This programme can be simply modified to provide cutpoint indices for each point of the graph, since the cutpoint index of a point A is one more than the difference between the number of connected components in the original graph and the number of connected components in the graph formed by the removal of A from the original graph.